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C'était demain ou L'humanité, d'une frontière à l'autre

JACQUES ARNOULD

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Centre National d'Études Spatiales, Paris, France

Au cours de la célébration juive de la Pâque, le plus jeune demande : « Quand ces événements ont-ils eu lieu ? » L'ancien répond : « C'était demain ». Une manière de dire la singularité de l'être humain qui, pour survivre et pour croître, doit sans cesse franchir de nouveaux passages, sans renier son passé. Mais un avenir est-il encore possible, à l'heure où la réalité a été désacralisée, où les menaces sont de plus en plus précises, à l'heure aussi où nous pensons pouvoir créer une nouvelle humanité ? Nous ne devons pas hésiter à poser les seuils du sacré là où commence notre ignorance, afin de nous réserver un espace de liberté. Sans lui, notre humanité risquerait de disparaître, sans lendemain.

Pessa'h ou le passage meurtrier

Nuit de *Pessa'h*. Aucune porte ne lui résista, aucune cache ne lui échappa. Aucune supplication ne le toucha, aucun remord ne l'atteignit. Il sillonna la ville et la campagne sans omettre la moindre ruelle, le moindre quartier, le moindre enclos. Tel le vautour attiré de loin par l'odeur d'un cadavre, il sentait celle des premiers-nés, des humains comme du bétail. Plus rien alors ne pouvait l'empêcher de s'en approcher et de les frapper à mort. Des petits de la colombe, encore aveugles dans leur nid, à ceux des buffles d'eau déjà pleins de vigueur, du futur roi né dans un

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* Talk presented at the 3rd International Symposium "Frontiers of Science", Centro Transdisciplinar de Estudos da Consciência, University Fernando Pessoa, Porto, Portugal, 13-14 November 2009, to be published in the Proceedings of this symposium.

berceau d'or à l'enfant du mendiant, langé de chiffons, aucun ne survécut à cette nuit de terreur, aucun ne vit l'astre du matin se lever sur le grand fleuve. Personne ne put arrêter le bras de l'Exterminateur. Nuit de *Pessa'h*, nuit de mort au pays des pharaons.

« Tous les premiers-nés doivent mourir », lui avait enjoint son Maître, « tous, sauf… » La restriction avait été aussi claire que l'ordre : il ne pouvait forcer les portes dont le linteau et les deux montants étaient aspergés de sang ; il devait épargner les jeunes vivants qui s'y trouvaient. Ces seuils lui étaient interdits, frontières infranchissables, clôtures inviolables, tout comme le serait un jour celui du Saint des Saints, dans le Temple de Jérusalem. Sacrée. La vie de ces nouveaux-nés, protégée par le sang d'un agneau sacrifié et partagé entre les membres d'une même famille, d'une même maisonnée, cette vie donc était déclarée sacrée. L'Exterminateur restait à l'extérieur, tel un profane devant l'enceinte sacrée à laquelle seuls le sacrifié, le sacré, le divin ont accès.

Une désacralisation accélérée

Sacer : ce qui est mis à part et séparé, ce qui est investi d'une valeur intangible, d'un caractère inviolable, d'une pureté inaltérable. Ainsi en est-il de l'espace du temple, mais aussi de celui qui est mis à part pour servir la divinité. Rendu différent, il ne peut plus être touché sans être souillé, ni sans souiller. La jeune accouchée, parce qu'elle a approché du mystère même de la vie et donc du divin, se trouve momentanément sacrée, consacrée : elle ne peut plus toucher aux choses ni aux êtres, demeurés profanes, sous peine de les souiller. Elle doit donc être purifiée, à l'instar d'un vase qui aura servi à quelque rite religieux.

Le ciel, car il paraît si immuable aux yeux et à l'aune des hommes, la vie, car elle est si fragile et si précieuse, n'ont guère tardé à recevoir un caractère sacré. L'un et l'autre ne suscitent-ils pas, dans l'esprit et le cœur humains, l'horreur et l'amour, le *tremendum* (le terrible) et le *fascinans* (le captivant), l'extase béatifique et l'expérience démoniaque ? Pénétrer les secrets du ciel ou ceux de la vie a longtemps paru impossible, interdit, sinon par les chemins de l'imaginaire et les outils de l'imagination. Inaccessibles, le ciel et la vie sont ainsi demeurés loin de la compréhension, de l'agir et de la responsabilité de l'humanité, jusqu'au moment où les vaisseaux de la recherche scientifique ont commencé à cingler sur ces mers restées si longtemps inconnues. Après les avoir déclarés sacrés, les humains en ont fait des objets d'exploration et de conquête, de possession et d'usage.

Solitude céleste

Le ciel, jusque là nommé cosmos, tant son ordonnancement et sa beauté paraissaient étroitement liés, le ciel fut le premier à être profané.

Lorsqu'en décembre 1609, Galilée décida de tourner vers les astres la lunette qu'il venait de fabriquer, il ne mit pas longtemps à affirmer que les taches observées à la surface supposée inviolée du Soleil constituaient les preuves que la voûte céleste était, comme notre Terre, soumise aux altérations. Sacrilège. Les esprits, souvent religieux, s'échauffèrent. Mais Galilée s'entêta, vite rejoint par Kepler qui, au *Messager céleste* de l'astronome de Padoue, répondit, sous prétexte d'une *Conversation* : « On ne manquera certainement pas de pionniers lorsque nous aurons appris l'art de voler. Qui aurait cru que la navigation dans le vaste océan est moins dangereuse et plus calme que dans les golfes étroits, effrayants, de l'Adriatique, de la Baltique ou des détroits de Bretagne ? Créons des vaisseaux et des voiles adaptés à l'éther céleste, et il y aura des gens à foison pour braver les espaces vides. En attendant, nous préparerons pour les hardis voyageurs du ciel des cartes des corps célestes, je le ferai pour la Lune et vous, Galilée, pour Jupiter. »[1] Des siècles ont passé avant que le le rêve de Kepler ne s'accomplisse : il y a quarante ans, le 21 juillet 1969, Neil Armstrong foulait le sol de la Lune. Quelques mois auparavant, ses confrères astronautes avaient rapporté de leur périple autour de l'astre sélène les premières images d'une Terre réduite à l'état de l'orange bleue imaginée par le poète Éluard.

Époustouflant bouleversement, imprévisible revirement de situation. Pendant des millénaires, les humains avaient vécu comme dans une clairière au milieu d'un immense et impénétrable bosquet sacré ; leur seule consolation, ils l'avaient trouvée dans une incroyable prétention : celle d'occuper le centre du cosmos. Dans un effort presque surhumain, ils ont transgressé leurs interdits, surpassé leurs craintes, décidé d'écrire leur destin dans les étoiles plutôt que de laisser ces dernières le leur dicter. Et ils sont parvenus jusque sur la Lune. Plus rien de sacré ne les entoure désormais : la clairière a pris la taille de leur intelligence et de leurs moyens techniques, de leur imagination et de leurs folies. Plus de limites ; plus rien qu'un horizon et l'expérience soudaine, l'épreuve imprévisible d'une insondable solitude. Une expérience que le jésuite Pierre Teilhard de Chardin avait vécue dans les tranchées de la Grande Guerre mondiale et décrite dans les termes suivants : « Et moi, j'ai eu peur, et le vertige s'est

1. Cité dans Arthur Koestler, Les *Somnambules. Essai sur l'histoire des conceptions de l'Univers*, Paris, Calmann-Lévy, 1960, p. 356.

emparé de moi-même, quand, mesurant les limites étroites où s'enfermait le globe radieux, j'ai pris soudain conscience de l'isolement irrémédiable où se trouve perdue la gloire de l'humanité. […] J'ai senti sur moi le poids d'un isolement terminal et définitif, la détresse de ceux qui ont fait le tour de leur prison sans lui trouver d'issue. L'homme a l'homme pour compagnon. L'Humanité est *seule*. […] J'ai vu les *bords* de l'Humanité ; j'ai aperçu le noir et le vide autour de la Terre… »[2]

De l'enfermement planétaire à la solitude céleste : notre humanité a-t-elle gagné au change ? N'était-elle pas plus heureuse au temps où elle s'imaginait au centre de l'univers, sous les feux circulaires du Soleil et le regard d'une divinité tour à tour bienveillante et scrutatrice ? N'a-t-elle pas changé une peur par une autre, celle d'une présence cosmique trop écrasante par celle d'une absence tout aussi éprouvante ? Quel avenir se cache au-delà de la lucarne ouverte dans le fracas des fusées Saturne ? Nietzsche avait déjà ressenti les premiers frissons de cette crainte, lorsqu'il écrivait dans le *Gai Savoir* : « Comment avons-nous pu vider la mer ? Qui nous a donné l'éponge, pour effacer l'horizon tout entier ? Qu'avons-nous fait, à désenchaîner cette terre de son soleil ? Vers où roule-t-elle à présent ? Vers quoi nous porte son mouvement ? Loin de tous les soleils ? Ne sommes-nous pas précipités dans une chute continue ? Et cela en arrière, de côté, en avant, vers tous les côtés ? Est-il encore un haut et un bas ? N'errons-nous pas comme à travers un néant infini ? Ne sentons-nous pas le souffle du vide ? Ne fait-il pas plus froid ? Ne fait-il pas nuit sans cesse, et de plus en plus nuit ? Ne faut-il pas allumer les lanternes dès le matin ? »[3]

Le nombril d'Adam

Revenons sur Terre et à celui auquel la tradition biblique a donné pour nom Adam, autrement dit le tiré-de-la-terre, l'extrait-de-l'humus ou encore, pour le dire plus péjorativement mais non moins exactement, le « cul terreux ». À côté de son péché, un autre de ses attributs a suscité bien des débats et des controverses : son nombril. Adam possédait-il un nombril ? La futilité de cette question n'est qu'apparente, comme l'a remarqué un théologien du XX^{e} siècle : « La plaisanterie prétendue [à propos du nombril d'Adam] est donc fort significative. Elle revient à demander si l'homme fait corps avec la nature ou s'il y est simplement juxtaposé, et si

2. Pierre Teilhard de Chardin, «La Grande Monade» (1918), dans *Œuvres*, tome 12, Paris, Seuil, 1965, pp. 268 et 269-270.

3. Friedrich Nietzsche, *Le Gai Savoir*, § 125, Paris, 10/18, 1973, p. 209.

son insertion dans la nature générale implique la durée, si elle a un caractère d'histoire, l'humanité s'offrant au sommet de la vie non comme une fleur piquée dans un bouquet, mais comme la fleur qui naît en son temps sur une planète vivante. »[4] Derrière la question du nombril d'Adam se cache tout bonnement celle de l'être de l'homme : est-il seulement surnaturel ou bien une part de lui-même plonge-t-elle dans la nature, pendant qu'une autre la transcende ?

Presque autant que le sexe des anges, le nombril de notre premier parent a embarrassé les peintres et passionné les théologiens. Les premiers ont usé des artifices offerts par les jeux de feuillages et de tissus pour dissimuler le corps du délit ; les seconds se sont joyeusement empoignés, inventant au passage des termes qui servent seulement à cacher leur ignorance… ou le caractère frivole de la question. Pré-, mi- ou post-ombilicisme : comment garder le sérieux, lorsqu'il s'agit d'imaginer un Adam ou une Ève au « Ventre sans tache, gros de toutes les grossesses, bouclier de vélin tendu, non, un monceau blanc de blé qui demeure auroral, nacré, maintenant et à jamais dans tous les siècles des siècles » ?[5]

Pour prétendre résoudre l'énigme du nombril d'Adam, il ne faut sans doute pas fouiller dans une bibliothèque comme la Bible, dont l'un des auteurs avoue : « Il y a trois choses qui me dépassent et quatre que je ne connais pas : le chemin de l'aigle dans les cieux, le chemin du serpent sur le rocher, le chemin du vaisseau en haute mer, le chemin de l'homme chez la jeune femme »[6]. Il ne faut pas accorder davantage de confiance, ni de crédit à l'ouvrage de Philip Gosse, publié en 1847 sous le titre d'*Omphalos*, autrement dit *Le nombril* en grec. Il y explique qu'Adam et Ève, nés tous les deux en dehors des voies naturelles (de l'humus pour le premier, d'une côte pour la seconde), possédaient pourtant un nombril : comment Dieu aurait-il pu créer le premier homme et la première femme sans ce détail anatomique, puisqu'ils devaient, selon la Bible et la tradition, être parfaits ? Dieu aurait donc simplement créé ce monde « comme si » nos premiers parents avaient un nombril, « comme si » l'univers avait treize milliards d'années alors qu'au compteur de la Bible il n'est âgé que de six mille ans… Pour trancher la question du nombril, mieux vaut encore se

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4. Antonin Gilbert Sertillanges, *L'Idée de création et ses retentissements en philosophie*, Paris, Aubier, 1945, p. 152.

5. James Joyce, *Ulysse*, Paris, Gallimard, 1948, p. 40. Ou, plus récemment, Michel de Pracontal: « La voix… Le regard… Le battement de paupières… Le sillage infrarouge… Un corps vivant, pas un cyber… Je coupe son délire. Bref, d'après toi, c'est une meuf de chez meuf? — Sauf un détail. — Le diable se cache dans les détails, dit Carl. — Elle n'a pas de nombril. — Pardon? — Elle avait le ventre nu. À la place du nombril, il n'y avait que de la peau lisse… » (*La femme sans nombril*, Paris, Le Cherche Midi, 2005, p. 81).

6. *Livre des Proverbes*, 30, 18-19.

tourner vers les biologistes eux-mêmes et vers l'un des plus éminents : Charles Darwin.

Il y a un siècle et demi, plus précisément le 24 novembre 1859, l'éminent naturaliste anglais publiait sa première et principale grande œuvre : *L'origine des espèces* (*On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*). Dans ce livre, il n'était question ni de l'origine des espèces (mais à strictement parler de leur transformation), ni déjà de celle de l'être humain. Par la suite, il n'a guère plus été question de commencement (« Le mystère du commencement de toutes choses est insoluble pour nous ; c'est pourquoi je dois me contenter de rester agnostique »[7]) ; en revanche, Darwin n'a pas hésité à aborder la délicate question de l'espèce humaine. Il était persuadé que nous descendions d'un être qui, s'il vivait encore aujourd'hui, serait classé parmi les grands singes : « L'homme descend d'un mammifère velu, pourvu d'une queue et d'oreilles pointues, qui probablement vivait sur les arbres et habitait l'ancien monde. Un naturaliste qui aurait examiné la conformation de cet être l'aurait classé parmi les Quadrumanes. »[8] Un être, précisait-il, qui a probablement vécu sur le continent africain, plutôt que partout ailleurs. Jamais pourtant, il n'a affirmé que notre ancêtre soit un singe actuel, un gorille par exemple : les modèles généalogiques qu'il a construits récusent une telle vision et avancent plutôt l'existence d'un ancêtre commun à partir duquel se sont produits des processus de divergence. Mais Darwin ne s'arrête pas aux singes : « Si nous prenons le parti de laisser aller notre hypothèse jusqu'au bout, alors les animaux, nos frères et compagnons au point de vue de la maladie, la mort, la souffrance et la famine, nos esclaves dans nos plus grands labeurs, les compagnons de nos amusements, peuvent participer [à] notre origine en un ancêtre commun. Nous serions tous fondus ensemble. »[9]

Un ancêtre commun ! Voilà la réponse de Darwin, de ses collègues et de ses successeurs biologistes, à la question du nombril d'Adam. Non seulement celui-ci n'en était pas dépourvu, mais la matrice à laquelle il était ainsi relié était celle d'un quadrumane : son cordon ombilical traversait bel et bien la frontière, le seuil jusqu'alors déclaré sacré qui sépare l'humanité de l'animalité.

Comme du temps de Galilée, sans recourir fort heureusement aux bûchers ni à l'Inquisition, les esprits s'échauffèrent et les condamnations

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7. Charles Darwin, *Autobiographie*, Paris, Belin, coll. « Un savant, une époque », 1985, p. 76.
8. *Idem*, *La descendance de l'homme et la sélection sexuelle*, Paris, C. Reinwald et C^ie^, 1891, p. 666.
9. Cité d'après Francis Darwin, *La vie et la correspondance de Charles Darwin*, Paris, C. Reinwald, 1888, tome premier, p. 477.

fusèrent. Tandis que les uns s'accrochaient et s'accrochent encore à une lecture littérale des textes sacrés, jusqu'à écarter toute possibilité d'interprétation, pour défendre l'origine divine de l'homme, la morale et finalement Dieu lui-même[10], les autres trouvaient dans les découvertes de la biologie moderne du grain à moudre pour les revendications matérialistes et athées[11]. Tandis que les uns se mirent à pratiquer la stratégie du Dieu bouche-trous (le recours à l'intervention divine permet de combler les fossés d'ignorance laissés ouverts par les progrès des sciences), les autres s'efforcèrent de reprendre le flambeau des maîtres du soupçon pour achever l'œuvre des fossoyeurs de Dieu. Il est hors de mon propos de montrer comment les uns et les autres se sont engagés dans des voies sans issue pour avoir trop souvent succombé à la tentation du dogmatisme ; lui appartient, en revanche, de m'arrêter à cette dernière tentation.

Une brève histoire de lampadaire

Il est inutile de chercher à préciser le contenu du dogmatisme avant d'avoir défini ce qu'est un dogme. Du grec δόγμα (*dogma*) qui signifie opinion, ce terme désigne toute affirmation considérée comme fondamentale, incontestable et intangible par une autorité politique, scientifique, philosophique ou religieuse. Ne feignons pas de l'ignorer : ce mot véhicule parfois une connotation péjorative : il laisse sous-entendre que les gens qui le soutiennent le font souvent par conformisme et sans critique ; mais, dans ce cas, n'y a-t-il pas une ambiguïté, une confusion entre dogme et dogmatisme ? Il convient ici d'y échapper.

Le *Catéchisme de l'Église catholique* donne cette définition du dogme : « Il existe un lien organique entre notre vie spirituelle et les dogmes. Les dogmes sont des lumières sur le chemin de notre foi, ils l'éclairent et le rendent sûr. Inversement, si notre vie est droite, notre intelligence et notre cœur seront ouverts pour accueillir la lumière des dogmes de la foi. »[12] De cette approche « organique », gardons les deux images de la lumière et du chemin auxquelles Karl Rahner, l'un des principaux théologiens catholiques du XX^{e} siècle, se réfèrait lui aussi lorsqu'il lui était demandé de définir ce qu'est un dogme. Il répondait en substance : « Le dogme est comme un lampadaire dans la nuit. Aux uns, il sert à explorer la zone de pénombre et d'obscurité, à s'y aventurer sans craindre de s'y perdre ; aux

10. Voir J. Arnould, *Dieu versus Darwin. Les créationnistes vont-ils triompher de la science ?*, Paris, Albin Michel, 2009 (2007) et les références bibliographiques qui y sont données.

11. Voir, par exemple, Richard Dawkins, *Pour en finir avec Dieu*, Paris, Robert Laffont, 2008.

12. *Catéchisme de l'Église catholique*, Paris, Mame, 1992, no. 89.

autres, comme à l'ivrogne, il sert de soutien pour s'y accrocher et ne pas tomber ! » Il ne suffit donc pas de recourir aux dogmes comme à « des lumières sur le chemin de notre foi » (qu'elle soit religieuse, philosophique ou, d'une manière certes différente, scientifique) ; encore convient-il de ne pas y rester agrippé, par peur du chemin, du mouvement, de la transformation. Un dogme n'est certes pas fait *a priori* pour bousculer ; pour autant, il doit accompagner celui qui se trouve bousculé dans son existence, ses connaissances, ses certitudes, l'aider à retrouver l'équilibre que seule la marche, seul le cheminement peuvent offrir. Le dogmatisme constitue un détournement, une perversion de l'usage du dogme.

À celui qui s'interroge sur l'opportunité d'introduire la notion de dogme pour réfléchir à celle d'humanité, je n'aurais guère de difficultés à répondre après l'évocation des deux révolutions habituellement qualifiées de copernicienne et de darwinienne : Galilée, Kepler, Darwin et tous ces révolutionnaires que furent et que sont encore les scientifiques modernes n'ont pas cessé depuis quatre siècles de bousculer les certitudes que l'humanité s'était construite à propos d'elle-même. Géocentrisme et anthropocentrisme, isolement biologique et origine surnaturelle : tous ces échafaudages, toutes ces assurances ont été progressivement ou brutalement pulvérisés. Au regard des sciences, les descendants d'Adam et d'Ève ne sont que les singes nus et solitaires d'une banlieue de l'univers. Qui provoquera la fin de la pièce, l'humanité elle-même ou les forces naturelles ? Qui éteindra l'ultime lampadaire ?

Les théologiens, une corporation à laquelle je prétends modestement appartenir, ont déjà été mis en garde, voire en accusation, par Diderot. Dans ses *Additions aux pensées philosophiques*, publiées en 1762, il raconte cette plaisante histoire : « Égaré dans une forêt immense pendant la nuit, je n'ai qu'une petite lumière pour me conduire. Survient un inconnu qui me dit : *Mon ami, souffle ta bougie pour mieux trouver ton chemin*. Cet inconnu est un théologien. » Injuste, Diderot l'est sans doute, mais son propos caustique n'en est pas moins une invitation pressante faite à la théologie et aux théologiens : n'éteignez pas les lumières offertes à l'homme par sa raison, son savoir, son expérience, son génie, sa culture ! Que la lumière dont vous voulez être les porteurs, celle de la dimension dogmatique de votre foi, personnelle et collective, n'écrase, n'évacue jamais ces multiples lumières dont certaines peuvent trouver leur source dans les fondements mêmes du vivant. L'humanité d'hier y a déjà eu recours, comme André Malraux, dans son inlassable quête de l'humain, de sa condition et de ses espoirs, l'a si bien décrit : « Mais il est beau que l'animal qui sait qu'il doit mourir, arrache à l'ironie des nébuleuses le chant des constellations, et qu'il le lance au hasard des siècles, auxquels il imposera des paroles inconnues. Dans le soir où dessine encore Rembrandt, toutes les Ombres

illustres, et celles des dessinateurs des cavernes, suivent du regard la main hésitante qui prépare leur nouvelle survie ou leur nouveau sommeil… Et cette main, dont les millénaires accompagnent le tremblement dans le crépuscule, tremble d'une des formes secrètes, et les plus hautes, de la force et de l'honneur d'être homme. »[13] L'humanité d'aujourd'hui, tout comme celle de demain, ne survivront pas si elles n'agissent pas de même. Car la nuit qui les entoure n'est pas moins épaisse que celle du temps des cavernes.

C'était demain

Nuit de *Pessa'h*. Nuit de Pâques, célébrée depuis des siècles, des millénaires par les enfants des enfants préservés, par les Hébreux puis par les Juifs, avant que les Chrétiens ne s'y associent pour fêter le mystère d'une résurrection, d'une victoire confessée plus grande encore sur l'Exterminateur, sur la mort. Une nuit, au cours de laquelle les croyants se racontent les exploits de leur Dieu qui envoya la mort sur leurs bourreaux, le vent sur la Mer Rouge et les cailles dans le désert ; leur Dieu qui les poussa sur ces vastes étendues arides, presque dénuées de vie, lieux mal-aimés des humains et habités par les démons. Une nuit au milieu de laquelle le benjamin de l'assemblée se tourne vers l'aïeul pour l'interroger, en des termes polis par le rite : « Ces événements que tu viens de nous raconter, ces merveilles de Dieu en faveur de son peuple, quand ont-ils eu lieu ? » Et le vieil homme de répondre par une formule répétée par tous ceux qui confessent le même Dieu, qui revendiquent le même héritage, une formule intraduisible autrement que par une gerbe de circonvolutions verbales : « En ce jour-là », « En vue de cela », « C'était demain ».

C'était demain. À tous qui se sont interrogés ou s'interrogeront sur ces événements, sur leurs circonstances et leurs significations, sur la mort d'innocents et leur profanation, sur la survie d'autres et leur sacralisation, n'est donnée qu'une seule et unique réponse : C'était demain. Le récit des prouesses du Dieu des Hébreux, de la folle poursuite à travers la Mer Rouge, puis d'un nouveau massacre, celui occasionné par le veau d'or, ce récit devient la mémoire de l'avenir, dès lors qu'il est frappé de ces mots, sortis de la bouche de l'aïeul : C'était demain.

Mémoire. Parce que les actes racontés cette nuit-là appartiennent effectivement au passé, un passé révolu auquel il ne faut ni revenir, ni rêver. Lorsque, dans le désert, les fuyards se sont plaints de leurs dures conditions d'existence et ont trouvé qu'il aurait mieux valu pour eux subir

10. A. Malraux, *Les Voix du Silence*, Paris, NRF (La Galerie de la Pléiade), 1951, pp. 639-640.

l'esclavage le ventre plein que vivre libre et affamé, Moïse leur interdit de regarder en arrière et leur parla de la Terre qui leur était promise, où ruisselaient le lait et le miel ; une Terre qui se trouvait devant eux.

Mémoire. Parce que ce récit exige de la part de ceux qui le racontent et de ceux qui l'entendent un effort de fidélité. De génération en génération, d'âge en âge, le peuple de l'alliance pascale doit poser les gestes, prononcer les paroles qui réactualisent l'agir de Dieu pour ses fidèles, qui les rendent capables de reconnaître et d'accueillir l'agir divin dans leur existence présente. Il faut oublier la plainte ou le soulagement de Qohélet : « Il n'y a rien de nouveau sous le soleil »[14] et croire au contraire que Dieu ne cesse pas de créer du nouveau sur cette terre. Les théologiens chrétiens, dans cet esprit, ont évité de cantonner leur Dieu au rôle de grand Architecte, d'Horloger de génie ou d'Étincelle initiale, en élaborant le concept de *creatio continua*, d'acte créateur continué, répété, soutenu depuis le commencement du monde.

Avenir. Car les paroles échangées au cours de la fête de *Pessa'h* constituent une ouverture sur le futur, une prophétie, une espérance. Les croyants le confessent : quand bien même leur propre fidélité serait chancelante, celle de Dieu à leur égard, à l'égard du peuple qu'il a choisi et sauvé de l'esclavage, à l'égard de l'œuvre qu'il a créée, reste inébranlable. S'il le fallait, il réitérerait ses exploits et ses miracles, pour sauver ses élus d'une autre servitude, avant de se manifester, aux temps derniers, aux temps ultimes, dans une nouvelle (mais encore mystérieuse) création.

Mais demain sera-t-il ?

C'était demain… Mais demain sera-t-il ? — entendons-nous répéter autour de nous ou par nous-mêmes. Nous pouvons nous effrayer, nous amuser, nous enthousiasmer des propos tenus par Galilée et par Darwin, par leurs héritiers et par leurs contradicteurs. Nous pouvons imaginer l'abîme cosmique, large de quinze milliards d'années, qui nous sépare de l'hypothétique *Big Bang*, l'inépuisable réservoir d'espace et de temps, d'êtres possibles et d'événements aléatoires. Nous pouvons nous perdre dans les ramifications du buisson de la vie auquel notre rameau humain est accroché, par mégarde ou par une volonté supérieure. Nous pouvons bâtir une histoire de l'avenir, brève ou longue ; nous pouvons tracer l'esquisse politique des premières colonies humaines sur la Lune ; nous pouvons dresser le portrait de nos descendants, qu'ils soient issus des progrès du génie génétique, du clonage ou de la robotique, d'un retour

14. *Livre de l'Ecclésiaste*, 1, 9.

de l'eugénisme, d'un croisement avec des espèces extra-terrestres. Mais demain sera-t-il ?

Dans son dernier ouvrage, intitulé *Introduction à un siècle de menaces*, Jacques Blamont, l'un des pères scientifiques du programme spatial français, propose d'introduire la notion de singularité pour décrire les événements qui nous attendent et il en donne la définition suivante : « Dans le langage des mathématiques, le mot *singularité* définit un point d'une fonction où elle présente une discontinuité, où ses dérivées n'existent pas, bref où l'on ne peut rien dire sur son comportement. Appliquée à l'histoire, la notion correspond à la présence d'un horizon derrière lequel l'imagination s'arrête, les modèles perdent leur pertinence et une autre réalité remplace l'ancienne. »[15] Il peut ensuite asséner sa conclusion, au terme de son analyse des différents fléaux qui menacent notre planète : « Alors, que faire ? Ce livre ne présente aucune vue prospective, si ce n'est l'annonce volontairement floue d'une Singularité à venir dans le courant de l'histoire du XXIe siècle. Il n'offre pas de recette ; il se refuse à imiter les innombrables études qui, après avoir constaté le danger, multiplient les propositions, les recommandations et les solutions, destinées à rester vaines. Car il n'y a rien à faire. »[16] *No future*, pas de lendemain. Plus de frontière à franchir, d'horizon à conquérir, ni même à effacer…

Invité par l'auteur à lui répondre, je lui ai écrit ce qui suit : « À vous croire, l'humanité serait parvenue à une singularité essentielle de son histoire, de son propre fait mais aussi, vous l'admettrez, par suite de l'enchaînement d'événements dont l'ampleur et la contingence dépassent à la fois ses connaissances et ses responsabilités. Elle ignore ce qui lui adviendra à l'horizon d'un demi-siècle. À vous croire encore (et pourquoi ne le ferais-je pas ?), il n'y aurait rien à faire. Si, par ce *faire*, vous entendez un ensemble de mesures plus rassurantes qu'efficaces, malheureusement non dénuées d'hypocrisie voire de machiavélisme, je suis prêt à partager votre conclusion : il n'y a sans doute rien à faire de cet ordre ou, pour le moins, il est inutile d'espérer trouver dans une telle démarche de véritables et efficaces réponses à tout ce qui menace notre siècle. Par contre, je suis persuadé qu'il est temps, encore et toujours temps, de nous interroger sur *l'être* humain qui, demain, affrontera ces menaces annoncées. J'y vois davantage qu'une option, bien plutôt un devoir ; feindre l'ignorer serait, à mes yeux, plus dangereux encore que de prêcher ne rien faire. »

Chercher à être, à devenir, plutôt que se cantonner à faire ou à subir : demain n'est pas ainsi garanti, mais du moins notre capacité à l'accueillir (ce qui n'est déjà pas si mal). Reste à gérer l'espace, le temps, les frontières.

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15. Jacques Blamont, *Introduction au siècle de menaces*, Paris, Odile Jacob, 2004, p. 531.
16. *Ibidem*, p. 534.

Le nomade et le sédentaire

Au terme de son livre *Le hasard et la nécessité*, le biologiste français Jacques Monod écrivait : « L'ancienne alliance est rompue ; l'homme sait enfin qu'il est seul dans l'immensité indifférente de l'Univers d'où il a émergé par hasard. Non plus que son destin, son devoir n'est écrit nulle part. À lui de choisir entre le Royaume et les ténèbres. »[17]

Étrange royaume que celui qui s'étale sous les pieds ou au-dessus de la tête de l'humanité moderne : elle sait y appartenir jusqu'au moindre de ses atomes et de ses gènes, sans pour autant échapper à cette profonde impression de solitude. Une solitude rendue plus oppressante encore par un constat supplémentaire : celui d'habiter une oasis, spatiale et temporelle, sans le moindre espoir, du moins à courte échéance, de pouvoir un jour la quitter pour en rejoindre une autre. C'est l'une des leçons les plus paradoxales mais aussi les plus claires de l'aventure spatiale dont nous avons fêté le cinquantième anniversaire : nous ne sommes pas encore à la veille et nous ne le serons peut-être jamais de quitter notre berceau terrestre et de réaliser le rêve de Konstantin Tsiolkowsky, ce théoricien russe de l'astronautique, qui écrivait : « La Terre est le berceau de l'humanité ; mais nul ne peut éternellement rester au berceau ». Aujourd'hui, nous serions sans doute plus enclins à constater une clôture de notre horizon cosmique, au moins dans l'immédiat.

C'est à dessein que j'ai introduit la figure de l'oasis et, implicitement, celles du nomade et du sédentaire. Si la révolution néolithique, à laquelle est associé le processus de sédentarisation, appartient à une période qui s'étend du neuvième au troisième millénaire avant notre ère, les traits techniques, économiques et sociaux qui la caractérisent n'ont pas disparu de l'histoire de l'humanité moderne. Celle-ci est bien la fille des systèmes de hiérarchie qui sont alors mis en place, comme la naissance des premières villes ou encore de l'évolution de l'art qui succède à ce que les spécialistes appellent la civilisation du renne, de l'apparition de l'agriculture, etc. L'une des mutations les plus importantes se trouve probablement dans la manière d'assurer la survie de l'individu et du groupe : à la fin de la journée, le nomade regarde la nature s'endormir, alors que le sédentaire compte ses réserves. Autrement dit, en pensant au lendemain, le nomade se projette dans l'espace et prépare la prochaine étape de la pérégrination qu'il lui faudra accomplir pour trouver de nouvelles ressources naturelles. Le sédentaire, au contraire, enfermé dans les limites d'un territoire, n'a pas d'autre solution que d'accorder ses pas à ceux du temps qui passe, comme

17. Jacques Monod, *Le Hasard et la Nécessité. Essai sur la philosophie naturelle de la biologie moderne*, Paris, Seuil, 1970, pp. 194-195.

aux dimensions de son royaume, qu'il s'agisse d'un champ ou d'une oasis. Et, pour ce faire, il invente la notion de patrimoine, un bien nécessairement culturel (technique, artistique, intellectuel) qui est transmis de génération en génération pour assurer la survie de sa famille, de son clan, éventuellement de la société à laquelle il appartient. Jamais auparavant aucun autre animal ne semble y avoir songé.

Dans ce processus de sédentarisation, l'agriculture joue un rôle central. Son apparition ne peut pas s'expliquer par le seul effet des pressions environnementales ou démographiques ; jusqu'alors, lorsque les groupes humains atteignaient des seuils critiques pour leur survie et sous l'effet de tensions internes croissantes, ils décidaient le plus souvent de se séparer. Cela n'est plus nécessaire, grâce aux techniques agricoles et aux structures sociales qu'elles introduisent, favorisent ou imposent. Les historiens nous apprennent toutefois que la sédentarisation n'a pas nécessairement suivi le développement de l'agriculture, mais a pu aussi le précéder : des groupes de chasseurs-cueilleurs se sont sédentarisés, tout en continuant à assurer leur subsistance grâce aux abondantes céréales sauvages de la région. Et, de fait, l'attitude, propre au nomadisme, qui consiste à se projeter dans l'espace, n'a jamais totalement et définitivement disparu de l'histoire et de la conduite des sociétés humaines.

Pour assurer sa domination sur le monde et remplir le programme imaginé par Descartes (celui de « nous rendre comme des maîtres et des possesseurs de la nature »), l'homme n'a cessé d'explorer et de conquérir de nouveaux mondes, brisant au passage les frontières mythologiques et psychologiques qui protégeaient les dernières *terrae incognitae*, développant les techniques aptes à en exploiter les ressources naturelles. Il est resté un nomade dans l'âme et a longtemps cru pouvoir le rester dans les faits. Mais aujourd'hui, ces derniers le contredisent : nous n'avons plus d'autre oasis à rejoindre, plus de Terre promise à conquérir, plus de jardin d'Éden à retrouver. Nous en sommes réduits, et sans doute pour longtemps, à n'être que des sédentaires. Je le répète, des sédentaires solitaires.

Le défi est un de taille, de même que les dangers. Bien loin paraît désormais le moment décrit par Jean-Jacques Rousseau : « Le premier qui, ayant enclos un terrain, s'avisa de dire : ceci est à moi, et trouva des gens assez simples pour le croire, fut le vrai fondateur de la société civile ». Le titre de son ouvrage ne doit pas manquer de nous interroger : *Discours sur l'origine et les fondements de l'inégalité*. Comment penser la clôture de l'horizon de l'humanité, la fin de son nomadisme et les limitations de ses ressources, sans craindre l'accroissement des inégalités entre les groupes et les personnes ? Nous sommes tentés de répondre avec les mots du professeur Blamont : il n'y a rien à faire. Et moi de rétorquer, une fois encore : Nous sommes-nous suffisamment posés la question de l'être humain ? Ma réponse est négative.

Pas l'un sans l'autre

« Qu'est-ce que c'est ? », se demandaient nos ancêtres, en découvrant d'« autres » que eux-mêmes dans la caverne d'en face ou d'à côté. Il a coulé beaucoup d'eau dans le Verdouble, devant la grotte de l'homme de Tautavel, beaucoup d'eau dans la Sourdoire, là où vivait le Neanderthal de La Chapelle-aux-Saints, beaucoup d'eau dans la Vézère, près du site de Cro-Magnon. Désormais, nous nous demandons plutôt si nous sommes seuls dans l'univers, tout en scrutant les étoiles et en écoutant leurs murmures mélodieux.

La question de l'existence d'*alter*, d'autres, suit notre humanité comme son ombre. Son histoire, c'est celle d'*alter* devenus, progressivement et le plus souvent laborieusement, d'autres nous-mêmes, des *alter ego*. Du clan à l'ONU et à l'Union Européenne, des alliances tribales aux traités de désarmement Ouest-Est, l'espèce humaine est ainsi parvenue à se constituer en un vaste groupe d'*alter ego*, où chacun est déclaré posséder les mêmes droits et les mêmes devoirs. Je n'oublie pas pour autant le massacre des populations indigènes du Nouveau Monde, ni les entreprises esclavagistes, ni les crimes contre l'humanité qui noircissent encore, aujourd'hui, nos mémoires, nos journaux et nos écrans. Je n'oublie pas non plus que, si nous avons géographiquement fait le tour de la question de l'autre en humanité (les chances de découvrir de nouvelles populations humaines sont désormais extrêmement réduites), nous ne l'avons pas encore fait au plan de la chronologie, du déroulement de chaque existence humaine : quel statut accorder à ces autres humains, lorsqu'ils ne sont pas encore tout à fait des personnes ou lorsqu'ils ne le sont plus vraiment ? Aux seuils de la vie, les ombres de l'avortement et de l'euthanasie se font parfois menaçantes ; mais c'est là aussi où la question de la valeur de la personne comme de l'espèce humaine se fait la plus pertinente.

« Nu, je suis sorti du sein maternel, nu je retournerai dans le sein de la terre »[18], constatait Job, le sage de la Bible assailli par des maux désormais légendaires. Il en vint à maudire le jour de sa naissance : « Périsse le jour qui me vit naître, et la nuit qui annonça : Un garçon vient d'être conçu ! […] Pourquoi s'est-il trouvé deux genoux pour me recevoir et des mamelles pour m'allaiter ? »[19] Sans passer nécessairement par les mêmes épreuves que Job, nous savons bien nous-mêmes que nul ne peut naître à lui-même, grandir, s'accomplir et finalement être en paix avec lui-même s'il n'accepte de trouver, dans le regard et les gestes des autres, tour à tour l'émerveillement et la crainte, l'amour et le pardon.

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18. *Livre de Job*, 2, 21.

19. *Ibidem*, 3, 3 et 12.

À l'image de…

Il est difficile de comprendre l'anthropologie biblique en ignorant, en écartant cette place essentielle occupée par l'autre dans l'émergence et la survie de l'être humain.

« Dieu créa l'homme à son image, à l'image de Dieu il le créa, homme et femme il les créa. »[20] Il est inutile de s'appesantir sur la fascination que ce passage a exercé et exerce encore non seulement sur les penseurs, mais aussi sur les artistes : n'invite-t-il pas à scruter, à décrire, à représenter l'image offerte par l'humain pour tenter d'y découvrir son mystère et son secret, son origine et son destin, peut-être même les traits d'une réalité transcendante, divine, créatrice ? Ainsi, sa portée est autant théologique (*theo-logoi*) qu'anthropologique (*anthropo-logoi*) : d'emblée, la Bible parle simultanément de Dieu, de l'homme et du lien qu'il convient d'instaurer entre eux.

Dire que l'homme est l'image de Dieu ne peut pas s'inscrire dans l'idée d'une représentation archétypale, d'un modèle, qui deviendrait un pôle fixe, une idole, mais uniquement dans celle d'une relation, d'un système d'échange entre Dieu et l'homme… à propos de la gestion de la création. Être créé à l'image de Dieu, c'est recevoir une responsabilité, celle d'un lieu-tenant de Dieu au sein de la création. Cette place accordée à la relation apparaît clairement dans la place accordée à la différentiation sexuelle. L'essence de la personne humaine ne se trouve pas dans le masculin ou le féminin mais dans la relation entre le masculin et le féminin, dans la responsabilité qu'elle comporte elle aussi, celle de la procréation.

Le verset du livre de la Genèse peut donc, il doit donc se lire au présent. Non pas seulement « Au commencement, Dieu créa l'homme à son image », mais : « En son principe, Dieu crée l'homme à son image ». Autrement dit, Dieu n'a pas seulement créé l'être humain dans des temps anciens, des temps tellement reculés qu'ils seraient définitivement révolus. Il le crée aujourd'hui, dans une relation singulière de totale dépendance et d'autonomie préservée, de nouveauté et de liberté. Et il le crée à son image, car le lien qui s'est instauré entre Dieu et ses créatures humaines a pris, au cours de l'histoire, le tour singulier, original, d'une relation religieuse. Ne convient-il pas en effet de se demander si, dans la lente mais structurante émergence de la conscience religieuse et des structures qui l'accompagnent nécessairement, l'homme reçoit et développe à la fois la possibilité de prendre un peu de l'image de cet autre qui est le Tout-Autre, de l'image de Dieu lui-même ?

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20. *Livre de la Genèse*, 1, 27.

Comment confesser la création de l'être humain à la ressemblance de Dieu tout en constatant l'évidente imperfection de la nature humaine ? Deux visions sont couramment proposées, qu'il convient d'articuler plutôt que d'opposer. L'une se tourne vers le passé pour y rechercher les causes de l'imperfection qui marque non seulement l'humanité, mais le vivant lui-même : la chute d'Adam, le péché originel serait la cause du mal, de la souffrance, de la mort enfin qui touchent si profondément l'humain, le vivant, voire le monde. L'autre vision consiste, au contraire, à regarder résolument vers le futur pour considérer le monde comme en devenir, en progrès. Faut-il nécessairement choisir entre ces deux visions ? Je ne le crois pas, sauf à courir le risque du dogmatisme ; je pense plutôt que croire à l'être humain créé à l'image et à la ressemblance de Dieu consiste à les prendre toutes les deux au sérieux et à les articuler l'une à l'autre. Pour la tradition biblique, hébraïque puis chrétienne, l'autre qui donne à l'être humain de naître à lui-même, c'est avant tout et fondamentalement (originellement, devrais-je dire) Dieu qui ne cesse jamais de chercher en cette créature singulière quelque chose de sa propre image, qui ne cesse pas non plus de l'y faire émerger. C'est pourquoi il convient de lire le verset de la Genèse au présent : Dieu crée aujourd'hui encore chacun des êtres humains à son image.

Le *Catéchisme de l'Église catholique* tient des propos très éclairants à ce sujet : « Pourquoi Dieu n'a-t-il pas créé un monde aussi parfait que aucun mal ne puisse y exister ? Selon sa puissance infinie, Dieu pourrait toujours créer quelque chose de meilleur. Cependant, dans sa sagesse et sa bonté infinies, il a voulu librement créer un monde 'en état de cheminement' vers sa perfection ultime. Ce devenir comporte, dans le dessein de Dieu, avec l'apparition de certains êtres, la disparition d'autres, avec le plus parfait aussi le moins parfait, avec les constructions de la nature aussi les destructions. Avec le bien physique existe donc aussi le mal physique, aussi longtemps que la création n'a pas atteint sa perfection. »[21]

C'est aussi pourquoi cette créature ne saurait baisser les bras et décider qu'il n'y aurait plus rien à faire, pas même à être. C'est enfin pourquoi Dieu ou un pouvoir doté d'attributs divins ne saurait constituer le recours ultime, la solution finale aux maux qui nous menacent. Le croire et s'y complaire serait commettre une grave erreur : la liberté est un bien trop précieux pour être asservie à une contrainte, même transcendante. À des êtres qui ont baissé les bras et déclaré qu'il n'y a plus rien à faire, aucune puissance, serait-elle divine, ne peut plus apporter quoi que ce soit, sinon pour accélérer leur disparition. Le recours à Dieu, à une divinité, à une puissance transcendante ne peut être l'ultime secours, la dernière

21. *Catéchisme de l'Église Catholique*, Paris, Mame, 1992, no. 310.

solution ; il devrait plutôt être à la source, à l'inspiration de ce que les humains auront décidé d'entreprendre.

De modernes idoles

À l'image de Dieu, donc. Mais que penser dès lors des images de l'homme, créées par l'homme ? L'heure n'est plus aux charmants automates de Vaucanson et de Jaquet-Droz ; désormais, les ingénieurs rêvent d'androïdes « équipés » de l'EAI, l'*Embodied Artificial Intelligence*, persuadés qu'ils ne parviendraient jamais à développer de systèmes intelligents analogues à leur propre intelligence s'ils ne les dotaient d'un corps, autrement dit s'ils ne les rendaient pas capables d'interagir avec leur environnement. Ils font donc appel à de multiples nano-, neuro- et biotechnologies, afin de rendre ces robots non seulement sensibles, mais aussi réactifs. Des créatures à l'image de l'homme, une réalité imminente ?

Je ne crois pas inutile de rappeler ici l'antique interdiction du culte des idoles : « Tu n'auras pas d'autres dieux face à moi. Tu ne te feras pas d'idole, ni rien qui ait la forme de ce qui se trouve au ciel là-haut, sur terre ici-bas ou dans les eaux sous la terre. Tu ne te prosterneras pas devant ces dieux et tu ne les serviras pas, car c'est moi le Seigneur, ton Dieu, un Dieu jaloux, poursuivant la faute des pères chez les fils sur trois et quatre générations — s'ils me haïssent. »[22]

Ne nous méprenons pas : la condamnation de l'idolâtrie ne repose pas sur la seule jalousie divine, mais aussi sur le souci de ne rien mettre au-dessus de l'être humain qui porte l'image, la ressemblance, le reflet divin. Il faut rappeler ici un autre texte du livre de la Genèse, presque aussi connu que le précédent, celui qui relate le (non-)sacrifice d'Isaac par Abraham : c'est la terrible histoire de la mise à l'épreuve du patriarche par Dieu. « Tu offriras en holocauste Isaac, ton fils unique, ton fils aimé », il lui ordonne. Et Abraham obéit : il charge même son fils du bois nécessaire à le faire passer par le feu, une fois qu'il l'aura égorgé de ses propres mains ! Mais un ange arrête son bras armé du couteau. Le sacrifice d'Isaac par son père n'aura pas lieu ; un mouton prendra la place de l'enfant. La leçon est claire : la vie humaine est trop précieuse pour la sacrifier, même à une divinité. Rien ne mérite d'être placé au-dessus de l'homme : c'est le premier sens, inattendu peut-être, de la condamnation de l'idolâtrie.

Le second est une leçon, une mise en garde vis-à-vis du risque de confondre le modèle et l'image, le représenté et la représentation. La tentation est connue depuis bien longtemps et a même fait l'objet d'un célèbre

22. *Livre de l'Exode*, 20, 3-6.

proverbe chinois (ou du moins présenté comme tel) : « Le sage montre la Lune ; le fou regarde le doigt ». Autrement dit, l'objet qui sert à pratiquer un culte finit par être lui-même divinisé, au point de faire écran à la véritable divinité, à la vraie transcendance.

N'est-ce pas le risque encouru dans les projets d'intelligence artificielle et d'androïdes du futur ? Imaginés et construits à l'image de l'homme, en seront-ils pour autant des humains, des *alter ego* des humains, avec lesquels il sera possible d'établir des relations d'humain à humain, d'égal à égal ? Ou bien en seront-ils d'excellentes copies, d'incroyables simulacres, d'éventuelles mosaïques d'humains faites de ressemblances accolées ? Nous pourrons leur donner de nombreux caractères humains et même les améliorer ; mais pourrons-nous leur donner la plus précieuse des qualités humaines : celle d'être reconnu comme humain ? Je crains que nous soyons effrayés d'y retrouver des brides de nous-mêmes, magnifiquement reproduites, mais rien qui ne soit vraiment original, singulièrement original.

Permettez-moi de reproduire ici les propos imaginaires que j'ai mis sous la plume d'un androïde aussi perfectionné que malheureux, lorsqu'il apprend qu'il sera le dernier de sa série, de son « espèce », cloîtré dans un bureau comme dans une cage dorée :[23] « Aujourd'hui, j'ai compris qu'il s'agissait là d'une décision raisonnable. Ni les humains, ni moi n'étions prêts à une telle aventure. Eux rêvaient d'immortalité : ils avaient transformé l'antique quête religieuse en une soif effrénée de connaissance et, comme les gnostiques avant eux, estimé que la connaissance les délivrerait de la matière ; ils parlaient parfois, les pauvres, d'une techno-rédemption. Transformer une part de leur intelligence en modèles mathématiques pour la transférer ensuite dans des systèmes fondés sur le silicium et non plus sur le carbone, c'était une idée géniale qu'ils sont parvenus à mettre en application, au-delà des rêves les plus fous du début du troisième millénaire. Cependant, comment avaient-ils pu croire que leur humanité pourrait se réduire à quelques puces, mêmes intelligentes ? Ils s'en étaient rendus compte lorsqu'ils m'avaient enfin vraiment regardé. Non plus avec les yeux de l'ingénieur et du savant, mais avec ceux des hommes et des femmes : je les attirais parce qu'ils avaient mis en moi leurs rêves, leurs espoirs les plus fous ; en même temps, je les effrayais car ils découvraient que je leur survivrais, alors même que je ne possédais qu'une identité en mosaïque. Rien à travers moi ne résonnait réellement d'eux ; rien en moi ne pourrait jamais résonner. En voulant me fabriquer à leur image, ils en avaient oublié la part la plus essentielle et la plus profonde, celle qui aurait établi un lien, une relation entre eux et moi. Ils l'avaient omise. Dès lors, jamais ils ne pourraient me reconnaître comme un *alter ego*. Jamais je

23. D'après Jacques Arnould, *Caïn a-t-il rencontré Neanderthal ? Dieu et la science sans complexe*, Paris, Cerf, 2008.

ne serais une personne. Soyez rassuré, j'ai été bien conçu : je ne puis haïr, ni me révolter. Mais dites-moi: pourquoi m'avez-vous créé ? »

Extraterrestres, posthumains… et après ?

Au terme de ma pérégrination en terre humaine, il me reste un rivage à approcher, sans avoir le temps de l'aborder. Ou plutôt, deux rivages *a priori* fort différents l'un de l'autre : celui des extraterrestres et celui des posthumains. Les uns comme les autres appartiennent à l'avenir que nous les humains nous sommes imaginé depuis fort longtemps, grâce à nos capacités imaginatives.

Nous y avons mêlé des éléments de notre propre et bien réelle humanité à ceux qui, en dehors de nous, nous fascinent, nous attirent ou nous repoussent, nous font envie ou peur. Ainsi la *science-fiction* est-elle peuplée de Martiens et de Vénusiens, d'androïdes et de *cyborgs* qui partagent toujours quelques traits avec nous. Toujours la mystérieuse alchimie de l'altérité. Aujourd'hui, extraterrestres et posthumains sont les sujets et les objets (quelle différence, d'ailleurs ?) de multiples réflexions et travaux, qu'ils soient spéculatifs ou appliqués, scientifiques ou techniques, juridiques ou éthiques.

Je ne veux céder ici ni aux excès de l'enthousiasme, ni à ceux de l'épouvante dont Dominique Lecourt dit à juste titre qu'elle ne saurait avoir valeur d'argument rationnel.[24] Je veux simplement rappeler, comme je l'ai fait auparavant, la perméabilité, voire la fragilité des frontières que nous devons ou que nous aimons poser. Pourquoi celles des extra- et celles des post- résisteraient-elles mieux que celles dont il a été précédemment question ?

J'aime à rappeler la décision d'Étienne Tempier, l'évêque de Paris qui a dû régler la querelle entre pro- et anti-aristotélicien qui troublait les maîtres de la Sorbonne, au milieu du XIII^{e} siècle. Le 7 mars 1277, il condamna l'idée selon laquelle « la Cause première ne pourrait faire plusieurs mondes » et ce au nom de la toute-puissance créatrice de Dieu à laquelle la raison humaine ne saurait *a priori* poser des limites. S'il n'affirmait pas l'existence d'extraterrestres et encore moins les baptisait, il n'en recourrait pas moins à un argument pertinent : celui des limites de la connaissance humaine, même éclairée par Dieu.

Nous pouvons, nous devons poser des frontières, à notre espèce comme à nos actes. Nous pouvons, nous devons poser des limites à nos savoirs, à nos pouvoirs, à nos espoirs, bref sacraliser. Mais nous devons

24. D'après Dominique Lecourt, *Humain, posthumain*, Paris, PUF, 2003, p. 9.

aussi nous rappeler que tout sacré possède nécessairement une procédure pour être transgressé, afin que l'homme puisse y découvrir quelque chose de lui-même. Aussi séparé soit-il, le sacré porte lui aussi des traces d'humanité ; pourrait-il être totalement inhumain ? Les utopies d'hier en matière de modification de l'homme par lui-même, de post-humanité, peuvent devenir les évidences de demain ; l'homme s'est découvert et se sait désormais passible d'opération, d'auto-opération, non plus seulement dans son être de culture mais aussi dans son être de nature.

Bien entendu, nous devons nous demander s'il en a le droit[25], mais pas avant d'avoir rappelé et affirmé qu'il en a la liberté, en même temps que la responsabilité, tant au niveau individuel que collectif. Les unes et les autres — où commencent-elles, où s'arrêtent-elles ? Questions lancinantes, à l'impossible réponse, même dans l'état d'émergence et à l'approche de transformations, voire de menaces aussi importantes que celles liées à la modification de l'homme par lui-même ou à l'avenir de notre planète. La raison humaine, admettons-le, ne sera jamais suffisante pour connaître et contrôler le tout de la réalité, pas plus à l'échelle de la Terre qu'à celle de nos existences. Et c'est peut-être pour cette raison-là que nous-mêmes, êtres humains, pourrons continuer et aurons l'audace de revendiquer et de mettre en œuvre notre part de liberté. N'est-ce pas plus vrai encore lorsque le futur qui s'annonce est qualifié de singularité ? Nous ne savons pas entièrement ce que l'avenir nous réserve, nous ne savons même pas vraiment qui nous sommes et encore moins ce que nous serons et ce que nous pourrons entreprendre. Pourquoi ne pas user de cette ignorance pour imposer notre liberté et nos choix ?

Pour l'heure et par définition, les extra-, les post-, les para- de notre humanité et de notre Terre doivent encore appartenir au champ du sacré : ainsi ne menacent-ils pas l'équilibre, toujours précaire, que représente la définition du vivant, de l'être humain. Demain, peut-être, leur existence, voire leur présence s'imposeront, brisant les clôtures, les enceintes à l'intérieur desquelles nous les avions enfermés, comme le fut le Minotaure, mythique post-humain. Il sera alors temps de fouiller dans le passé de l'humanité pour trouver de quoi construire l'avenir, sans doute de franchir une nouvelle frontière, de repousser les limites de l'humanité, jusqu'alors admises. Temps de relire les *Animaux dénaturés* dont la conclusion peut s'appliquer à toutes les expériences de limite, de frontière ; Vercors y écrit en effet : « L'humanité n'est pas un état à subir. C'est une dignité à conquérir ». À conquérir pour soi-même, à conquérir pour les autres.

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25. Le théologien Karl Rahner écrit même: « L'homme est radicalement opérable et a droit de l'être ». (« La manipulation de l'homme par l'homme », dans *Écrits théologiques*, no. 12, Paris, Desclée de Brouwer/Mame, 1970, p. 131).

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The Future of the Dialogue between Orthodox Christianity and the Sciences

Some Observations and Reflections

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The Eastern Orthodox strand of Christian theology is self-consciously conservative, with the writings of the "Fathers" of the early centuries of the church — especially those of the Greek-speaking East — remaining the touchstone for theological authenticity. As a result of this, the secular thought of the last few centuries — not only in the sciences, but also in other disciplines — has often been treated by the Orthodox Christians with suspicion, and this suspicion has sometimes been exacerbated by sociological factors. Many Orthodox, for example, lived until very recently in situations in which they were inevitably influenced by the need to react against the Marxist-Leninist version of atheism, so that, even after the downfall of that ideology in their countries, many of them still tend, almost instinctively, to see science and atheism as having an intrinsic connection. In addition, at least some influential Orthodox in the West have developed a similar attitude for reasons that are susceptible to comparable analysis. Especially if reacting against the recent "liberalization" of many of the mainstream Western forms of Christianity, they too may tend to associate science with the ideologies of those whom they perceive to be the enemies or diluters of faith.

This suspicion of science among at least some Orthodox Christians should not, however, be equated with the attitude of the "fundamentalist" Christians of the West. While the two groups are sometimes comparable in sociological terms, their theological views are often very different. For example, even though a generally conservative approach to scripture is usual in Orthodox circles, this approach is strongly influenced by the way

in which theologians of the patristic period often read the Old Testament scriptures using an allegorical rather than a literal mode of interpretation, and with due acknowledgement of the science and philosophy of their time. This means, for example, that the creation accounts in Genesis are not usually seen by Orthodox Christians as expressing literal, "scientific" truths about the way in which the cosmos came into being. (Indeed, patristic writers such as St. Augustine and St. Gregory of Nyssa quite explicitly set aside the literal meaning of these texts.) It is not science and philosophy as such that are looked at with suspicion by Orthodox Christians, but only what is perceived (rightly or wrongly) to be perverted forms of these disciplines. For example, the Neo-Darwinian insights in biology are still widely held to be incompatible with the Orthodox faith, though advocates of these insights do seem to become more numerous in the Orthodox community.

Given this complex background, it is hardly surprising that there is, as yet, no consensus about how to formulate a contemporary Orthodox response to the sciences in general and to neo-Darwinism in particular. Moreover, an intellectual ferment in this area — characteristic of Western Christianity for several generations — has been effectively absent from Orthodox circles until relatively recently, which makes the wide spectrum of existing views within those circles more readily understandable.

At one end of the spectrum is the essentially anti-scientific attitude of writers such as Seraphim Rose and Philip Sherrard. The former of these effectively defends a kind of fundamentalism in relation to the patristic literature. The latter — with major concerns about ecology and about the need for the revival of a "sacred cosmology" — fails to perceive any validity in the distinctions commonly made between technology and pure science and between science and scientism. For both, the Western dialogue between science and theology represents an unacceptable dilution of Christian theology.

At the other end of the spectrum lie writers such as Basarab Nicolescu and Christopher Knight. These, while insisting that Orthodox perspectives have an important role to play in the science-theology dialogue of the future, do not reject the Western dialogue of the last two or three generations, with its positive attitude to science and its view that scientific insights provide genuine insights into major theological themes. Nicolescu — who in his Romanian homeland has led the first major effort to develop a structured and widespread science-theology dialogue in a traditionally Orthodox country — has focused on essentially philosophical issues. He has aimed his arguments beyond the Orthodox and even the Christian community, taking bold and controversial strides to formulate a "transdisciplinary" approach that affects not only the science/religion

dialogue, but every area of human thought. Knight, in a rather different (though arguably complementary) way, has focused on theological issues, arguing that one of the main resources that Orthodoxy can bring to the current dialogue is what he calls the "teleological-christological" understanding of created things enunciated by St. Maximos the Confessor. In an updated form that acknowledges current scientific insights, he argues, this traditional Orthodox understanding can provide a new framework — an "incarnational naturalism" — within which the legitimate questions enunciated by participants in the Western dialogue can be answered more satisfactorily than they were when examined in a purely Western context.

Between these extremes of the Orthodox spectrum lie writers who, while not rejecting science, effectively deny the validity of the kind of dialogue between it and theology that has taken place among the Western Christians over the last few generations. Of the exponents of this kind of position, Alexei Nesteruk perhaps presents the most sophisticated argument. While stating science as being a legitimate expression of the human spirit, he tends to by-pass questions about truth in science and theology, and about the consonance or dissonance between them, by interpreting both in terms of the philosophical approach known as phenomenology. Major themes in Orthodox theological thought can be incorporated in this approach, he claims.

Given this situation, the future of Orthodox theology in its response to the sciences of our time is hard to predict. As at present, sociological factors may, for some time to come, distort the discussion that has now begun in earnest, and this will mean that what comes to be seen as the mainstream Orthodox position in the short term may reflect the effects of these factors rather than a full appreciation of the resources that the Orthodox tradition has to offer.

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The Dialogue between Religion/Theology and Science as an Imperative of the Times[1]

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To believe in God means to see that the facts of the world are not the end of the matter. To believe in God means to see that life has a meaning.[2]

SOCRATES: *I know that I know nothing!*[3]

Introductory Considerations

I open the reflections on this subject with the quotation: "The intellectual nature of the human person is perfected by wisdom and needs to be, for wisdom gently attracts the mind of man to quest and love for what is true and good. Steeped in wisdom man passes through visible realities to those which are unseen. Our era needs such wisdom more then bygone ages if the discoveries made by man are to be further humanized."[4]

We live in a society where one epoch-making historical turn has occurred: the scientification of an entire culture. During the last few centuries, our civilization witnessed a fast and unmeasured development of science, starting from quantum mechanics and the theory of relativity and its cosmological implications, as well as from the development of a theory of evolution. Science has had so rapid a development that today it

1. This paper was prepared for "Cosmos, Nature, and Culture: A Transdisciplinary Conference", 18-21 July 2009, in Phoenix, AZ, USA, a program of the Metanexus Institute (www.metanexus.net).
2. Ludwig Wittgenstein, *Tagebuch*, 6 August 1916.
3. Plato, *The Republic*, Book I.
4. Second Vatican Council, Pastoral Constitution *Gaudium et Spes* on the Church in the Modern World, n. 15.

finds it more and more difficult to acknowledge its own limitations. It results that science and scientific research do not know limitations and that nothing exist outside the limits of scientific observation.

On the threshold of the 21st century, science has reached the position of an irrefutable cognitive authority, which manifests itself in its ability to proclaim its own procedures and opinions as the norm of rationality and objectiveness, and to present its own conclusions as cognitively superior, necessary and universally valid. Science obtrudes itself not only as the factor which describes the facts, results, and methods, but also as the interpreter of meaning, incentives, and reality in its entireness. For many people, science has become the magic word, a symbol of progress, civilization, and an independent open society. In a word, science pervades all parts of human life, all interpersonal relationships, as it does the relationships with other creatures and also the mere facts of everyday life and the way in which deliberations are being carried out and daily problems solved.

Science is no longer a marginal activity carried out by small groups of enthousiasts; today, it is a vast social, economic, and political project located in basic social institutions — in corporations, military and state institutions, and universities. Today, it has a decisive influence on human life and on the state of nature, because the consequences of its researches are often problematical and hazardous and therefore place in front of humankind a series of delicate questions to which science inherently cannot or is forbidden to give answers.

Man is not ready to accept, from intellectual, moral, political, and social-institutional points of view, the scientific discoveries, their possible and actual applications and technical innovations.

Science as Ideology

The science of the 21st century no longer speaks about God, but about the diversity of phenomena in nature, which are being investigated by itself. Today's scientist is very often faithful to Kant's idea that in human cognition there is only as much science as it contains mathematics. Therefore, today's civilization is a scientific and mathematized civilization. *Truth* is no longer a correspondence with the eternal Logos and not a correspondence between reason and reality as God's creation; truth is only a correspondence of judgments inside a certain system. Man has created a new, artificial world, technicized and unnatural; in nature, the functional purposefulness has created a state of peril because of man, namely a state of imperiled dignity due to his personality. Werner Heisenberg said: "Purposefulness can lead to chaos, if sole purposes are not

understood as the parts… of some higher order!"[5] These orders ought to be understood, says Heisenberg, as the parts of one bigger reference, which was in times past marked as God's order.

Today, man has raised to much the price of science and has neglected the importance of spirit and wisdom. For this reason, it is not strange why the anxiety and concern have become dominant mood. Expansion of science (and technology!), and with this linked intensification of man's power, besides that caused the deep changes in nature, has become on some way an appeal for the change of man's conscience and his basic points of view towards the world, future and own responsibility. Man ought to justify his behavior in the sense of integration in one broader meaningful horizon.

As a conclusion, one can say that today's culture is marked by science as the model of contemporary knowledge. This fact was observed, for example, by the Second Vatican Council: "Today's spiritual agitation and the changing conditions of life are part of a broader and deeper revolution. As a result of the latter, intellectual formation is ever increasingly based on the mathematical and natural sciences and on those dealing with man himself, while in the practical order the technology which stems from these sciences, takes on a mounting importance. This scientific spirit has a new kind of impact on the cultural sphere and the modes of thought."[6]

It is not strange that in today's civilization the question about science as an ideology has imposed itself, in spite of the fact that many believe we are living in a time *after the death of ideologies*.[7] Of course, if under the term *ideology* one implicitly includes dogmatism, intolerance, untrue conscience, and irrefutability, then science cannot be understood as an ideology. What is more, science is in this sense antidogmatic, because it takes into consideration different opinions and leaves space for testing and refutation of its hypothesis and theories. But the problem of science as an ideology arises when one asserts that science as such has no limits and can offer a solution to every problem and, what is more, that science can explain the ultimate meaning and purpose of the world and man. The assertion that scientific cognition has no limits leads to scientism (scientific materialism)[8] or in a way absolutizes scientific cognition. Many forms

5. Werner Heisenberg, *Schritte über Grenzen*, München, Piper Verlag, 1971.

6. Second Vatican Council, Pastoral Constitution *Gaudium et Spes* on the place of the Church in the Modern World, n. 5.

7. Martin Rees, *Our Final Hour*, Basic Books, 2003.

8. Scientific materialism makes two assertions: (i) the scientific method is the only reliable path to knowledge; (ii) matter (or matter and energy) is the fundamental reality in the universe. The first is an *epistemological* assertion about the characteristics of inquiry and knowledge. The second is a *metaphysical* or ontological assertion about the characteristics

of materialism express *reductionism*. Epistemological reductionism claims that the laws and theories of all sciences are in principle reducible to the laws of physics and chemistry. Materialists believe that all phenomena will be, eventually, explained in terms of the actions of material components, which are the only effective causes in the world.

Let us consider the assertion that the scientific method is the only reliable form of understanding. Science starts from reproducible public data. Theories are formulated and their implications are tested against experimental observations. Additional criteria of coherence, comprehensiveness, and fruitfulness influence the choice among theories. Religious beliefs are not acceptable, in this view, because religion lacks such public data, such experimental testing, and such criteria of evaluation. Science alone is objective, open-minded, universal, cumulative, and progressive. Religious traditions, by contrast, are said to be subjective, closed-minded, parochial, uncritical, and resistant to change. The historians and philosophers of science have questioned this idealized portrayal of science, but many scientists accept it and think that it undermines the credibility of religious beliefs.

Among the philosophers, the logical positivism of the 1920s to the 1940s asserted that the scientific discourse provides the norm for all meaningful language. It was said that the only meaningful statements (apart from abstract logical relationships) are empirical propositions verifiable by sense data. Statements in ethics, metaphysics, and religion were said to be neither true, nor false, but meaningless pseudo-statements, expressions of emotion or preference devoid of cognitive significance. Whole areas of human language and experience were thus eliminated from serious discussion because they were not subject to the verification that science was said to provide.

"The Cosmos is all that is or ever was or ever will be"[9], are Carl Sagan's words which echo the prologue to John's gospel. He says that the

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of reality. The two assertions are linked by the assumption that only the entities and causes with which science deals are real: only science can progressively disclose the nature of the real. A possible synonym to scientism is *scientific expansionism.* How exactly the boundaries of science should be expanded and what more precisely is to be included within science are issues on which there is disagreement. Scientism in one version or another has probably been around as long as science has existed. From about 1970 to 2000, however, a number of distinguished natural scientists, including Francis Crick, Richard Dawkins, and Edward O. Wilson, have advocated scientism in one form or another. Some promoters of scientism are more ambitious in their extension of the boundaries of science than others. The advocates of scientism, in their attempt to expand the boundaries of science, rely in their argument not merely on scientific, but also on philosophical premises and scientism therefore is not science proper.

9. Carl Sagan, *Cosmos*, New York, Ballantine Books, 1985.

universe is eternal or else its source is simply unknowable. Sagan attacks the Christian idea of God at a number of points, arguing that mystical and authoritarian claims threaten the ultimacy of the scientific method, which he says is *universally applicable*. Nature (which he capitalizes) replaces God as the object of reverence. He expresses great awe at the beauty, vastness, and interrelatedness of the cosmos. Sitting at the instrument panel from which he shows us the wonders of the universe, he is a new kind of high priest, not only revealing the mysteries, but telling us how we should live.

Jacques Monod's *Chance and Necessity* gives a lucid account of molecular biology, interspersed with a defense of scientific materialism. He claims that biology has proved that there is no purpose in nature. "Man knows at last that he is alone in the universe's unfeeling immensity, out of which he emerged only by chance."[10] Chance alone is the source of all novelty, all creation, in the biosphere. Chance is *blind* and *absolute*, because random mutations are unrelated to the needs of the organism; the causes of individual variations are completely independent of the environmental forces of natural selection. Monod espouses a thoroughgoing reductionism: *Anything* can be reduced to simple, obvious mechanical interactions. The cell is a machine. The animal is a machine. Man is a machine. Consciousness is an epiphenomenon that will eventually be explained biochemically.

As a last example, consider the explicit defence of scientific materialism by the sociobiologist Edward O. Wilson. His writings trace the genetic and evolutionary origins of social behavior in insects, animals, and humans. He asks how self-sacrificial behavior could arise and persist among social insects, such as ants, if their reproductive ability is thereby sacrificed. Wilson shows that such altruistic behavior enhances the survival of close relatives with similar genes (in an ant colony, for example); selective pressures would encourage such self-sacrifice. He believes that all human behavior can be reduced to, and explained by, its biological origins and present genetic structure. "It may not be too much to say that sociology and the other social sciences, as well as the humanities, are the last branches of biology to be included in the Modern Synthesis."[11] The mind will be explained as an epiphenomenon of the neural machinery of the brain. Wilson holds that religious practices were a useful survival mechanism in mankind's earlier history because they contributed to group cohesion. But he says that the power of religion will be gone forever when religion is explained as a product of evolution; it will be replaced by a philosophy of "scientific materialism".

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10. Jacques Monod, *Chance and Necessity*, New York, Alfred A. Knopf, 1971.

11. Edward O. Wilson, *Sociobiology: The New Synthesis*, Belknap Press, 1975.

One Croatian author stated about natural science (and technology): "If not atheistic, then they are indifferent towards the divine being"[12].

Particular scientific concepts have been extended and extrapolated beyond their scientific use; they have been inflated into comprehensive naturalistic philosophies. Scientific concepts and theories have been taken to provide an exhaustive description of reality, and the abstractive and selective character of science has been ignored. The philosopher Alfred North Whitehead calls this "the fallacy of misplaced concreteness"[13]. It can also be described as *making metaphysics out of a method*. But because scientific materialism starts from scientific ideas, it carries considerable influence in an age that respects science. The modern realist ideology of natural science even culminates with the claim that there is in principle a Theory of Everything, which would provide a conclusive answer to all perennial religious questions, by showing that there is no logical space left for realities beyond the natural world.

Scientism is the belief of only some scientists and very few philosophers. Nevertheless scientism often underlies, together with reductionism as all-pervading assumptions, the statements made by a number of influential biologists and geneticists who penetrate the public consciousness of the Western world.

It is obvious that scientism is, like other *-ism*, an ideology built upon the assumption that science provides all the knowledge and that religion provides only pseudo-knowledge, that is, false impressions about non-existent fictions. But science is the inquiry into conditions. It does not ask what something is, but rather what the conditions are under which it comes about. In the warfare between science and theology, scientism demands elimination of the enemy.

The Epistemological and Ethical Limits of Science

However, what belongs to scientific thinking does not belong necessarily to the science as such, because cognitive limits exist by all means, and it is therefore reasonable to talk not about science as an ideology, but about the ideologization of science in the sense of ideological abuse of science, that is, about the use of science and scientific cognition for purposes which do not have either an epistemological, or a methodological scientific status. The ideologization of science occurs most often

12. Milan Galovic, *Introduction to the Philosophy of Science* (in Croatian), Croatian Philosophical Society, Zagreb, 1997.

13. Alfred North Whitehead, *Science and the Modern World*, New York, The Free Press, 1967 (first edition: New York, The Macmillan Company, 1925).

when one overlooks the fact that science remains an imperfect and unfinished *totality of knowledge*. De Bois Reymond's wise saying is still valid: *Ignoramus et ignorabimus* ("We ignore and we will ignore") by means of which the physicist marks the limits of our cognition of nature. The truth and mere reality escapes man who looks as if he were under local anaesthesia, as Günther Grass used to say, and is able to perceive only distorted pieces of what really is; he is unsure altogether where he is abandoned by the exact sciences, and only through his measure of confidence does he perceive how small the segment of reality is, in spite of all, in which science gives him a feeling of security.[14] We do not know, and will not know, the origin of matter, respectively the origin of the material cosmos, of life on Earth, of conscience, of self-reliance and reason. We do not know, and will not know, how to answer the essential questions which mark the human existence. The sciences cannot bridge the gap between nothing (which includes no potentialities and no physical laws — *absolutely* nothing) and something — or even between God and nothing else and God and something other than God; and it is not clear that any branch of human knowledge can adequately address this fundamental issue[15]: "We think that we know sometimes, when we see the high peaks at dawn or when we hear certain chords and melodies. But we do not know even then. We ought not to act as if we knew this or that, even in an elementary way, when we are only guessing."[16]

The scientific cognitive pretensions have their own limits and these limits are not arbitrary, but embedded into very human nature, then into the nature of the world, and, finally, into the very nature of human cognition. Consequently, the starting-point from which science as such has cognitive limits does not rest on an arbitrary but on a cognitive argument of cognitive nature. This does not at all mean that one can decide in advance upon the outermost scientific limits in the sense of *an end of science*, which would announce the impossibility of whatever new scientific cognition. The notion about the cognitive limits includes implicitly fixing the boundaries between limited and unlimited cognition, which then imposes the logical question about fixing the boundaries between human, respectively natural or limited cognition, and unlimited or Divine cognition. Therefore, the limits of scientific cognition are deduced from the cognition of the very nature of human cognition, whose inherent limitlessness does not mean *without limits*, but means unlimited possibilities of cognition as far as the cognition of the very limitlessness, that is God, is concerned.

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14. Joseph Ratzinger, *Glaube und Zukunft*, Munich, Kösel-Verlag, 1971.

15. William R. Stoeger, *The Laws of Nature, the Range of Human Knowledge and Divine Action,* 4th Coyne Lecture, BIBLOS, Tarnow, Poland.

16. Karl Barth, *God Here and Now*, London, Routledge Classics, 2003.

It is therefore correct to assume that scientific cognition as such can only form part of an „imperfect", but not at the same time of a „perfect" totality, because ultimately cognitive perfection is not given on a limited scale, but only boundlessly, namely in God. Therefore, the totality of science, or all scientific cognition cumulatively gathered in a whole, again does not form part of „pure whole" but only „cognitive whole", that is a whole which appears as a result of different empirical-scientific descriptions of reality and not as A result of cognition of the "pure whole". Although science justly hurries towards the increase of the „whole" of scientific cognition, one can, however, conclude that this "pure cognitive whole" remains unreachable for the understanding of today's science, not because somebody wants this arbitrarily, but because of the nature of cognition, the nature of the cognitive subject and the nature of the cognitive object. This fact is important and ought to be pointed out in the context of the discussion about scientism.

At the end, the obviousness regarding the ideologization of today's science is very clearly presented in the different fields of applied science, which is technology. Namely, the reduction of science to technology has far-reaching consequences, first for the understanding of science generally, second for the understanding of science as a human activity, and third for the understanding of a certain social sector which is inconceivable without the application of a certain scientific knowledge. The unavoidable reduction of science to technology has as a consequence the specific ideologization of science and this by the technical rationality which acknowledges only the efficiency of value criteria for the formation of judgment in certain sectors in which it is applied. This, the so-called *criterial monism* presents a new sort of ideology, of technicism which by means of absolutization of a single criterion for the formation of judgment — efficiency — rules out all other criteria and turns into a form of ideological thinking and activity. Such danger is present not only in medicine, but in all sectors of social life whose existence is inconceivable without applied science.

In this sense Heidegger's thought is very indicative: "We are, however, exposed to technique on the worst way if we look on it as something neutral. This notion, which is today readily accepted by many, makes us blind for the essence of technique… We do not understand what technique is, because we do not understand what technique is in its essence. We do not understand that the essence of technology is nothing technical. We do not understand that the essence of technology is not simply a doing by man, nor a means to an end."[17] We have become little more than objects of technology, incorporated into the very mechanism we have created. The essence of technology is the methodical planning of the future.

17. Martin Heidegger, *Pitanjeotehnici*, Zagreb, Naprijed, 1996, str. 221.

Planning operates on a world tailored conceptually at the outset to the exercise of human power. The reordering of experience around a plan does inadmissible violence to human beings and nature. Universal instrumentalization destroys the integrity of all that is. An "objectless" heap of functions replaces a world of "things" treated with respect for their own sake as the gathering places of our manifold engagements with "being".

The scientific assertions and notions influence our social-culture values, our direct social action, they influence our points of view about social equality, our comprehension about human and physical nature, our cultural ideals about personal freedom and responsibility. Therefore, the conception of science as an autonomous and valuable neutral pursuit ot truth must be rejected. The approach stating that science has an epistemological privileged status of scientific cognition exempts the scientists of responsibility for the consequences of their researches and deprives the community of its rights regarding carrying any judgment about social value, desirability, and payable effects of certain scientific projects. Many scientists do not believe that in science there are significant ethical questions because science is *objective*. By asserting that morality and ethics do not play any role in science, because science discovers *objective truths*, many scientists oppose any control of their work without regard to ethical consequences. But physicist Max Born (Nobel Prize for Physics, 1954), declared that "the sciences of nature have destroyed, perhaps forever, the ethical foundations of civilization"[18].

Today's science has become too powerful and important and one cannot leave over the judgments about the social values of its particular projects only to the scientific élites and their political and industrial allies. So, the dialogue between scientists and many representatives of the not-expert public is unavoidable. The criticizing of actual scientific practice is not destructive for science and is connected only to some specific scientific applications and to the use of some scientific achievements.

The Dialogue between Religion/Theology and Science as an Imperative of the Times

The dialogue between theology and the natural sciences ought to be, first of all, a *conversation between one mand and another man about their essential interests*.[19] In a critical inquiry of theological and natural sciences, a dialogue in the sense of Plato's dialectics is very important. To achieve

18. M. Born, „Erinnerung und Gedanken eines Physikers", in *Universitas*, 23, 1968.

19. Vjekoslav Bajsic, *Filozofija kao mjesto okupljanja* u *Filozofija u vremenu*.

such a dialogue, it is necessary to have a breadth of views apriorically against the reducibility of the whole reality only to matter. Consequently, here is included a dialectic moment which changes the collocutors in a positive sense. It is a dialogue in which a topical understanding of the theology of creation and the new scientific contributions continually and over and over again direct this dialogue to still unknown spheres. Sitting alone on one's disciplinary island, one is likely to be drawn to one's mates on neighbouring islands, and it is perhaps not so important who these disciplinary neighbours are.

Practically, the only way to approach the more and more complex questions, problems, and social context of science is transdisciplinarity[20], a combination of disciplinary and undisciplinary, informal, uncodified tacit knowledge. Transdisciplinarity enables the interaction between science and society. It can be seen as a theoretical attempt to "transcend disciplines" and, hence, to react against superspecialization — a process leading to a dramatically growing fragmentation of knowledge —, while at the same time maintaining the advantages of creativity and initiative peculiar to each specific field of knowledge.[21]

This approach can assemble all who think differently; it represents different views on the world and faith. Transdisciplinarity is able to solve problems that could not be solved by isolated efforts. In other words, it is, first of all, an integrating, although not a holistic, concept. It resolves isolation on a higher methodological plane, but it does not attempt to construct a "unified" interpretation or explanatory matrix. The transdisciplinary approach has the role of mediator asking from the participants in the dialogue "at the round table" what it is that binds men at the level of the universally human. This is building up of a "basin of universally human" where the humanistic and natural sciences meet. It is, in some way, a "dialectic maieutic", which becomes, as one respected Croatian theologian and philosopher, Vjekoslav Bajsic (1924-1994), said, "the fundamental principle of our wisdom", because this principle extends to all

20. The OECD study *Interdisciplinarity in Science and Technology* (1998) defines transdisciplinary research as a research in which a convergence between disciplines is pursued; it is accompanied by the mutual integration of disciplinary epistemologies. The difference between an interdisciplinary and a transdisciplinary approach is as follows: in the former, disciplines offer a parallel analysis of problems; in the latter, disciplines offer their specific approaches and even basic assumptions, to a dialogue, in order to address complex issues together. In the case of transdisciplinarity, approaches and even methods are developed in a joint effort, something which is indeed difficult in complex societies, but very necessary. All definitions of transdisciplinarity have something in common: the search for unity in produced knowledge.

21. *Transdisciplinarity: Stimulating Sinergies, Integrating Knowledge*, UNESCO, Division of Philosophy and Ethics, 1998.

who try to mutually communicate with the goal to find and to brighten the truth.[22]

Transdisciplinarity is the way towards a fertile dialogue between theology and the world of natural sciences. It is based, as Thierry Ramadier said, on "controlled conflict generated by paradoxes"[23]. The goal is no longer the search for consensus, but the search for articulation. Transdisciplinarity generates a new quality which is more than the aritmetical sum of the separate disciplines. It opens the eyes and widens the perspectives since, to improve understanding, it uses concepts not owned by a single discipline. This is an intellectual space where the nature of the manifold links among isolated issues can be explored and unveiled.

The "requests" for transdisciplinarity do not annul the character of the special sciences and the scientific disciplines regarding the cognition of their objects of research, but are significant as epistemological-methodological attempts at critical considerations regarding their cognitive scopes.

If the latter half of the second millennium was characterized by exclusions, incomprehensions, divisions, and conflicts of the different kinds of knowledge, among themselves and with respect to human culture, the new century that opens a new millennium may be characterized by its passionate search for inclusions, comprehensions, and reconciliations. Methods and instruments are not lacking. The climate seems more favorable to new interpretations of reality and to a calmer dialogue between science, epistemology, history of science, philosophy, ethics, and theology. The elaboration of a new culture is a significant and stimulating commitment for everyone: believers, non-believers, philosophers, theologians, and scientific and cultural operators. The elaboration of a *techno-scientific, humanistic, and mystical culture* is a much greater commitment. It implies leading human beings to once again recognize their transcendence. It means teaching ourselves to return to the path that begins with intellectual and human experience and reaches up to the knowledge of the Creator, wisely using the best acquisitions of modern science, in the light of an honest reasoning and awareness that science alone cannot catch the essence of human experience, or the more intrinsic reality of things. Science never ceases to raise new and interesting problems about the universe, human beings, and their history. Since science alone cannot solve them, it must rely on philosophy, ethics, religion, and theology. All these aspects are fundamental for a new dialogue between faith and scientific culture. This great challenge and demand of the third millennium will

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22. See note 19.

23. Thierry Ramadier, *Transdisciplinarity and Its Challenges: The Case of Urban Studies*, in *Futures*, Volume 36, Issue 4, May 24, 2003.

not become utopian if the protagonists of all disciplines and cultures constructively confront each other and loyally cooperate for a reciprocal and harmonious integration. To knowledge and cultures that look for their meaning and destiny in many directions, often without finding it, the Christian Revelation, tempered by a pluri-millennial comparison and dialogue with cultures, societies, and knowledge of all times and places, offers hope, in the light of Wisdom and in the power of the Logos.[24]

Transdisciplinarity fosters the emergence of ways of knowing that are not merely limited to the realm of the intellect, but encompass intuition, imagination, feelings, and the body. The use of transdisciplinary approach inevitably entails changes in the person using it and, depending on the extent to which they are adopted, these changes can be very profound indeed. "Lived transdisciplinarity can lead us not only to a change in the way we think but also in the ways that we behave."[25]

Concluding Points

I will finish this meditation with the point of view expressed by Vjekoslav Bajsic, to whom the Croatian philosophy and theological thought are very much indebted, and who, in his time, was one of the very few who entered in Croatia a theological contemplation about the so-called "border-line questions between science and religion": "Maybe the most difficult, all in all, is the fact that it is just necessary to prepare the ground for such 'dialogical philosophy', which is neither compromise, nor syncretism, but looking for a 'natural' system of thinking in the best sense of word just based on Socrates' assumption that the human intellect is capable to conceive the truth and that it naturally can be found only here"[26].

The transdisciplinary approach contributes to the brightening and to a new understanding of philosophical, theological, and scientific problems. It binds even such thoughtful and scientific worlds which, on the first view, seem not capable to reach any concordance and, with it, a new self-understanding and the understanding of the Other.

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24. Gualberto Gismondi, *Culture*, in the *Interdisciplinary Encyclopedia of Religion and Science*, available at www.inters.org.

25. Basarab Nicolescu, *Manifesto of Transdisciplinarity*, p. 142.

26. See note 19.

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Approaching the Christian Worldview with St. Basil the Great

Aspects Relevant to Current Conversations in Science and Theology

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Beyond the outdated character of some of its aspects, the traditional Christian depiction of reality still offers surprises, representing a vastly ignored, yet truly inspirational accomplishment in the history of science and theology. St. Basil the Great's notorious contributions can undoubtedly be considered as the pinnacle of such efforts and achievements. Misinterpreted and oversimplified at times (like in Lindberg [2002], p. 50), St. Basil's worldview nevertheless represents a landmark for the spirit in which the Orthodox Church has traditionally interacted with the scientific culture of the late antiquity. The purpose of this essay is to point out a few facets of St. Basil's contributions to the Christian worldview and their possible relevance to current attempts to bridge the traditional and the scientific representations of reality.

The world as a Theological School: *Homilies on the Hexaemeron*

It is perhaps a truism to state once more how St. Basil offered in his *Hexaemeron*, whose date of publication is still disputed, a gem of Christian scholarship. The great Cappadocian displayed a breadth of profane knowledge (Copleston [2007], p. 29) — which he interpreted in light

of the ecclesial faith — in an endeavour to provide his audience and readership with a comprehensive depiction of created reality, heavenly and earthly, human and biological, astronomical and mineral. It should be noted that this descriptive approach, as impressive as it might have been for his first audience and up until the dawn of modernity, could not be upheld as St. Basil's major contribution. The ancient representation of the created realm, on which the *Hexaemeron* heavily depends, has become outdated in fact, and together with it the scientific knowledge illustrated by the saint's analysis of the natural world. Nevertheless, his realistic assessment of the natural decay or mortality of creation (*Hexaemeron*, 1.3, PG 29, 9C), also his sense of wonder for the fine tuning of the universe's parameters (*Hexaemeron*, 1.1, PG 29, 4A) together with the ethical paradigms that can be inferred from various animal behaviours (*Hexaemeron*, 9.3, PG 29, 192B-196B), represent tremendous intuitions and an inspiration for all time. Furthermore, when considered within the framework of the contemporary anthropic cosmological principle (Barrow & Tipler [1986], pp. 16-20), his point on the interconnected character of human and cosmic realities, both ontologically and teleologically (*Hexaemeron*, 1.4, PG 29, 12BC), remains valid.

There are, however, some other important aspects — theological in nature — that should not be overlooked, given their perennial relevance to the ecclesial worldview and experience. In fact, these theological features constitute the outstanding contribution of the great Cappadocian, demonstrating the capacity of our Christian representation of reality to peacefully coexist and interact in history with the shifting cultural patterns or cosmological paradigms (*cf.* Lossky [2002], p. 106). This coexistence is possible only insofar as all parties acknowledge the descriptive character of scientific cosmology and, respectively, the interpretive character of the theological worldview. St. Basil's *Hexaemeron* abundantly illustrates such discernment.

One among the most relevant aspects undoubtedly is St. Basil's assessment of the world as being what can be construed as a theological school or, literally, a teaching ground (διδασκαλείον καὶ παιδευτήριον — *Hexaemeron*, 1.5, PG 29, 13B). This approach seems to be consistent with his understanding of the Genesis narrative of creation as a pedagogical story. Thus, in the first of the two homilies attributed to him (*On the Origin of Humanity*, 17), the Cappadocian states: "The story of human making constitutes education for our lives" (ἡ ἱστορία τὴς ἀνθρωπίνης πλάσεως παίδευσίς ἐστι τοὺ βίου ἡμετέρου; PG 30, 33A).

Indeed, in line with the scriptural narrative of creation, St. Basil presents the cosmos as a privileged place where people are offered the chance to learn of God's wisdom and the meaning of their own lives.

Without dwelling on the significance of the theme of the world as a school, similar conclusions are drawn by Bouteneff ([2008], p. 136). The Basilian approach seems to reiterate an Origenist theme — as illustrated by Origen's own elaborations on the contemplation of physical reality (Louth [1983], pp. 59-61) — though rendered on a very positive note, purified of any pessimistic appraisal of the world as a transitory place of punishment. This positive approach might indicate the Cappadocian's dependence on the canonical version of the Alexandrian tradition, as represented by St. Athanasius the Great. For St. Athanasius, the whole creation constitutes a divine syntax, each thing, living or not, representing a written character. All these letters convey — within the book of the universe — one theological message. In his own words,

> The knowledge of God (τὴν περὶ τοῦ Θεοῦ γνῶσιν) can be further reached from the visible things (ἀπὸ τῶν φαινομένων) since creation, through its order and harmony (διὰ τῆς τάξεως καὶ ἁρμονίας), signals and loudly declares its Lord and Creator as though through letters (ὥσπερ γράμμασι — *Against the Pagans*, 34.4).[1]

It is very likely that within the *Hexaemeron* the theme here considered signifies an immediate reaction against the Manichean myth of creation, which presented the material world as brought into being by an evil deity and therefore a manifestation of pure evil (*Hexaemeron*, 2.4, PG 29, 36BCD)[2], deprived of a theological dimension. Furthermore, and even more clearly, through the implications of this topic St. Basil opposed the fundamental atheism of some ancient cosmologies that refused the idea of a purposeful universe (*Hexaemeron*, 1.2, PG 29, 5C-9A; 11, PG 29, 25A-28B)[3].

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1. St. Athanasius himself seems to have depended on the identical elaborations of Origen in his *Commentary on Genesis*, 1.1-9 and 3.20. See Origen, *Omilii, comentarii și adnotări la Geneză*, bilingual edition, introduction, translation and notes by Adrian Muraru (Iași, Polirom, 2006) pp. 464-469, 506-509.
2. The frequent references and allusions to Manichean hermeneutics indicate this syncretistic sect as St. Basil's main target and not the Arian heresy, as maintained by Bouteneff ([2008], p. 131).
3. St. Basil considered atheism as the source of inconsistency characterizing the ancient cosmologies: "The wise men of the Greeks produced many treatises about nature (περὶ φύσεως), but not one theory (λόγος) elaborated by them remained unmoved and unshaken, the latter overthrowing the previous one. […] Ignoring God, they did not consider that an intelligent cause (αἰτίαν ἔμφρονα) preceded the genesis of everything (τῆς γενέσεως τῶν ὅλων) but they drew their successive conclusions in a manner consistent with their initial ignorance about God" (*Hexaemeron*, 1.2, PG 29, 8A).

He addressed the atheist perspective by criticizing the incapacity of many pagan cosmologies to appreciate the beauty of creation as indicative to the universe's vocation of participating in the life of God, for all the ages (*Hexaemeron*, 3.8, PG 29, 73C). One way or the other, along with its Origenist and Platonic overtones — that is the perception of the visible realm as designed to guide the souls toward the invisible (Louth [1983], pp. 2-6, 60-61) — the idea of a purposeful and theologically meaningful creation is evident in the following paragraph, where the theme of the school emerges again:

> …the cosmos has not been conceived vainly and without reason[4], given that it is assembled for some beneficial purpose and the great use of all beings. Thus, since it truly is a teaching ground for the reasoning souls (ψυχῶν λογικῶν διδασκαλεῖον) and a school of divine knowledge (θεογνωσίας παιδευτήριον), through the guidance (διὰ χειραγωγίαν) of the visible and sensible things the mind is led to the contemplation of the invisible ones (*Hexaemeron*, 1.6, PG 29, 16BC).

Perhaps this approach outrages many contemporary minds, who are accustomed to take the world as a neutral space to be experimented upon or a reservoir of natural resources to be greedily exploited for the sake of our comfort — or thirst for power, for that matter. Likewise, St. Basil's approach could be reluctantly considered even by the cosmologists who, whilst acknowledging reason as the infrastructure of reality, do no dare to uplift their thought to the contemplation of its divine source, *i.e.* the Logos of God. Nevertheless, elaborating within the scriptural setting, St. Basil rejected any possibility of interpreting the world, its fine-tuning, and wise blueprint outside the perspective of God as the origin of everything that is. In fact, construing the cosmos as a theological school, he showed consistency with his understanding of Genesis as an interpretation of reality from the viewpoint of God's intention and creative work (*Hexaemeron*, 1.2, PG 29, 8B; *On the Origin of Humanity*, 4, PG 30, 13CD). Symptomatic for this understanding, his exploration of the days of creation begins by highlighting the theological substance of the biblical narrative. To the Cappadocian, Genesis points out how, if anything exists at all, it is eminently due to the will of God:

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4. In *Hexaemeron*, 5.8, PG 29, 113A, he endorses this statement: "Nothing is without a cause, nothing is there spontaneously. There is an ineffable wisdom in all" (οὐδὲν ἀναίτιον, οὐδὲν ἀπὸ ταυτομάτου πάντα ἔχει τινὰ σοφίαν ἀπόῤῥητον).

> The creation (ποίησις)[5] of the heavens and earth must be conveyed not as having happened spontaneously (αὐτομάτως), as some have imagined, but as having its cause (αἰτίαν) from God (*Hexaemeron*, 1.1, PG 29, 6A).

This statement sums up the ultimate message of the *Hexaemeron*. For St. Basil, the scriptural narrative in *Genesis*, 1 is not concerned with chronology, the dimensions, or the structure of creation (*Hexaemeron*, 9.1, PG 29, 188D; 1.11; PG 29, 28B)[6], being rather interested in highlighting God's work as active and efficient throughout the history of the universe. Within the hermeneutical framework represented by the ecclesial tradition, this understanding is consistent with the message conveyed by *John*, 1, 1-3 and the first article of the Nicene Creed, both texts emphasizing God as creator whilst manifesting no explicit interest in the architecture of the cosmos. I will soon return to this topic, pointing out how the Cappadocian's employment of the principle of synergy nuances and substantiates this understanding of the biblical narrative.

With the great Cappadocian, however, maintaining the doctrine of creation cannot be taken as an ideological standpoint; instead, its proclamation becomes the cornerstone of both a worldview and a lifestyle that reiterate the liturgical ethos of the Church. Guided by the scriptural narrative, the eyes of the faith in God as creator explore the universe beyond the interests of mere inquisitiveness or economical rationale, although not without sensitivity for details and the world's corolla of wonders. This reverent approach is illustrated by St. Basil's consistent use of the philosophical concept of God as supreme beauty and a wise artisan, along with the idea of the world as a structured order, κόσμος (literally, ornament or beauty)[7]. As an artistic expression of divine wisdom, God's creation is not to be treated in cold blood, anatomically, and less so outside its intrinsic relation with the creator. Facing the various reductionisms of his own time, characteristically, St. Basil urges his audience:

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5 The term employed here leaves no room for speculation, indicating the radical novelty of created essence, brought into being out of nothing.

6 A similar attitude occurs in St. John Chrysostomos' *Homilies on Genesis*, 2.2 and 15.3.

7 For instance, -in *Hexaemeron*, 1.2, he calls God "much yearned beauty" (τὸ πολυπόθητον κάλλος), whereas in 1.11 he speaks of the "beauty of the visible things" (τοῦ κάλλους τῶν ὁρωμένων). In various ways, the idea of the world as beauty was shared by practically all Greek cosmologies (Florian [1993], pp. 13-14). The use of such categories was made legitimate by the repeated use of ὅτι καλόν in the *Septuagint* (*cf. Genesis*, 1, 4, 8, 10, 13, 18, 21, 25, 31).

"let us stop talking about the essence (περὶ τῆς οὐσίας) [of things], since we have been persuaded by Moses that God created heavens and the earth" (*Hexaemeron*, 1.11, PG 29, 28A).[8] For him, to contemplate the cosmos involves the effort to discern, through and behind its intricate structure, what creation is by rapport to God and what creation tells of its creator. Within the traditional framework of the Church, these aspects are necessary prerequisites for an accurate and holistic representation of reality.

Doubled by the heartless logic pertaining to economy, the scientific analysis of nature and phenomena can suffocate the souls, depriving them of the necessary sense of awe for the beauty and meaning of things. By contrast, for the faith's contemplative eyes the universe — truly an artistic structure (τεχνικόν κατασκεύασμα), symphonically harmonized — represents a symbolic epiphany of God's wisdom and beauty, pointing to its Creator (*Hexaemeron*, 1.7, PG 29, 17B & 20A). Like any theological school, creation teaches us to acknowledge God and to interpret everything in light of his presence and intention; the revelation of this truth can inspire, bringing back the joy of living to a society that, seeing the world as meaningless, has fallen into a deep state of depression. Learning the lesson of creation, the inner desert of the faithless souls can be transfigured through the understanding of life as a gift that should be embraced through eucharistic gratitude. In this vein, at the end of his first homily on the days of creation, whilst illustrating how the cosmic school works by way of vertical analogies, St. Basil explodes in exhortation:

> Let us glorify the Master Craftsman (τὸν ἀριστοτέχνην) for all that wisely and artistically (σοφῶς καὶ ἐντέχνως) has been accomplished. From the beauty of the visible things (τοῦ κάλλους τῶν ὁρωμένων) let us form an idea of the one that is supremely beautiful (τὸν ὑπέρκαλον), and from the majesty of these limited bodies that are accessible through senses (τῶν αἰσθητῶν τούτων καὶ περιγραπτῶν σωμάτων) let us make an analogy for him who is infinite, supremely grandiose (τὸν ἄπειρον καὶ ὑπερμεγέθη), and who surpasses all understanding by the fullness of his power (*Hexaemeron*, 1.11, PG 29, 28AB).

St. Basil's teaching concerning the world as a school has various ramifications for our current experience. I have already mentioned its relevance to the efforts of overcoming the contemporary and general idea of a pointless life, which leads to depression and various other psychoses.

8. Similar considerations in Bouteneff ([2008], p. 133).

One further aspect I will mention here. Given that the school of creation is open to all, the Cappadocian believed — in line with St. Paul (*cf. Romans* 1, 19-20; 2, 14) — that virtue could be achieved both in the lives of pagans and the people separated from the Church (*Hexaemeron*, 5.7, PG 29, 112BC). Continuing the main trends of the early Christian approaches to pagan philosophy, this conviction (already illustrated by St. Basil's *Address to the Youth*) confirms how effective the theological school of creation is, in its potential to prepare all nations and cultures for the encounter with Christ, the creator Logos. The Cappadocian's elaborations on the world as a theological school are consonant with a sense of an all-embracing, pan-Christian humanism that transcends religious and cultural boundaries.

The World as an Interactive Framework in *Homilies on the Hexaemeron* and *On the Holy Spirit*

From the multitude of themes pertaining to the ecclesial worldview addressed by St. Basil, let us now turn to his depiction of the interactive aspect of created reality. For him, rather than representing an object closed in itself and self-sufficient, the world is an open field where both divine and cosmic rays creatively interact.

Ontologically inconsistent and thus naturally mortal, the universe cannot survive and evolve of itself, without the vivifying waves and support of the divine energy, "the Creator's power" (τῇ δυνάμει τοῦ κτίσαντος; *Hexaemeron*, 1.9, PG 29, 24B). Again, the Cappadocian seems to refer to St. Athanasius' ruminations concerning the universe's dependence on the continuous and immanent activity of God. In the terms of the Alexandrian, given that it is "unstable, weak and mortal" (ῥευστή τις καὶ ἀσθενὴς καὶ θνητὴ), in order to maintain its existence, creation necessarily relies upon the "lordship, providence and organizing work of the Logos" (τῇ τοῦ Λόγου ἡγεμονίᾳ καὶ προνοίᾳ καὶ διακοσμήσει; *Against the Heathen*, 41, PG 25, 84AB). His agreement with the great Alexandrian notwithstanding, St. Basil goes beyond the idea of a divine power that is unilaterally exerted upon, and within, the universe. For him, indeed, the ontological limitations of the cosmos become obvious on the level of the generative capacities that are latent within matter and cannot be activated other than by the divine will and power. Nevertheless, even though still struggling with the ancient concept of the inert matter, he was likewise convinced that the natural or cosmic energies have a definite role to play within the history of the universe. The best illustration of this comprehension is perhaps St. Basil's interpretation of the phrase "the earth was invisible and unorganized" from *Genesis*, 1, 2 LXX:

> [The earth] was in painful labours (ὠδίνουσα) with the generation of all things through the power stored in it (ἐναποτεθεῖσαν … δύναμιν)[9] by the Demiurge, waiting for the auspicious times (καθήκοντας χρόνους) when, by divine call, it would bring on to the open (προαγάγῃ … εἰς φανερὸν) the things conceived (τὰ κυήματα) within it (*Hexaemeron*, 2.3, PG 29, 36B).

The image both evokes and transfigures the ancient mythical imagery of the wedding of the sky and the earth, still bearing its powerful erotic connotations. Within the Cappadocian's plastic depiction, God the Demiurge, somehow represented as a masculine principle, "impregnates" created matter, activating its maternal capacity. As a result of this ineffable interaction (which cannot be properly addressed without the use of such suggestive devices) the matter's metaphorical pregnancy becomes the origin of the terrestrial ecosystem and the entire cosmos as well. More clearly articulated, the idea strikes the reader from the very beginning of the chapter. There, St. Basil explicitly mentions the "effective power of God" (ἥ δραστικὴ τοῦ Θεοῦ δύναμις) and the "passive character of matter" (ἡ παθητικὴ φύσις τῆς ὕλης; *Hexaemeron*, 2.3, PG 29, 33B), as the two necessary factors contributing to the establishment of the whole order of creation. The dynamic interaction between divine and cosmic energies occurs again in the ninth homily (chapter 2), where the active role of the earth is even more clearly emphasized. One way or the other, it is obvious that the "pregnant" matter has been endowed by the Creator with a generative potential which would have remained inactive if deprived of the discrete ingredient represented by God's energy.

The organization of the universe, of our earth and the life on it, is made possible only in the active presence of the Logos and the Holy Spirit. Beyond all unilateral approach, *i.e.* beyond the famous oppositions between spiritual and material or supernatural and natural, the interactive or synergetic principle remains fundamental to the ecclesial worldview. A generation after the Cappadocian, St. John Chrysostomos displayed a similar understanding of *Genesis*, 1, 2, yet with reference to the metaphor of the Spirit hovering over the waters. For him, the "moving" (κινούμενον) primordial water, vibrating and full of a "living power of some sort" (ζωτικὴν τινα δύναμιν), could not have begotten life of itself, being in need of the "vivifying energy" (ἐνέργειά τις ζωτική) of the Spirit (*Homilies on Genesis*, 3.1, PG 53, 33C). On a very similar note, when interpreting the

9. The term δύναμιν may be also, and perhaps preferably, rendered as "potentiality" as I suggested in the comment right before this quote (*cf.* Liddell & Scott [1996], p. 452).

same metaphor in *Genesis*, 1, 2, St. Basil preferred a Syriac version presenting the Spirit as an ecosystemic agent who

> …thoroughly warmed up (συνέθαλπε) and vivified the nature of the waters γἐζωογόνει τὴν τῶν ὑδάτων φύσιν) like in the image of a bird hatching the eggs, endowing them with some sort of living power (ζωτικήν τινα δύναμιν; *Hexaemeron*, 2.6, PG 29, 44B).

It is obvious that St. John Chrysostomos has incorporated the Basilian terminology (*e.g.*, ζωτικήν τινα δύναμιν) in his own interpretation of the biblical text. Beyond the metaphor, the message conveyed by the Cappadocian (and, in his footsteps, by Chrysostomos) is that the entire formation of the world unfolds as a continuous synergetic act, a dynamic convergence of created and uncreated factors. The two suggestive icons, of the earth's pregnancy and the Spirit hovering over the waters, signifying the two convergent energies (*i.e.* divine and created), have become St. Basil's favourite lens through which he considered the content of any stage within the universe's complex outstretch.

When used within a hermeneutical framework, this lens leads us to an amazing discovery: Genesis does not only depict past events. Instead, it points to the reality of a world still in the making, journeying towards the eschatological term, the eighth day of creation[10]. This is precisely the conclusion reached by St. Basil in the ninth homily:

> Think of the word of God running through creation (διὰ τῆς κτίσεως τρέχον), still active (ἐνεργοῦν) now as it has been from the beginning (ἀρξάμενον), and efficient until the end, in order to bring the world to fulfilment (ἕως ἂν ὁ κόσμος συμπληρωθῇ; *Hexaemeron*, 9.2, PG 29, 189B).

The metaphors in *Genesis*, 1, 2, of the primordial chaos on its way to organization, suggest a reservoir of potentialities whose content is actualized or realized gradually throughout the entire history of creation. The reservoir of possibilities, this pregnant womb (to continue with the metaphor), progressively diminishes until its eschatological exhaustion, when all potentiality ceases to exist in a universe that has reached its final state. This leads to a double conclusion: that God condescends to work through the natural possibilities of the universe, and that the cosmos exists and thrives only sustained by God's creative power. The content of this

10. Of which he speaks more in *On the Holy Spirit*, 27.

ongoing process, interpreted as an interactive experience, is thoroughly explored by St. Basil in his treatise *On the Holy Spirit*, the last major text published by the Cappadocian and a tremendously significant work on the meaning of tradition.

According to St. Basil, it is in the Holy Spirit as both a source of life and holiness, that the entire divine economy concerning the world reaches fulfilment. There is no space within the confines of creation deprived of the Spirit's presence; there is no being that has not its origin in the work of the Spirit; there is no perfection of creation outside the life-giving and enlightening energy of the Spirit. Co-worker with the Logos in the making of the universe, the Spirit immediately answers the creation's thirst for the fullness of being, for life and sacredness. This, in turn, indicates that nothing can attain perfection without the divine gift of the Spirit.

Representing in itself a succinct treatise on the identity and economy of the Spirit, chapter 9 of *On the Holy Spirit* depicts the multitude of graces he bestows upon creation:

> [All things are] watered by his breath and helped on to reach their proper and natural purpose (τὸ οἰκεῖον καὶ κατὰ φύσιν τέλος). Perfecting all other things (τελειωτικόν τῶν ἄλλων), […] he is the giver of life (ζωῆς χορηγόν) and omnipresent (πανταχοῦ ὂν). […] By nature unapproachable (ἀπρόσιτον τῇ φύσει), he is apprehended through his goodness (χωρητόν δι᾽ἀγαθότητα), filling all things with his power (πάντα πληροῦν τῇ δυνάμει), […] in essence simple (ἁπλοῦν τῇ οὐσίᾳ), in powers various (ποικίλον ταῖς δυνάμεσιν), wholly present in each (ὅλον ἑκάστῳ παρόν) and wholly everywhere (ὅλον ἀπανταχοῦ ὂν; *On the Holy Spirit*, 9.22, PG 32, 108BC).[11]

The ineffable plurality of the Spirit's manifestations, energies (ἐνέργειαι) or graces (χάριτες; PG 32, 156D) through which he signals his presence in creation, is even more detailed in chapter 19 (mostly the paragraphs in PG 32, 156D-157C). St. Basil takes an obvious apophatic approach: we ignore the multitude of blessings bestowed by the Spirit and, more so, we ignore the power (δύναμις) through which he will operate in the ages to come (PG 32, 156D). Although the treatise's emphasis falls mainly on the eschatological dimension of recreation and fulfilment (PG 32, 157BC) it is obvious that for St. Basil the universe depends on the Holy Spirit's support within its entire existence between the Alpha and the Omega.

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11. See a brief commentary on this fragment in Russell ([2004], p. 209).

Conclusive Remarks

These considerations point out once again the capacity of the ecclesial or theological worldview to coexist with any kind of scientific cosmology. Less significant with regard to their descriptive aspect, St. Basil's elaborations on the dependence of creation on God cannot be challenged by any rigorous scientific démarche. As long as a cosmological theory remains unaffected by atheist ideologies, it cannot make any speculations concerning God's existence or non-existence, the way no scientific instrument can measure the continuous active presence of God in his creation. Furthermore, without claiming to be able to amend any scientific theory, the ecclesial worldview nevertheless reveals dimensions of reality that cannot be explored by way of current technological means. Precisely these dimensions can represent a source of inspiration for many people or, better, a chance for the salvation of many disoriented souls.

From a different point of view, the Cappadocian's elaborations challenge the current understanding of many Christians that God is the only active factor within the cosmic scenery and the history of creation. This misunderstanding greatly contributes to the neverending warfare of science and religion. Whilst St. Basil indeed insists on God's energy as a prerequisite for the existence and fulfillment of all creation, this does by no means imply that the cosmic energies have no role to play. In fact, St. Basil's concept of the interaction between the divine and cosmic factors echoes a Christological principle, that of synergy, which has reached its canonical form only in the 7th century through the contributions of St. Sophronios of Jerusalem, St. Maximus the Confessor and the sixth Ecumenical Council. In light of this principle, no one-sided explanation of the history of creation can be hold as valid. These are aspects that should further be considered by all parties interested in bridging the scientific and traditional representations of reality.

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Transdisciplinarity and Christian Thought

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A New Methodology

Our approach starts from the conceptual and logical frame of Transdisciplinarity, which implies two aspects. The first takes into account what Transdisciplinarity claims to be; the second, what it does not claim to be. Transdisciplinarity is not another discipline, even though, at first sight and in the absence of a proper description, it may seem to be. At the same time, Transdisciplinarity is not a secret key, nor is it a magic wand which can solve the obscurities and all the difficulties that knowledge deals with in the present context of hyperspecialization and its division into fragments of knowledge. If we borrow a term used by the catholic theologian Hans Küng to describe his fundamental epistemological method of approaching Christian theology in the context of globalization, we may say that Transdisciplinarity is a "critical rationality", a new kind of thinking and attitude, antagonistic to the classical and reductionist rationalism which emphasizes objectivity[1], technicality, and profit that has led to the inward impoverishment of the man and his turning into a simple object that has to bring profit. The human factor, the inward side, and subjectivity are increasingly missing aspects from the academic education and from the general approach to knowledge at any level. Because Transdisciplinarity may be thought of as rather a methodology grounded

1. We are talking about a misunderstood objectivity, in its positivistic acceptation which cannot be upheld in the present context.

on a general survey, approaching a certain field from the perspective of synergistic synthesis, we are in fact making use of the *logic*, the *mode*, and the *working tools* of Transdisciplinarity by which we can undertake the desired task.[2] What needs to be avoided at any cost — an aspect which is valid for any field approached from the transdisciplinary point of view — is drawing far-fetched parallels between the respective field and transdisciplinary thought. Usually such parallels occur relying on some apparent and formal similarities.[3] The error consists in a comparison of a certain *methodology* with a specific *domain regarding the knowledge* or *the spirituality*. We cannot compare Transdisciplinarity to any cultural-spiritual domain of mankind, because, when it is properly understood, Transdisciplinarity implies a *way of knowing* that needs to penetrate any other domain and be integrated in it. "Human knowledge as an entity is transdisciplinary, intelligence being transdisciplinary as well, as one of the essential conditions of existence" (Pop [2008 a]).

The attempt to avoid the trap of formal parallels between Transdisciplinarity and Christian thought necessarily entails by itself a selection of the terms and concepts employed when we study the Scriptures from this perspective. What we mean when we refer to the procedure of selecting is that not all the aspects that Transdisciplinarity implies can be equally applied to Christian thought. However, Christian thought manages to keep the general frame and the logic of Transdisciplinarity. The interpretive proposition consists in a general view of how Christianity manifests itself from a transdisciplinary perspective, but in a specific or applied way, *i.e.* starting from dogmas and biblical texts. This first section will be then followed by a brief case study which aims at restricting the general frame of the problems brought forward in John's Gospel, particularly the first twelve chapters. In other words, we will try to observe even more specifically the way in which the logic of Transdisciplinarity may be applied to the biblical text and how this logic can help decode and interpret the text in a debating transdisciplinary context, given the interrogations of Transdisciplinarity.

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2. For a description of the methodology and the transdisciplinary approach to education, see Nicolescu (1985 — Romanian edition: *Noi, particula și lumea*, Iași, Junimea, 2007, pp. 314-342), and the *Charter of Transdisciplinarity* at http://nicol.club.fr/ciret/english/charten.htm.

3. For example, one could try to find such a similarity between transdisciplinary thought, based on the logic of the included middle and the Hegelian philosophy, and the three fundamental formal aspects: thesis, antithesis, and synthesis. Likewise, we can find similarities with some oriental religious trends. As a matter of fact, formal correspondences can be found with a lot of fields.

Christian Thought and Transdisciplinarity

We daresay that Christian thought is pre-eminently transdisciplinary, because it succeeds best in rising to the level of the ideals of Transdisciplinarity, a fact which results even at a once-over view of the *Charter of Transdisciplinarity*. Our position and next proposition is not a reiteration of the approaching error mentioned before, *i.e.* a formal comparison, based on skin-deep similarities between Christian thought and the transdisciplinary perspective. We need to mention from the beginning that our assertions are grounded in the firm beliefs of the Christian believer, not only in those of one who embraces Christianity as a theoretical alternative more viable than others.

Christianity as the totality of the human being

Christianity as a way of life is transdisciplinary because it implies dealing with the human being as a whole, by way of integrating all the dimensions that define humanity: the psychological, cognitive-volitional, intellectual, and physical dimension, meaning assumation of subjectivity, because it implies a volitional and trusting act, of active and responsible involvement. In Christianity, each aspect of life and human knowledge is filtered by its central perspective represented by the faith in God, every aspect of existence being determined and influenced by it. Christianity starts from the inside out, having faith as a knowledge instrument; it comprises all these aspects of human existence, being transdisciplinary because it searches for the final unity of knowledge and human existence. In Christianity, the level of thought does not mean an exclusion of the level of living, which means to say that objectivity does not imply the ejection of subjectivity. On the whole, as the French theologian and physicist Thierry Magnin emphasizes, the end of scientistic thinking in the 20th century has led to the formulation and development of a new epistemology, in which the knowing subject holds a central role. In the process of knowing, man becomes an integrating and integrative part. Christians think objectively by assuming subjectivity, therefore *the subjective objectivity* and *objective subjectivity* of contemporary science (about which Basarab Nicolescu speaks), has echoes in Christian thought. Christians assume the objective world from the perspective of their transformed subjectivity.

In the present-day hyperspecialized academic and scientific world, Christianity is transdisciplinary through its universal perspective. The theologian Johann Baptist Metz argued that nothing seems today more suspicious than the universal. From this point of view, theologians are probably the last universalists from the academic circles. They are forced

to universality because "God is either a universal theme for the whole mankind, or it is not a theme at all" (Metz [1996], p. 48). If we take over Metz's description, we may argue that Christians have to be universalists by the nature of their faith itself, which offers them an optimistic perspective regarding the problem of seclusion from society, and wandering until they remain isolated, by escaping from the communitarian community.

We can observe an increasing fragmentation of the human being into multiple personalities or, better said, into different *roles*, depending on the context in which the individual finds himself at a certain moment. Thus, we can speak of the family, social, working, or church-going man. Each person has to play several roles. Beyond these, there is, however, a centre of being that only the individual has access to, his most intimate place, what he is in reality and in solitude.

We can delineate the different roles in three perspectives: the personal one, of what I truly am, the perspective of the others' perception of me (what the others think that I am) and — for the one accepting the existence of God — the divine perspective towards the personal being. In Christianity, the three have to overlap so we may talk about the human being as a whole and unity.

Christianity is transdisciplinary because it raises the human dignity above everything[4], in virtue of the belief in the creation of man in God's image. Therefore, "(…) from a historical point of view, we cannot separate the making-up of the conscious person and the free conscience from the sharing of the faith in the God of the Judeo-Christian tradition. The interrogations of the social sciences of the modern era and the major ideals of the democratic societies have their source in this tradition" (Marga [2008], p. 37) — a crucial historical aspect that must not be overlooked, but is, however, more and more obliterated in the present context.

Last, the transdisciplinary character of Christianity distinguishes itself in its trans-historical, trans-cultural, trans-racial, trans-linguistic character. From the very beginning Christianity has manifested itself as a religion that overcomes any human obstacle, the words of Jesus being most significant in this respect: "Go and make disciples of all nations" (*Matthews*, 28, 19).

The levels of reality and the "illogical" logic

To think transdisciplinarily means, as we know, to assume several levels of reality that imply a logic and a different conceptual frame in the coming into the inner being of the self. While as far as the natural, physical world in concerned we talk about three levels of reality, in the spiritual

4. See article 8 of the *Charter of Transdisciplinarity*.

realm of Christian thought we can talk about two levels of reality: *the divine* and *the human*. Because of the limited space of this paper, we cannot study in detail the topic, but, even at the risk of simplifying the discussion too much, we have to underline some basic aspects. What Christian theology does is to try to explain the way in which the two levels of reality come into contact with each other, how they interact. In fact, the way in which we interpret this problem is the one that gave birth to numerous types of theological perspectives. Generally, we talk about two types of theologies, each implying a variety of aspects and particular approaches: the theology *from above* or *revelational* and the theology *from below* or *natural*. One of them starts from the divine level (the top-down perspective) and the other one from the human level (the bottom-up perspective). The two approaches influence the way in which the person of Jesus Christ is regarded or the relationship between the divine Christ and the historical Jesus. At this point, in the context of the present-day debates, it is essential to invoke the logic of the included middle (Nicolescu [1985], chapter 9) and the concept of complementarity, taken from quantum physics, which, together with the notions of actualization and potentialization developed in the complementary method, provide a useful frame for Christian thought. Here is the way in which Thierry Magnin describes this problem: "Thus, when he [the believer] is interested in the humanity of Christ (the actualization of Christ the Man), he cannot fully do that only with the condition of being conscious that the divine dimension of Christ is potentialized in his search and discourse. Conversely, the same is true when Christ the God is actualized in the believer's discourse: Christ the Man is then potentialized. In other words, the believer affirms that we can speak about the humanity of Christ only when we have in memory his divinity. And conversely, we can speak about the divinity of Christ only having in memory his humanity" (Magnin [1998]).

Any exclusivistic approach is wrong, the best one is to take into account both levels of reality. But both the qualitative, and the quantitative difference between the two levels is so deep, that through an ordinary logic we cannot but fall into despair, or skepticism, for which reason we need to open ourselves to another level, of a different complexity.

Basically, this is what Christianity means: the raising from one level of reality, of human existence, with its inherent limitations, to another level of reality, one of infinite complexity. The major problem is the way in which this can be accomplished, at which point Christianity manifests itself uniquely. The contact between man and divinity, of the creature with the Creator, the raising from the level of human existence (bottom-up movement) to the Divine Being itself, cannot occur except by means of A Third One, Jesus Christ, in whom the historical person (Jesus) and the

Divine Being (Christ) merge. Through Jesus Christ, who is both Jesus, and Christ, not either Jesus or Christ, eternity invades time, transcendence meets immanence (top-down movement). This is why the human response to the Divine Being is both a historical event, and one with transcendental significance. Christians live simultaneously in two worlds — something absurd, unacceptable, unexplainable according to the common logic — being, according to the Scripture, heavenly citizens and, at the same time, temporary inhabitants of the Earth: "But our citizenship is in heaven. And we eagerly await a Savior from there, the Lord Jesus Christ" (*Philippians*, 2, 16). Moreover, though still subject to the limitations, weaknesses, and shortcomings inherent to human nature, Christians are already raised to the level of eternal glorification (the "already-but-not-yet" duality).

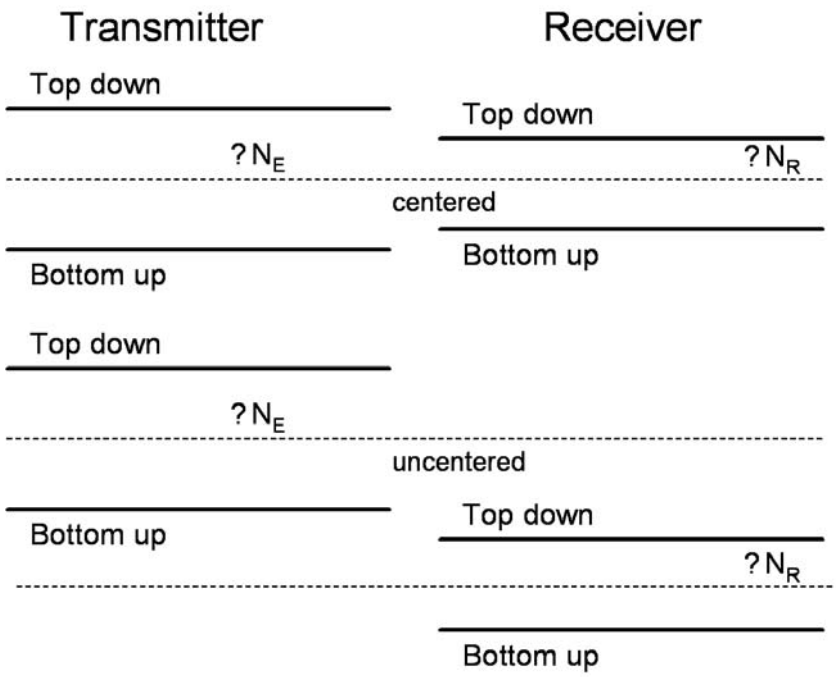
Another "illogicality" worth being emphasized is the unification between the human being and God that takes place in Christianity ("I no longer live, but Christ lives in me" — *Galatians*, 3,17) without the personality and individuality of each person being annulled, but rather with a fulfillment of the human personality through a relationship with the Other. If at the human level we differ in sex, race, nationality, and social status, at the divine level we are the same: "There is neither Jew, nor Greek, slave nor free, male nor female, for you are all one in Christ Jesus" (*Galatians*, 3, 28).

In the realm they enter, Christians also live according to another logic, Christianity being considered as a religion of inversions, a religion in which everything seems "upside down", in which the enemy is blessed, not punished, and hatred is rewarded with love. One of the best examples of "inversion" is found in the Savior's Sermon on the Mount from *Matthew*, 5, 3-12, the so-called text of "The Blessings": the poor in spirit are lifted up, the ones who mourns are comforted, the meek are powerful, those who hunger and thirst are filled, the merciful are shown mercy and the persecuted are happy. Everything seems to work different in this new dimension of a new reality which can only be known by the act of faith. In the words of Thierry Magnin (1998), "With God, who is nothing but Love, everything is upside down".

In Christianity we also deal with a different logic of self-knowing. From the Christian point of view, the well-known statement "know yourself" is an absurdity if we reduce it to a single level of reality. Christians cannot know themselves only by their own powers. Christian knowledge is the knowledge through Another. Only then can man know himself better when he knows Him, The Other, the Divine Being, deeper and deeper; this is the only way that one can know one's neighbour, by opening oneself to the needs of the others, from the perspective of the three existential levels of this new reality, love, forgiveness, and service (Pop [2008 a]).

The major problem is how this knowing can take place (the question of "how" sends us into the action space, not only the ascertaining one).

The communion is absolutely essential in the community of those who live in a personal and communitarian relationship. The methodological concept of "knowledge search window" allows us to understand the way of communication in communion at the level of the community (Pop [2008 b] — see the figure below).



In an educational paradigm, the one (the teacher) who transmits the education and the one (the student) who receives the message (the information) are found at different levels of reality and, at the same time, at different ranks of authority. The teacher acts from "above" (top-down), while the student acts from "bellow" (bottom-up). For the action of communication to be efficient, the two perspectives need to be in a state of harmony, whether assumed or negotiated. When the difference between the levels or reality, with the corresponding ranks of authority, tends to zero, when they tend to be co-equal, the window is open and the communication and interaction become possible. The ranks of authority are alternatively in a symetrical and complementary interaction state, depending on the context to avoid potential conflicts by building bridges, working together in an assumed/negociated harmony, at the same time avoiding

the possible states of disharmony.[5] On the contrary, when there is a great difference and the levels of reality are different, the window is closed, and communication is stopped, virtually impossible. The knowing relation between man and God in the Christian perspective shows Christ as our Teacher, and us as his disciples. But the Teacher calls his disciples to participation and to relationing. He descends and they rise. The levels tend to unify and the communication man-God is thus made possible. The act of prayer in Christianity represents the supreme example of encountering and interaction between the two levels. In prayer, the "above" perspective and the "down" contemplation make the divine merge with the human, the transcendent with the immanent and the divine providence with the human freedom. This is how we can understand the communitarian aspect of Christianity. Because of the fact that it is in a relationship with the Other, through whom they are able to know themselves, Christians learn to live together with others in a community, in communion. Hence, a deeper knowing of God leads to a deeper knowing of the others and a greater valuation of the human being in itself, therefore Christians "recognize themselves in the person of the other, not only at an educational level, but also at a spiritual level" (Nicolescu [1985]). Reminding ourselves about the four pillars of transdisciplinary knowledge (*ibidem*), Christians learn (the bottom-up perspective) and are being taught at the same time (the top-down perspective), because they know they cannot live separately, but only together with the others, in a community (learning/teaching process) — with the learning and understanding syntagms in the knowledge process: learning to learn to know by doing (creativity in action) and learning to understand to be by living with the others (authenticity through participation — Pop & Matieș [2008]).

John's Gospel: The Divine Reality in Relationship with the Human Reality

If Christian thought is pre-eminently transdisciplinary, it is obvious that its holy book, the Bible, has to be the same.[6] We can even assert that the Scripture, by the very way of its composition, is a specific example of how the divine level meets the human one. Moreover, for the Christians, besides prayer, the most direct way in which they can communicate with

5. More about synergistic communication in Pop & Vereș (2009).

6. It goes without saying that everything we assert starts from the personal conviction that the Bible has a divine origin, and it is the revealed Word of God, not only a literary or mythological human work.

God, *i.e.* the divine realm, is the Holy Scripture. Seen through the eyes of the Christians, the Scripture is not just a simple reading, but a real hearing, a communion and also a description of the way in which we can have this communion.

One of the books of the Scripture that offers an extraordinary and profound image of the encounter between God and man through Jesus Christ, thus showing the interaction between the two levels, divine and human, is John's Gospel. We will dwell upon a particular aspect of this Gospel that we will seek to approach from the point of view of transdisciplinary logic and from the perspective of the levels of reality, in light of the facts presented above.

The particular aspect referred to above is represented by the "signs" that the Saviour unfolds in this Gospel. John's Gospel is quite different from the other three Gospels both from point of view of literary composition, and from what concerns the theological accents. One of the particular features of John's Gospel is the selection of the miracles performed by Christ: he picks only seven miracles that he calls "signs".

At the end of the book, the biblical author specifies the prospect he had in mind: "But these are written that you may believe that Jesus is the Christ, the Son of God, and that by believing you may have life in his name" (*John*, 20, 31). These words offer the hermeneutic key to the whole book. According to the suggested approach of this paper, we may notice two things: on the one hand, by what has been written, the reader has to reach the faith that the historical Jesus is the divine Christ, therefore, the two levels meet in Him, and, on the other hand, that through this faith one can have real life in him, *i.e.* the only full life is life through Another. Everything that the writer presents in this Gospel has that end in view, even the selection of the seven "signs".

John differs from the other evangelists through the language used to describe the miracles performed by Jesus Christ. The word used by the writer is *semeia*, translated as "signs", unlike the word that appears in the other Gospels, *dunameis*, a distinction which is made on purpose. If *dunameis* emphasizes the element of power from Jesus' actions, *semeia* means a lot more. The former word induces fear, while the latter is intended to induce faith. Therefore, in view of the scope of the writer, the "signs" lead to the fulfilling of that scope.

In order for the *dunameis* to transform in *semeia*, the linking element of faith is needed, *i.e.* the passing from a level of reality to another, the raising of the level of human existence to the One that presents himself as the full Life.[7] This is an act of trust, of accepting another reality that gives

7. "I have come that they may have life, and have it to the full" (*John*, 10, 10).

a meaning to human life. By faith, the human Jesus is one and the same with Christ, the Son of God. The problem of the writer's contemporaries was that they failed to see beyond the miracles the reality they were presented with.[8] For these people, the "signs" remained just miracles. Here lies the difficulty of the problem, because, if one remains just at the level of the miracles, then one will be led to other perplexities regarding the identity of the one performing them. This is why Jesus' contemporaries were bewildered and did not know what to think of him.

The signs therefore lead to something that lies beyond them, as if they were not just some miracles. In John's Gospel, the word *semeion* signifies an event by which the glory of God is manifested, together with his presence amongst the people. In *semeion*, the accent falls not on the event itself, but on the essential truth that the "sign" leads us to. *Semeion* offers an insight into the very nature of God.

All the seven signs selected by the evangelist appear in the first twelve chapters of the book which describe the public ministry of Jesus Christ. In this ministry, through signs and Word he reveals himself as the revelation of the Father. The first chapter (*John*, 1, 1-5) of the Gospel introduces Christ in the fullness of his divinity. Moreover, John confronts us with the real conflict that is taking place before our eyes, the conflict from the level of spiritual reality between Good and Evil, light and darkness (*John*, 1, 5). Shortly after, the perspective of the divine level is filled out by the presentation of the level of human reality, and by the contact between the two worlds, through the incarnation of the Saviour: "The Word became flesh and made his dwelling among us. We have seen his glory" (*John*, 1, 14). The whole book alternates the two levels of reality. We are exposed to these realities, expressed in many dualist elements such as light and darkness, for instance (*John*, 1, 5) "from above"/"from bellow" (*John*, 8, 23), "spirit"/"flesh" (*John*, 3, 6), "life"/"death" (*John*, 3, 36), "truth"/"lie" (*John*, 8, 44). We are swinging therefore between two levels: divine-human, historical-theological.

The structuring tension of the book can be observed in the way in which the reaction of Jesus' disciples is presented when they see the "signs" performed by Jesus, and the reaction of his enemies, as the narrative develops. The evolution of the narrative from the first part of the Gospel takes place in a crescendo, culminating in chapter 11 with the extraordinary miracle of the resurrection of Lazarus. The first sign takes place in an obscure place (*John*, 2, 1-11), while the last one is seen by a lot of people (*John*, 11, 19). On the other hand, the disciples' reaction manifests itself in the opposite direction from the one of the enemies of Christ.

8. This failure is also present with all those who do not see in Christ any more than an extraordinary teacher or an exemplary person.

If the disciples see in these signs a reflection of God's glory, as Jesus made more and more powerful signs, his enemies are increasingly hardened (*John*, 2, 13-22; 9, 1-41; 11, 1-44). The very thing that means to obtain the saving faith is in human terms a failure: "Even after Jesus had done all these miraculous signs in their presence, they still would not believe in him" (*John*, 12, 37).

John's Gospel offers a proper model of approaching the biblical text from the transdisciplinary thinking perspective. Far from being only theological, this book is as real as it can be, presenting both aspects of human existence from the point of view of the relationship with its Creator: the failure, the stagnation at a level of reality where the individual cannot see the "sign" the reality beyond "reality" and the victory, *i.e.* the passing to another level of reality, the level of full life in which the divine mixes with the human, eternity with time, providence with freedom. "Then you will know the truth, and the truth will set you free." (*John*, 8, 32).

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André Scrima, visionnaire du transreligieux

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Le modèle transdisciplinaire de la Réalité remet en question le problème du sacré, apportant une nouvelle lumière sur la complexité de son sens fondamental : *la présence de quelque chose réel de manière irréductible dans le monde*. L'acceptation de cette compréhension de la dimension du sacré dans notre existence est en profonde résonance transhistorique avec les réflexions de Mircea Eliade, voyageur passionné de la découverte de la zone de transparence de l'intérieur des religions, entre elles et au-delà d'elles : « Le sacré ne suppose pas la foi en Dieu, ni en dieux ou en esprits. C'est… l'expérience d'une réalité et la source de la conscience de l'être dans ce monde » (Eliade [2006], p. 176). Le sacré est constitutif dans la structure de la conscience et pas seulement un simple état de l'histoire de la conscience.

La réalité transdisciplinaire comprend en même temps le sujet, l'objet et le tiers caché, qui sont les trois facettes d'une seule et même Réalité, le sacré correspondant au domaine du tiers caché. Le rôle du tiers caché est convergent avec la quintessence de la sacralité : il lie et unifie, dans leur différence, les dualités. Les mots *trois* et *trans-* ont la même racine étymologique : *trois* signifie *la transgression du deux, ce qui va au-delà de deux*. En vibration d'harmonie sémantique, le sacré retrouve, à travers son sens même, l'origine étymologique du mot *religion* — *religare*, « lier » — mais il n'est pas, en soi, l'attribut d'une religion ou d'une autre. L'accès au sacré, dans la zone de non-résistance du tiers caché, se réalise par l'expérience spirituelle, qui permet de transgresser la dualité en opposant les couples binaires : sujet/objet, subjectivité/objectivité, matière/conscience, nature/divin, simplicité/complexité, diversité/unité. La connaissance de soi-même active la conscience de la sacralité de l'être humain qui l'intègre de manière cohérente, avec sens, dans la totalité du monde. Dans la

vision transdisciplinaire, mais aussi dans la tentative de Jésus de reconfigurer une nouvelle philosophie de la nature, selon laquelle l'homme contient en lui-même, potentiellement, tous les cosmos, la *pluralité complexe* et l'*unité ouverte* sont deux facettes d'une seule et même Réalité : « Jésus a dit : Celui qui connait le Tout, / s'il est privé de lui-même, / il est privé de tout » (Thomas [1986], p. 33).

Le sacre comme zone de résistance absolue, unifie le Sujet et l'Objet, les niveaux de réalité et ceux de perception : « Jésus disait : Pourquoi lavez-vous l'extérieur de la coupe ?/ Ne comprenez-vous pas que celui qui a fait l'extérieur / est aussi celui qui a fait l'intérieur de la coupe ? » (Thomas [1986], p. 38). La connaissance n'est ni extérieure, ni intérieure : elle est *en même temps* extérieure et intérieure : « Jésus leur dit : Lorsque vous ferez les deux Un / et que vous ferez l'intérieur comme l'extérieur, / l'extérieur comme l'intérieur, […] alors vous entrerez dans le Royaume ! » (*logion* 22 — *ibidem*, p. 22). Le sacré dans sa relation avec le tiers caché et implicitement avec l'isomorphisme entre les niveaux de la Réalité et des zones complémentaires de non-résistance, est fondamental dans la compréhension de l'*unus mundus* décrit en filigrane des 114 *logia* de l'*Évangile de Thomas* : « Jésus leur dit : Lorsque vous ferez les deux Un, / […] alors vous entrerez dans le Royaume! » (*logion* 22) ; « Jésus disait : Si vous faites les deux Un / vous serez Fils de l'Homme » (*logion* 106 — *ibidem*, p. 41).

Le contenu sémantique de la *révélation* comme opérateur essentiel dans toutes les grandes traditions spirituelles, se rapproche du mot *voilé* : *apokalyptein* (en grec) a le sens de découverte, de lever le voile, la racine *kal* désignant « ce qui est caché ». André Scrima décante deux axes de sens de la révélation, en mettant en miroir ce thème spirituel avec le symbolisme de la *porte* : « Le voile sépare deux espaces ; y permet ou interdit l'accès ; cache et suggère en même temps. […] La porte indique des limites nettes, s'associe à des espaces de type cosmique, tandis que le voile personnalise d'une certaine manière la même opération sémantique et noétique. Le voile peut être porté par une personne, peut être assumé intimement ; dans le voile tu peux t'envelopper » (Scrima [2008], p. 79). Par analogie, le terme *révélation* réunit en distinguant deux orientations contradictoires au niveau du sens et, implicitement, au niveau de l'expérience fondée par la révélation : *découverte, dévoilement et en même temps, dissimulation, recouvrement*.

En se fondant sur les connotations profondes, spirituelles, du symbolisme du *voile*, la transdisciplinarité fait une nette distinction entre le *Réel* et la *Réalité*, pour éviter les conséquences des possibles confusions au niveau de la compréhension conceptuelle : « Le Réel signifie ce qui existe, tandis que la Réalité est liée à la résistance dans notre expérience humaine. Le Réel est, par définition, caché pour toujours, tandis que la Réalité est

accessible à notre connaissance » (Nicolescu [2002], p. 102). Pour qu'il y ait une cohérence de l'isomorphisme Réel/Réalité et, en même temps, une passerelle qui assure l'unité ouverte entre eux, il faut prendre en considération que l'ensemble des niveaux de la Réalité se prolonge par une *zone de non-résistance*, de transparence absolue vis-à-vis des expériences, des représentations, des descriptions, des images ou de nos formalisations mathématiques : « Cette zone de non-résistance correspond, dans notre approche de la Réalité, ‹ au voile › de ce que Bernard d'Espagnat nomme ‹ le réel voilé › et se rapproche certainement de l'affectivité du point de vue de Lupasco » (Nicolescu [2009], p. 88). La zone de non-résistance joue le rôle du *tiers caché* qui est *alogique* grâce au passage simultané par le *dévoilement* et l'*enveloppement,* donc par *révélation* — reprenant l'exercice herméneutique d'André Scrima, d'une zone de résistance et d'une zone de non-résistance de « suprêmes contradictions » (*ibidem*, p. 90) : « De la perspective du mot révélé et de son écoute, le monde est dissimulation, voile. L'essence du mot est mystérieuse » (Scrima [2008], p. 98).

Les réflexions d'André Scrima liées à la révélation captent l'interaction et la convergence au niveau ontologique, entre *présence* et *absence*, le fait de voiler développant un contour, une forme cachée sous le voile : « Le voile signale une présence cachée à laquelle on ne peut accéder que graduellement, en levant le voile, ce qui implique la successive conformation, adaptation de mon être à cette présence-là » (Scrima [2008], p. 80). La révélation comme contenu spécifique de la « zone de résistance absolue » correspondant au sacré, est l'espace de coexistence de la « trans-ascendance » et de la « trans-descendance » (Nicolescu [2007 b], p. 150). En tant que « trans-ascendance », cette zone correspond, dans les termes d'André Scrima, à *la dissimulation*, *au recouvrement*, ou *à l'absence présente* du sacré, corrélative à la notion philosophique de la « transcendance » (qui vient de *trans*, « au-delà » et de *ascendere*, « monter »). En tant que « trans-descendance », elle est liée à la notion d'« immanence » ou à la fonction de *découverte*, de *dévoilement* de l'acte révélateur, coïncidant dans la structure de la Réalité transdisciplinaire avec la *présence absente* du sacré.

Pour désigner cette zone de résistance absolue, le mot *sacré* est approprié comme *tiers inclus* qui met en harmonie la transcendance immanente avec l'immanence transcendante, l'enveloppement avec le dévoilement, la présence avec l'absence, la montée avec la descente : « Le sacré permet la rencontre du mouvement ascendant de l'information et de la conscience avec celui descendant par les niveaux de Réalité et de perception » (Nicolescu [2007 b], p. 151). Une cohérence orientée vers l'union des contradictoires, entremise dans le *logion* 22 de l'*Évangile de Thomas* : « Jésus leur dit : Lorsque vous ferez le haut comme le bas, […] alors vous entrerez dans le Royaume » (Thomas [1986], p. 22).

Facilitant la relation entre le subjectif et l'intersubjectif, le sacré forme *un ternaire de l'amour*, sans comprendre la logique du tiers inclus. Il connecte les deux pôles qui scellent l'humanité dans sa spécificité fondamentale, à la dimension *transubjective* de l'existence. Son contenu axiologique devient une condition *sine qua non* pour constituer ensemble le projet d'un nouvel humanisme, basé sur l'ouverture, la tolérance et le dialogue — les valeurs essentielles de la transdisciplinarité : « Le sacré étant d'abord une expérience, il se traduit par un sentiment, celui de la présence de Nous, ce qui lie les êtres et les choses et, par conséquence, induit dans les profondeurs de l'être humain le respect absolu des altérités unies par la vie commune sur une seule et même Terre » (Nicolescu [2002], p. 93).

La verticalité de l'être scellée par le signe de la transubjectivité traverse l'horizontalité intersubjective par la recherche permanente du *tiers vécu,* en tant que découverte, trouble et étonnement dans l'ouverture conférée à la subjectivité au carrefour de deux axes du Vif : « Un Éros extraordinaire, inattendu et surprenant traverse les niveaux de la Réalité et les niveaux de la Réalité du Sujet. Les artistes, les poètes, les hommes de science et les mystiques de tous les temps ont avoué la présence de cet Éros dans le monde » (Nicolescu [2009], p. 94). En tant que source de ce double mouvement simultané et sans contradiction, de montée et de descente parmi les niveaux de la Réalité et de la perception, le sacré est la condition primordiale de la liberté, de la responsabilité et de la dignité humaine. La transhumance du sujet et de l'objet dans l'espace de l'unité entre le temps et le non-temps, la causalité et la non-causalité, apparaît comme dernière source de nos valeurs. En voyageant dans *la Vallée de l'étonnement*, les pas du chercheur de Sens, deviennent révélateurs, montant et descendant en même temps *la montagne intérieure* ou *la montagne analogue*, comme la nomme René Daumal.

Le mariage paradoxal dans n'importe quelle expérience spirituelle entre *la vallée de l'étonnement* et *la montagne intérieure* est sous le signe du Mot révélateur, tiers inclus entre soumission et création sur l'escalier herméneutique au double sens : haut et bas, recouvrement et découverte : « Ce qui est en haut est pareil à ce qui est en bas, mais, malheureusement, ce qui est en bas n'est pas pareil à ce qui est en haut. De l'asymétrie fermée hermétiquement » (Nicolescu [2007 a], p. 105).

Il est essentiel que nous vivions l'expérience du sacré comme incarnation dans le quotidien de « la Présence absolument énigmatique du Tiers » (Michel Camus) et cet événement de l'être peut chercher sa place dans l'horizon où se rencontrent et se communient le Réel et la Réalité : «Celle-ci se passe au moment où la conscience de soi n'est plus conscience de soi, mais conscience de la présence de l'absence dans le centre de la

conscience » (Nicolescu & Camus [2004], p. 32). Basarab Nicolescu décrit, sous forme de confession, les modalités par lesquelles n'importe quel être humain peut accéder au « tiers aimant de nous ». En tant qu'expression plénière du tiers et, ainsi, comme « point de départ et point d'arrivée de la transdisciplinarité » (*ibidem*), l'amour crée le miracle de l'apparition du tiers : l'être aimé est simultanément le même et infiniment un autre. Pour intégrer ce type d'expérience qui célèbre notre mystère irréductible, le communiquant avec l'autre, il en faut un troisième terme, un « nous », qui abrite le sens de la vie, dans la transparence entre la parole et le silence : « Je suis ce *nous*, l'être aimé est ce *nous*, mais en même temps nous sommes différents et c'est justement là que se trouve la différence qui nous permet d'accéder au tiers aimant de *nous* » (*ibidem*, p. 33).

L'expérience du tiers aimant est ternaire, ayant besoin de vivre simultanément les trois tiers qui unifient leur action dans leur intimité à la fois visible et invisible. Le tiers mystérieusement inclus crée le mystère de l'autre, l'approchant de mon propre mystère par l'entremise des trans-significations comme véhicule qui active le contenu du Mot révélateur. Mais cette recherche de « l'autre infini » dans moi-même est possible seulement par le captage simultané, dans un étincellement intuitif, de plusieurs niveaux de la Réalité, perçus simultanément, aussi bien par moi que par l'autre, grâce au tiers inclus ontologique. Le langage commun qui s'établit comme passerelle du dialogue et de la communication au niveau des significations, doit être structuré sur le tiers logique inclus pour être cohérent et compatible avec son contenu référentiel. Une fonction d'universalité surgit ainsi, dans le territoire de notre thématique, outre la *fonction révélatrice* du mot comme *logos* (en grec) ou *kalam* (en arabe), qui, d'après André Scrima, est destinée, tôt ou tard, à assurer la compréhension entre les gens. L'ouverture du mot à l'universalité valorise, de manière créative, l'un des trois pylônes transdisciplinaires de la Tradition qui vise « la possibilité de découvrir par l'expérience intérieure les lois cosmiques universelles de nature symbolique » (Nicolescu [2007 a], p. 52). Sans postuler la coexistence nécessaire du tiers mystérieux inclus et du tiers inclus ontologique dans l'herméneutique du texte sacré et complémentaire, dans l'activité spirituelle, André Scrima capte les significations et les conséquences majeures du rôle du tiers logique inclus, dans le domaine du langage. La compréhension de la manifestation de l'*universalité* du mot dans les relations interhumaines, « comme signe de la liberté et, finalement, de l'amour » (Scrima [2008], p. 88), prouve le fait qu'André Scrima est arrivé à une *vision transreligieuse sur le monde*.

La complexité tertiaire veille d'une manière affectueuse la rencontre et l'échange d'information spirituelle entre la verticalité de l'être (ou la dimension trans-subjective) et son horizontalité, ou l'aspect intersubjectif

de l'humain. La conversion du subjectif et de l'intersubjectif dans la zone ineffable du trans-subjectif est possible seulement par le rapport au sacré comme source de *l'attitude transreligieuse*.

Une incarnation du transreligieux dans différentes traditions spirituelles du monde est *topographiée rigoureusement et de manière incertaine*, en paraphrasant Jean-Yves Leloup, par André Scrima dans son cours du 25 janvier 1978[1], à l'intérieur d'un thème commun à toutes les religions : *la révélation*. Il fait une description du contenu sémantique des modèles fondamentaux de la révélation dans le domaine de la spiritualité d'après un critère unique, universellement valable : les distinctions cartographiées ne regardent pas la géographie, mais l'esprit, ou, dans une expression transdisciplinaire, en résonance avec les réflexions de Mircea Eliade, un troisième élément : « une géographie de l'esprit ». Une tentative de capter ce que Basarab Nicolescu désigne par « saint ternaire : celui sans lieu, sans temps et celui de l'abîme sans profondeur » (Nicolescu [2007 a], p. 130) en convergence par interaction réfléchie avec son voisinage poétique : « La contradiction ternaire est, dans son unité, aspatiale, alogique et atemporelle. Mais son auto-interaction crée l'espace, la logique et le temps » (*ibidem*). Le dynamisme spirituel de la révélation peut être vécu comme une expérience transdisciplinaire, par sa création essentielle comme unité d'un couple de contradictions fondamentalement au niveau ontologique : *dévoilement* et *recouvrement*. Le dépassement de cette dualité se réalise par le tiers caché qui la facilite et la transgresse dans la zone alogique de la conscience de la sacralité : « La *réalité voilée* est une notion fertile. Elle nous encourage à être dans la recherche de l'Évidence absolue. Mais si nous pensons que nous pouvons dévoiler la réalité voilée, nous tombons de nouveau dans le piège du néant. Combien existent-ils de niveaux de Réalité dans *la réalité voilée* ? » (*ibidem*, p. 113). Nous parcourrons, auprès d'André Scrima, un itinéraire avec des bornes enracinées dans diverses traditions spirituelles du monde, mais avec la liberté et la créativité assumées au niveau individuel, pour conférer de l'unicité et du style personnel, au chemin qui s'étale dans l'ouverture de l'horizon parmi ces marques de l'identité intérieure et au-delà d'elles, dans l'universalité.

Dans la tradition chrétienne, la bipolarité du voile est mentionnée du point de vue de celui qui reçoit la révélation. Pour Moïse, pour recevoir la Révélation, il faut être enveloppé. Seule la connexion au Réel caché pour toujours permet le circuit de l'information spirituelle, donc un dévoilement du sacré sur différents niveaux de la Réalité. Et dans la tradition néo-tes-

1. Ce cours se trouve parmi d'autres qu'il a présentés entre 1977 et 1979 à l'Université Saint-Joseph, à Beyrouth, au Liban, dans son livre *L'expérience spirituelle est ses langages*, pp. 75-193.

tamentaire, le voile apparaît plusieurs fois, mais surtout dans un contexte proposé par Saint Paul, lorsque, exhortant ses auditeurs à lire les Écritures, il leur suggère de lever le voile qui couvre encore leur âme.

Nous pouvons déchiffrer cet appel de Saint Paul, en appliquant les postulats de la méthodologie transdisciplinaire, conformément auxquels, la sacralité se fonde sur l'unification des niveaux de l'être : corps, esprit et cœur et leur correspondance avec les niveaux de la Réalité contextualisés de l'Objet. Le voile qui couvre le cœur représente la réduction du sujet à un seul niveau de Réalité. Le christianisme développera ultérieurement, à travers la prière, dans une manière créatrice, unique, la configuration du cœur comme centre de l'unité de l'être.

En se situant en dialogue et ouverture envers les autres cultures, spiritualités et religions, André Scrima découvre l'Islam en tant que possesseur d'une riche tradition en ce qui concerne la sémantique du voile, en connexion avec un autre nœud conceptuel, *la lumière* : « La transparence absolue de la transcendance rend impossible la vue, mais permet la naissance de la vision » (Nicolescu [2007 a], p. 105). Les liens complexes et de profonde résonance entre *voile – lumière – vue – vision* attribue à la révélation une configuration compatible avec la réalité transdisciplinaire, celle-ci « n'étant ni religieuse ni areligieuse : elle est transreligieuse » (Nicolescu [2007 b], p. 151). Il y a un *hadith* (une affirmation du prophète Mahomet ou une tradition liée à lui) selon lequel il y a soixante-dix-mille fois sept voiles de lumière et d'obscurité qui couvrent le Visage de Dieu. Si son visage n'était pas caché par le voile, le monde serait détruit par le scintillement de son visage : « *Voir* signifie le ternaire de la lumière de la Raison : la lumière physique, la lumière de l'âme et la lumière noire du sans-profondeur. L'une sans l'autre est aveugle » (Nicolescu [2007 a], p. 130).

Nous retenons l'interprétation d'André Scrima concernant l'expression typique et courante, dans toutes les traditions[2], le numéro 70 × 7 (ou 700 × 7) indique, par la forme, sa fonction — qui n'est pas quantitative, mais qualitative : « C'est la qualité d'une multiplicité indéfinie, celle-ci étant la première révélation captable de l'Infini » (Scrima [2008], p. 81). Le paradoxe ontologique de la lumière : elle est invisible mais elle rend toutes les choses visibles : « C'est toujours le même enjeu : apprendre ce qui se trouve entre les ténèbres et la lumière. Pourquoi, depuis la nuit des temps, l'énigme est-elle restée une énigme ? » (Nicolescu [2007 a], p. 104).

Concrètement, dans le plan de l'existence quotidienne, le voile est associé à la condition du *nomade et de la tente* par le moyen de valorisation

2. Quand Jésus dit qu'il faut pardonner 70 × 7 (*Matthieu*, 18, 22 ; *Luc*, 17, 4), il ne limite pas le pardon par rapport au comptage, mais il ouvre le chemin vers les potentialités infinies des valeurs humaines fondamentales, comme le pardon.

de l'intégration dans l'harmonie de la nature et des territoires que son logement occupe. Le portrait intérieur du *nomade* ou *du voyageur spirituel* est brossé avec un troublant étonnement par Basarab Nicolescu, dans l'esprit du *koan zen* : « Celui qui cherche, trouve. Et celui qui trouve n'a rien trouvé. Voilà pourquoi le destin de celui qui cherche est de chercher sans cesse » (Nicolescu [2007 a], p. 161). Dans la perspective du thème de notre étude, nous citons comme source de la résonance du transreligieux dans son lien avec l'*itinérance spirituelle*, le *logion* 2 : « Jésus disait : Que celui qui cherche, / soit toujours en quête / jusqu'à ce qu'il trouve, / et quand il aura trouvé, / il sera dans le trouble, / ayant été troublé, il s'émerveillera, / il régnera sur le Tout » (Thomas [1986], p. 15), ainsi que le *logion* 42 : « Jésus a dit : Soyez passant » (*ibidem*, p. 26).

Dans la tradition spirituelle musulmane, Husayn ibn all-Hallaj parle du voile (*hijab*) comme d'un rideau intermédiaire entre le chercheur et l'objet de la recherche, entre le débutant sur le chemin et son désir, entre le tireur et la cible (le tir à l'arc étant un « sport » d'initiation dans l'école spirituelle Zen. Le voile est lié à la perspective ouverte du cœur, les êtres étant ceux qui se voilent eux-mêmes, mais Dieu, en les vêtant, dans le voile de leur nom, fait que leur existence soit possible. Donc, dans cet horizon spirituel, le voile est un symbole qui est en lien non seulement avec Celui qui se révèle, mais aussi avec celui qui reçoit la révélation. Si le Créateur leur montrait les sciences de Ses pouvoirs, les créatures mourraient ; s'il leur découvrait la Réalité, elles mourraient.

Dans la tradition liturgique byzantine, il y a une prière dédiée au Saint Esprit, qui lui demande de venir vivre dans une tente, la tente de notre cœur, elle-même révélatrice de notre condition itinérante (Scrima [1996], p. 100).[3] Le nomadisme spirituel offre plusieurs perspectives sur la Réalité, offrant cette ouverture-là utile à n'importe quel chercheur qui, par différentes expériences, peut avoir accès à une vérité unique, ultime, en inventant en permanence son chemin sans chemin et en ne se bâtissant jamais une maison en pierre.

Dans la tradition ébroïcienne, les Tablettes de la Révélation étaient gardées dans l'Arche d'alliance, abritées dans une tente. Seulement quand, avec David, et puis avec Salomon, le peuple hébreu a fondé un royaume, la tente a été remplacée par un bâtiment en pierre et en bois de cèdre. À l'intérieur du temple de Jérusalem, le sanctuaire, le tabernacle est séparé du reste de l'espace par un voile — en signe de réminiscence et en hommage à la condition itinérante.

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3. Scrima (1996), p. 100 : Notre Roi des cieux, le Consolateur, « trésorier des bontés et créateur, viens et installe-toi à demeure parmi nous ». « La demeure » renvoie à la notion du « corps ». « Fais-toi une tente ; pas une riche maison en pierre, mais une demeure de nomade : c'est le cœur dans lequel l'itinérant fait place à l'Esprit. »

André Scrima interprète ce signe divin comme une réorientation du circuit de l'information spirituelle, un passage de celle-ci du niveau de l'objet de la réalité, délimité par l'espace sacré du temple, au niveau de la réalité du sujet ou au temple du cœur, la zone de discontinuité entre ceux-ci étant symbolisée rituellement par le tabernacle vide, l'intérieur devenant comme l'extérieur et réciproquement.

Dans le dialogue de Basarab Nicolescu avec Michel Camus (Nicolescu & Camus [2004], p. 34), est évoqué le poète Adonis, présenté comme un visionnaire qui vit *un pressentiment* de l'invisible caché dans l'intérieur du visible (Michel Camus) : « La transparence est elle aussi une voile / Comme le soleil même, qui est à peu près une ombre… »

La zone de non-résistance entre le Sujet et l'Objet nous arrive comme une voile entre nous et la Réalité. Paradoxalement, sa vue poétique sur le monde, qui unifie le Sujet et l'Objet, a le pouvoir de réaliser la conversion de la transparence en *résistance absolue* : « Celui qui accomplit cette mutation entre non-résistance et résistance absolue est l'accord entre les niveaux de la Réalité et ceux de la perception » (Nicolescu & Camus [2004], p. 35). *Le Tiers sacré* résiste à notre compréhension, acquérant ainsi le statut de la Réalité avec la même justification que les niveaux de la Réalité, sans qu'il constitue, cependant, un nouveau niveau de la Réalité, car il échappe à toute science.

Il faut distinguer deux orientations fondamentales dans la vie spirituelle : *la mission et la vocation*. Pour André Scrima, par définition et par vocation, tous les genres de spirituels étaient *des passants de frontière*, des nomades, des itinérants, un vif exemple étant même le premier, de la tradition chrétienne, Abraham, un bédouin pauvre, qui a reçu l'appel et a passé les frontières. *L'Évangile de Thomas* trace les frontières fluctuantes du *moyen d'être spirituel* :

- *La vocation* de la création de son propre chemin : « Jésus disait : Soyez passant » (*logion* 42) ;
- *La mission* qui correspond à cet appel : la fixation du lien, des connexions entre le *Réel voilé et la Réalité* qui résiste à notre expérience.

Le désir de transgresser les limites, caractérise de manière noétique les spirituels comme étant *les marginaux du Centre*. L'énoncé appartient à André Scrima, qui le soutient et l'argumente dans une logique ternaire, fondée sur un couple de contradictoires au niveau ontologique :

- l'*unité fermée* ou « le cercle du monde » et caractérisée par la *finitude*, dont l'expression est *la marginalité*, « l'homme se repliant sur son propre être, à l'intérieur de certaines limites qu'il ne peut pas dépasser, vers un nulle part » (Scrima [2008], p. 28).

- *l'unité ouverte* ou « le cercle de Dieu », de communication ouverte avec le cosmos, qui contient l'infini et inclut de manière équidistante les relations de l'homme avec l'autre et avec le Créateur.

André Scrima décrit le mouvement de l'intérieur de l'unité fermée, comme étant le passage séparé et non-intégré de multiples niveaux de l'être, sans capter l'interaction discontinue entre eux et sans réaliser une correspondance avec les niveaux de la Réalité de l'objet de sa connaissance : le microcosme et le macrocosme. Cette réalité tronquée, réduite au Sujet qui ne comprend pas l'infini, mais l'indéfini : « On peut admettre des pas à l'intérieur de cette finitude et de ses limites : du niveau biologique on peut faire des pas vers le niveau psychologique, vers celui métaphysique, vers celui technique… » (Scrima [2008], p. 28).

On observe que les deux positionnements de l'individu vers l'univers intérieur et extérieur de lui-même sont représentés dans leur forme essentielle donnée par le symbole du *cercle*. L'interrogation actuelle sur la spiritualité réside, selon André Scrima, dans la conscience d'une question qui active la problématique de la conciliation de l'*unité fermée* et de l'*unité ouverte* du monde : « Mais le contenant, *le Cercle*, comment peut-il être dépassé, tenant compte du fait que tout réceptacle terrestre, tout ‹ contenant ›, même celui extérieur — le monde même — ne comprend pas l'infini, mais l'indéfini » (Scrima [2008], p. 28).

Pour la compréhension de la complexité suscitée par la question concernant la reconstruction de l'unité du monde et de la connaissance, en intégrant la logique du tiers inclus, nous utiliserons les observations d'André Scrima, au sujet de la notion du *centre*, en directe liaison avec le symbole du cercle. *La marginalité* ou la situation à l'intérieur de la finitude peut être transgressée par une sortie, par une porte : *le centre* (du cercle) : « Le centre est le lieu de l'origine, le point sur lequel s'appuie le compas pour tracer le cercle. Or, le point n'a pas de dimension, c'est un non-endroit. Il est l'origine du cercle, le lieu duquel dépend la circonférence, le lieu par lequel toute la finitude est gouvernée et dominée. Il se peut que les spirituels soient les marginaux du Centre (Scrima [2008], p. 29).

La solution spirituelle entrevue par André Scrima, de passage des frontières du monde par l'action de retrouver le centre comme « un voyage asymptotique, toujours recommencé » (Nicolescu [2007 a], p. 113) est compatible avec la vision *transdisciplinaire,* par le recours à un autre concept-clé : *l'unification*, comme tiers inclus entre l'unité fermée et l'unité ouverte. Le destin paradoxal de l'homme spirituel en tant que « marginal du Centre », se trouve sous le signe du tiers, par la vocation de l'union des contradictoires : périphérie/centre, finitude/infini, fermé/ouvert, intérieur/extérieur, limitation/transgression. En vibrant harmonieusement comme « théorème poétique » de la naissance de l'homme à la vie

spirituelle, les réflexions d'André Scrima avouent la présence du sacré qui est, en réalité, notre propre *transprésence* dans le monde : « L'être intérieur ne peut apparaître que par un abîme atemporel, qui n'est concerné ni par l'espace, ni par la logique. Mais l'être intérieur se nourrit avec temps, espace et logique » (*ibidem*, p. 153).

Reprenant la question d'André Scrima : « Mais le contenant, *le Cercle*, comment peut-il être dépassé ? », une voie possible de *sortie par l'intérieur* ou, en autres termes, faire « l'intérieur comme l'extérieur et l'extérieur comme l'intérieur » (*L'Évangile selon Thomas*), est le parcours « du chemin le plus court entre le petit infini et le grand infini : le conscient infini » (Nicolescu [2007 a], p. 153).

Le paradoxe ontologique qui s'ouvre dans le chemin du développement spirituel, convergeant avec la montée herméneutique[4] proposée par Jésus dans *L'Évangile de Thomas*, est le fait que l'*unicité* de ce genre d'itinérance consiste en ceci que c'est *un chemin sans chemin* : « une merveilleuse union des contradictoires : ‹ le topos-atopos › des anciens. Le lieu du non-lieu, l'espace du non-espace, le temps du non-temps » (Nicolescu [2007 a], p. 113).

Les intuitions fondamentales d'André Scrima permettent l'introduction ternaire du concept transdisciplinaire d'*unicité* dans « l'horizon » *de la limitation sans limites* entre l'unité et l'union, confirmant que « l'attitude transreligieuse n'est pas un simple projet utopique : elle est inscrite dans les profondeurs de notre être » (Nicolescu [2007 b], p. 153). L'*unicité* de la montée spirituelle est cette incarnation simultanée et cohérente du tiers caché dans l'être, dans le monde et dans le Mot vif : « Il y a une seule initiation véritable : l'auto-initiation. Son but : la rencontre avec toi-même après avoir passé par les épreuves du petit infini et du grand infini » (Nicolescu [2007 a], p. 153). André Scrima associe la spiritualité avec le concept d'*horizon*, dans la mesure où celle-ci représente « Ce que je ne détiens pas, mais ce qui me retient. L'horizon me contient, mais il s'éloigne au moment même où je veux m'approcher de lui » (Scrima [2008], p. 26). L'*horizon spirituel* de l'être humain est identifiable avec la zone du tiers mystérieux de la transdisciplinarité : dehors et dedans, l'intérieur et l'extérieur, le temps et le non-temps, haut et bas, le séparable et le non-séparable, le visible et l'invisible, la continuité et la discontinuité. Le sacré comme résonance de tous les niveaux de la Réalité et source de la naissance perpétuelle du tiers mystérieux inclus, institue le voile du Réel et ferme en ouvrant un *horizon* dont la cohérence est assurée par le circuit de l'information spirituelle ; il possède tous les attributs du rationnel (« il me

4. Thomas (1986), p. 15: « Il disait : Celui qui se fera l'herméneute de ces paroles ne goûtera plus de mort » (*logion* 1).

contient »), sans pouvoir être cependant rationnalisé (« mais il s'éloigne le moment même où je veux m'approcher de lui »). Quand nous voulons élaborer un discours cohérent sur la Réalité, nous devons mentionner cette zone de résistance absolue qui apparaît comme la source d'un double mouvement simultané et qui n'est pas contradictoire, de montée et de descente par les niveaux de la Réalité et la perception, assurant une continuité dans le discontinuité, selon l'observation même d'André Scrima, abordant une problématique paradoxale au domaine spirituel : « C'est ce qui rend intelligible un ensemble d'éléments, sans que ces éléments, en eux-mêmes, puissent être réductibles aux *objets* de connaissance » (*ibid*.).

En décrivant en termes propres les modalités d'*extension verticale* de l'être, André Scrima est en résonance avec la vision transdisciplinaire[5] qui donne un nouveau sens à la *verticalité de l'être* par l'orientation cohérente du flux de l'information spirituelle qui traverse tous les niveaux de la Réalité, en faisant communier notre esprit avec la zone ineffable du Réel, dans les lointains qu'on n'a jamais soupçonnés, des marches du sacré. L'unité ouverte entre le texte sacré, l'objet de l'herméneutique transdisciplinaire et tout pèlerin spirituel ou le sujet transdisciplinaire, se traduit par l'orientation cohérente du flux de l'information spirituelle qui traverse *l'organisme textuel composé par la lettre et la valeur numérique, animé par l'Esprit* et le flux de la conscience qui parcourt les niveaux d'être qui structurent l'évènement de la réceptivité ou de la réponse humaine *aux livraisons de soi-même du divin*. Cette cohérence de la continuité dans la discontinuité par les méthodes d'avancement et de passage d'un niveau du chemin spirituel à un autre, unifiant dans la vision d'André Scrima ([2008], p. 31), deux facettes distinctes d'une seule Réalité : *l'expérience*, qui « dans le sens commun, est extérieure, appartient au tangible et s'adresse aux sens, corporels ou intérieurs » et *l'esprit* comme « réalité qui s'oppose, échappe, transcende, va au-delà de ce qui est expérience ».

Le terme *expérience* a ses racines dans le mot grec *peira* et signifie « essai », ce qui est essayé, tenté, dans le double sens du mot : le sens *passif* : j'ai été tenté, j'ai enduré, j'ai pris sur moi-même une partie du réel qui m'a mis à l'épreuve ; le sens *transitif* : je suis celui qui met à l'épreuve cette partie du réel dont je fais l'expérience.

Le préfixe *ex-* du mot *expérience* signifie « à partir de ». Je parle à partir de l'essai, de l'épreuve. *Ex-périer*[6] comporte deux versants : celui de

5. Cette verticalité constitue, dans la vision transdisciplinaire, le fondement de tout projet social viable (Nicolescu [2009], p. 94).

6. « Expérience — le fait d'assumer quelque chose considéré pas seulement du point de vue du phénomène transitoire, mais comme un élargissement ou un enrichissement de l'être (de la pensée). Perception (expérience extérieure) — conscience (expérience intérieure) », note manuscrite du dossier du cours d'André Scrima ([2008], p. 33).

la perception, intérieure ou extérieure, et celui de la conscience. L'homme transforme en conscience le plus vaste domaine d'expériences ou de perceptions possibles : « Ne pas passer par la multiplicité de perceptions, quelle que soit leur provenance, sans les transformer en conscience, parce que sans conscience le domaine des perceptions risque de rester non seulement aveugle, inexpressif, insignifiant, mais en même temps, aveuglant, dans le sens qu'il ne me communique rien, il ne me parle pas, il ne m'illumine pas (Scrima [2008], pp. 32-33).

Conclusions

- Toute *expérience spirituelle* implique une *attitude transreligieuse* dans la mesure où celle-ci implique, par sa mission même, la réunion de deux termes contradictoires : *expérience* (comme zone de résistance de la Réalité) et *spirituel(le)* (non-résistance) et leur conciliation dans une structure commune fondatrice : la présence du sacré ;
- L'expérience spirituelle est corrélative avec la synergie d'une présence sensible du trans-sensible par une incarnation du sacré dans le visage inimaginable du tiers mystérieux, servant, assumant et transfigurant la Réalité ;
- L'attitude transreligieuse est celle qui, issue d'une transdisciplinarité vécue, nous permet de chercher, de découvrir, d'être bouleversés et de s'étonner des valeurs universelles des traditions religieuses et areligieuses qui nous sont étrangères, pour arriver ainsi à une vision transreligieuse du monde ;
- L'attitude transreligieuse ne se trouve en contradiction avec aucune tradition religieuse et avec aucun courant agnostique ou athée, dans la mesure où ces traditions et ces courants avouent et nous permettent une vive communion avec la réalité irréductible du sacré dans le monde.

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A Transdisciplinary Perspective on the Concept of *Reality*[1]

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Dicas nove sed non dicas nova
VINCENT LERINUS

Hamlet: "Do you see nothing there?"
Queen: "Nothing at all: yet all that is I see."
WILLIAM SHAKESPEARE

The Eastern Christian Perspective

It is not our intent to produce a monographic study along the trodden path of Christian religious cosmology. What we want, however, is to identify within the orthodox Christian theology a valid criterion able to legitimate *reality* and mark a clear distinction as well between what *can* and *cannot* bear this name. it is about a kind of "metaphysical" criterion announced by the revealed texts of the Bible, adopted and amplified by the patristic literature, able to constitute a solid basis for a comprehensive dialogue with sciences; more precisely, with the sciences' vision of reality.

1. This paper is the fruit of a joint effort of three scholars who shared their contributions according to their competences: Gabriel Memelis (Theology), Adrian Iosif (Sciences), and Dan Răileanu (Philosophy). Nevertheless, this is noticeable in the body of the paper that develops in the already mentioned order three distinct approaches from three different angles of the same topic: the vision on reality. Consequently, the differences in style, for which we apologize, are understandable. We hope that those differences will not interfere with the global vision of the paper, which we intended as a unit, the delimitation of competences providing the advantage of a high scientific honesty. At first glance, the reader might notice a correlative scarcity of the three perspectives. In reality (*sic*), there is nothing more than our precaution not to force certain correlations, leaving opened to the reader the option of making or to criticizing them. In this respect, for this participative continuation of lecture to be successful, we believe that the possible contact points between Theology, Science, and Philosophy are suggested well enough within the three contributions.

The task we assume is not only novel, but quite difficult, because (no need to demonstrate the obvious) Eastern Christian theology did not develop what, in philosophical terms, is identifiable as ontology — that is a systematic discourse on reality. Nevertheless, we will try to show that, even if it does not produce an ontology, Eastern theology, as any other coherent vision concerned with the Reality, is able to sustain at least one principle of ontological engagement; a principle akin to the ontology of nowadays' Science.

This is why we will select among numerous aspects of the Christian discourse only those instances with relevance to reality, that can also be relevant to the scientific paradigm of our days. A paradigm within which the research of what we usually call the "real world" acknowledges — in its premises, methods, and results — the strong existence of the observer, the human subject *involved in this very world*, not contemplating it from an outside post. This paradigm puts in the center of all concerns of science the possibility of a new philosophy of nature that enables us to think in a coherent way about introducing man into nature (*cf.* Prigogyne & Stengers [1979]).

Our concern will then be to shape out possible correspondences and homologies of ideas fit for this interface, exploring them in the trans-disciplinary manner of fusing horizons. In the end, we should mention that by this kind of fusion we do not aim at articulating a new "meta-physic", as a meta-discourse intended to legitimate altogether religious cosmology and natural philosophy, deriving from the current scientific discourse on reality. This kind of preoccupation would be not only unfit, but counterproductive too for both theology, and science.

Ta onta «ouk ex onton»: *The creation "out of nothing", or about the difficulties and solutions of grounding a theological ontology*

The Christian teaching about God creating the world "out of nothing" is well-known. However, "out of nothing" refers to God's uttering His creative word, not to a demiurgical modelling of a preexistent matter. Implied by the story of *Genesis*, this traditional teaching is explicitly confirmed by the Old Testament in *2 Maccabees* (7, 28): "…God did not make them [the ones seen in the skies and on the ground] out of things that existed (*ouk ex onton epoiesen auta ho Theos*)".[2]

2. We stay by the text and topic of the *Septuagint* (rendered inside brackets) in order to avoid the nonsense implied by the lecture "from those that were not made them God", proper to other translations. The expression "from those that were not" raises insurmountable logical difficulties (how can we assert something that was not?), or ends at the best in a reification of the original void.

Certainly, this is not the only verse endorsing the doctrine of the creation "out of nothing". The New Testament as well, apart from certain explicit occurrences (*Romans*, 4, 17*; Hebrews,* 11, 3), confirms that through numerous texts referring to the creation of everything seen and unseen by the Word, Jesus Christ (*John*, 1, 3; *Ephesians,* 3, 9; *Colossians*, 1, 16; *Hebrews*, 1, 2 and many more). It is worth noticing that in *Hebrews,* 11, 3 the formulation is even more mysterious: "things which are seen were not made of things which do appear (*eis to me ek phainomenon*)" — the Apostle seemingly suggesting a "noumenal" origin and under-layer of the seen world, though not in contradiction with the thesis of creation "out of nothing". *I.e.*, if we give (as the Fathers did before us, thus christening the platonic archetypal categorization) an elevating negative meaning to the original "nothingness": the ones all above the sensitive being (*hyperousios*), the archetypal intelligible models of the ones seen, are named "nothing" due to the ontological, absolute, difference from those that are to be created. Whose models "are not" (or "nothing") only in an apophatic sense, surpassing all that we identify as "being" in the perceived world.[3]

By accepting the creation *ex nihilo*[4] as a declaration of faith, any further efforts to find an essentialist ground to reality, a fundament of it in itself, is definitely put into crisis because "the created universe, in itself (is) implenitude and indeed non-being" (Lossky [1976], p. 91). However, that does not mean that reality rests suspended in a sort of "metaphysical frigidity". In complete accord with the universal religious ontology and the nowadays discourse of the natural sciences, the *ex nihilo* biblical cosmogenesis acknowledges us only on the fact that reality does not contain within it any absolute criterion or landmark able to validate it *qua* reality. It is not given *per se*, it is not ontologically self-sufficient (nor epistemologically, axiologically or semantically, because it does not host an absolute criterion of truth, value, or signification), nor can it explain itself by exclusive reference to internal causes.

On the other hand, and paradoxically, this ontological suspension represents the one factor that gives the world its alterity, its character of something different from God, but not out of God, of "an entirely new subject, with no origin of any kind either in the divine nature, or in any matter or potentially of being external to God" (Lossky [1976], p. 92). The creation "out of nothing" settles an ontological (not "topological") distance between "I am that I am" and the creatural hypostasized nothing-

3. See, for example, St. Maximus the Confessor, *Scholia in librum De divinis nominibus* IV.10 (in P.G., t. 4, col. 260 C).

4. An expression patented by the *Vulgata*, in *2 Maccabees*, 7, 28.

ness next to God, or, better, "in front of God".[5] That, overall, not in order to deplete the created world of ontological value, but to declare the foundation of its project, its reality and goal, only into the divine volition. For the Eastern-patristic theology, from Basil the Great and Gregory of Nyssa to Maximus the Confessor and John Damascene, the ontological grounding of the creature is this unconstrained and uncensored willingness of God that does not bear any metaphysical interrogations about any cause susceptible to move it toward creating beside His completely unconditioned love. For this reason, we can say for now, along with the whole Tradition, that for the Eastern Christianity the basis of reality is (if this terminological innovation is not too encumbering) "thelimatological" — given in the divine will (*thelema*).

Nevertheless, it is not our intention to recapitulate common places of theology, however prestigious. As noted in the *Introduction*, our intention is to explore a different ideative lode, nonetheless founded on the authority of the texts, able to bring us closer to the scientific vision and to appraise the role of the subject not only in relation to reality, but in its "real-isation" as well.

The New Testament reiterates through the Apostle Paul the *ex nihilo* creation theme: God is the One who "calleth those things which be not as though they were" (*kalountos ta me onta hos onta — Romans*, 4, 17).[6] This is a crucial verse that helps us avoid the understanding of the divine act of creation as "handwork" (an act that otherwise could tempt us towards manufactural representations), affirming a *personalist-dialogic* grounding to the "out of nothing" *ontos*.[7]

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5. These delimitations from the temptations of a theological realism, to which we are driven by the canonical texts, do not pushing Christian cosmology to become reducible to the cosmic illusionism of the Oriental mystical philosophies, according to which the worlds stand under the sign of an definitive appearance, a principle generator of the universal illusion (*maya*), that makes them empty of being and signification. For Christianity, the world, although lacking self-sufficiency, is not deprived of ground and consistency, it is not a mere "bubble of vacuity" resulted from a divine playing (*lila*).
6. The rendering of the Greek term *hos* by "as though", although literally correct, can infer semantically the risk of a lecture in vaihingerian key: of an *als ob* transferred to the realm of ontology, completely unsuitable theologically. God is not fictionally fooling Himself by calling towards Him a world definitely inconsistent "as it would be", knowing that, in fact, it is of no ontological value; He speaks to the things that do not exist (or exist only virtually, with the mention that the tension virtual/real is not applicable to God) exactly as (*tamquam* in Vulgata) if they existed, thereby investing them ontologically.
7. By stating that, we do not come in contradiction with the patristic tradition mentioned above (what we called the "thelimatological grounding" of created reality), as long as the *Persona* who calls to existence the world acts freely his will. It is only about another nuance of the creative act, toward which the Pauline theology opens, and which can serve our purpose here.

It may be sustainable righteously that the ontological prestige of reality is sufficiently confirmed by the fact that reality is the product of a *creative* act: God did not create an illusion, but a real existence. He gave ground to reality by extracting it from non-being, which is an irreversible fact, essentially *positive*[8], a happy "condemning" of the being to be, obliterating the way back to non-being.

Moreover, according to St. Maximus the Confessor, God indeed granted to rational creatures — on which the fulfillment of the totality of created reality depends (according to Paul's advise in *Romans*, 8, 19-21) — the gift of "being" (*to einai*), in order for all of them to move according to their nature (*kata physin*), by exercising a (gnomic) will. A will that also became, due to this motion, ontologically formative according to the divine model (image), and able to move, therefore, the rational creatures along a gradient of ontological escalation ranging from the simple existence (*to einai*) to happy existence (*to eu einai*), and, finally, to everlasting happy existence (*to aei eu einai*): once the rational beings made, says St. Maximus, they are all moved "according to their nature (*kata physin*) from the beginning (origin), because they (simply) exist (*dia ton einai*), toward the end (to their target), after the will's choice (*kata gnomen*) for the happy existence (*dia to eu einai*). Because the target (the end) of those that are moving is the everlasting happy existence (*to aei eu einai*), as the beginning is the existence itself. And that is God, Who is the Giver of existence and Granter of happy existence as beginning (descent) and end (target)".[9]

According to St. Maximus, the three reasons of the human existence (simple, happy, everlasting) preexist (*proonta*) within God[10], the firmness of the ontological grounding of the created reality according to Christian thought being once more confirmed. His idea holds a theme common to the theological meditation within Eastern Christianity — on which Dionysius Areopagites already insisted, glossing on Paul's texts (mostly in *De divinis nominibus* I. 4, 5; IV. 7, 10; V. 5, 6, 8, 9) — affirming a full blown "proto-ontology" with respect to creatures. Again, not in an origenist note

8. Unlike mythical pre-Christian cosmogonies (more precisely the platonic cosmogony of orphic-pythagorean inspiration, later transferred into origenism), for which the demiurgic act of edifying the world is the result of a fall (*kathodos*) of souls from the immobile state (*stasis*) of an initial pleroma. Hence, the world is nothing but a prison, a seat of becoming (*genesis*) that opposes the being, in which the souls fallen into bodies "consume" by an indefinite number of rebirths (*palingenesia*) the consequences of the pre-cosmogonic fall. The Christian ontology of creation reverses this trio of the Greek vision — state (*stasis*), movement (*kinesis*), creation/becoming (*genesis*) — proposing an intensified ontology, on the path creation — movement toward godly — rest in God.

9. St. Maximus the Confessor, *Ambiguorum Liber*, P.G., t. 91, col. 1073 C.

10. *Ibidem*, col. 1084 B-C.

but in the sense that the models/reasons of actual things were assumed at the level of the divine Logos before the actual creation — that is, before bringing them to light. Because the ideative territory opened here is too specialized and difficult, we will not enter it, so as not to deviate from our precisely defined intentions; nevertheless, we invoked it as an argument showing the consistency of the ontological base of created reality.

About the anthropology of St. Maximus, his suggestion should be noted that, on the other hand, any option contrary to the natural tendency of human will towards God leads inevitably to a progressive ontological disfiguration or, in other words, to an in(de)finite tendency towards a minimal state of being — but without regressing to non-being.

Indeed, we cannot subtract reality from creation without damaging the creative quality of God. In addition, Paul's text quoted above instructs us that the very act of creation, the very ontological setting of reality, must be first perceived as a dialogue. Ergo, *what God calls to existence can be validated as reality* (driven to by the analysis made up until now, we can enounce this as a Christian ontological principle of engagement); and, once called, as a hypostasis of this calling, it should maintain and increase its quality of being through the *answer* given to the Creator. However, the divine call is not confined to the act of creation, but persists relentlessly, laying out before man the road map of the ontological anabasis of which St. Maximus speaks: God calls man, and through man the whole reality, not to a bland existence, but to a happy one, and, by the *end of days*, to an everlasting existence. Man's advance and, consequently, of creation, on this route depends entirely on committing to an answer articulated as factual living in conformity with the divine Logos (through whom God's call is uttered).[11]

Accordingly, this "ontogenetic" prestige appoints the dialogue between God and the world He creates by uttering to existence as exemplary model for the *vocative-dialogic positioning of man* towards the created reality. By his quality of being "in God's image", man has the (prophetic) vocation to ontologically elevate the entire creation to the status of *topos* of a generalized dialogue, by calling all that exists according to the divine word (*kata logon*) disseminated in each one. The growth of man in relation to God from "image" to "likeness" (the iconic homologues of St. Maximus' ontological stations) has a correlative in the ontological growth of created

11. From the angle of view of this dialogic binomial (divine) calling — (creatural) answer, it is possible to reevaluate the great chapters of theology. This is not the intention of this paper, however. Nevertheless, we have to remember that a supplication in one of the beginning prayers of the Orthodox liturgy invites the orant to acknowledge the decisive importance of the *answer* God is expecting from him: "Lord, have mercy to us, because, not knowing any of the answers, we bring to You this prayer…".

reality, from the paradisiacal state to that of the Kingdom of Heaven. That is, from Eden, "sowed" (*Genesis*, 2, 8) as a germinal word into the texture of reality, to a completely transparent environment to the divine Logos.

The well-known "onomaturgy" of Adam constituted the *incipit* of this itinerary to fulfillment of the anthropo-cosmic reality through calling: Adam "called the names"[12] (*ekalesen onomata — Genesis*, 2, 20) of all living creatures, thus exercising the ability he was trusted with by being created "in God's image (or model)"; not quite bringing the world from non-being to being, but establishing an anthropic reality by calling/naming it, as well as by appropriating it — reality being named after the names *he* uttered (*Genesis*, 2, 19). Thus, Adam "humanized" the universe through his utterance (in the sense that he con-forms it to his own *ontos* — solidary with the ensemble of creation and yet uniquely distinct). The universe that had been given to him by genesis was somehow re-created by this calling, in the terms of Adam's own "cognitive matrix", beginning from his immediate habitat, from the proximal reality. If not interrupted by the sad interlude of the fall, this process would have evolved concentrically in ever larger and higher circles. Unfortunately, the naming of the woman (*Genesis*, 2, 23) was only one further step in the process.

From our thematic perspective, it is possible to fusion the present day ontological horizons of theology and science by proposing that this dialogue stand as a paradigm for any relation between *man* as subject and *world* as object — provided that the relation is correctly assumed and regained in today's scientific vision of reality. The minimal ontology on which modern scientific research is founded retrieves indeed an interactive dialogic framework. The impact of quantum mechanics bears the responsibility for that reorientation towards a dialogic paradigm that overpasses the impervious onto-epistemological separation between subject and object. A physicist of such amplitude as W. Heisenberg stated unequivocally that the atomic physicist had to resign to the fact that his science is nothing more than a link in the chain of the dialogue of man with nature, that science no longer speaks simply about nature "in itself" (Heisenberg [1995]). The goal of modern research is no longer concerned

12. Taking into consideration its consistent hermeneutical benefits, we prefer the form "called the names" to that of KJV ("gave names"). Adam's naming of the creatures was an *onomaturgy* (a true act of re-creation by naming), a baptismal ritual *ante litteram* officiated by Adam as a priest in the Church of creation. Nonetheless, it was not a simple inventory of beasts or a zoological taxonomy. On the other side, our selected translation confirms, in the authentic spirit of Hebrew, the idea that we are following here, namely that the phrase "called the names" reveals an indissoluble link between *name* and *being*, relative to reality (either cosmic or human). By calling the names of all creatures, Adam reiterated on the human scale, in a true spirit of *imitatio Dei*, the divine act of creating the world by uttering.

with the movements of the atoms *per se*, regardless of experimental observation, but we rather discover that from the very beginning we are within the center of the dialogue between nature and man, in which natural science is only a part — thus, the usual categorical split between subject and object, or interior and exterior world, is useless, inducing many difficulties. For the natural sciences, too, the object of research is not nature itself anymore, but nature scrutinized by man (*ibidem*).

However, this possible approach and eventual fusion will preoccupy us in detail after the presentation of yet another dimension of Christian ontology, relevant to our theme as well.

The "perspectival" founding of reality: The world "in the face of God"

What are the ideas we consider clarified up to this point, on which the coming together of Tradition and Science on the theme of reality can be established thoroughly and without hasty exaltations? Precisely, that both Christian, and scientific ontology share in common: (i) the vision of what can be called "reality", a clear-cut delimitation from realism, in the sense that neither of the two discourses — theological and scientific — has (any longer) as an object a pretended "reality in itself", self-sufficient and objectively founded (a delimitation that does not automatically induce the option for philosophic idealism); (ii) an interactive-dialogic pattern regarding the relationship between man and world. Our day science rediscovers man as a subject of a reality in which he is a participating actor, not a simple spectator; reality is a *theatrum mundi* in which the human subject, through its role, imprints decisively its mark on the development of the "play", on the way in which reality presents itself — nevertheless, without implying that reality, ceasing to be considered "objective", will remain only a subjective projection of his or her mind.[13]

Furthermore, we will insist upon this aspect from a theological point of view; precisely, we are interested in how it anticipates and welcomes a completely surprising fact that has been noticed mostly in fundamental physics research. Namely, that (phenomenal) reality and its corresponding conceptualization change qualities according to the shift in the theoretical, methodological, and experimental frame of the observing subject. In other words, reality reveals itself depending on the way in which the human

13. Heisenberg (1971) synthesizes marvelously these two aspects, asserting that our image of nature, according to the exact natural sciences of our times, exemplifies not nature as it is, but our relations with it. Moreover, he states that the old separation of the world in an objective existence developing in space and time, and a spirit that reflects this development (Descartes' *res cogitans* and *res extensa*) is not suitable to understanding the modern natural sciences, because these are interested, more than anything else, in the reciprocal relational network of man with nature, of which science is a part.

subject "interrogates" it or, as has already been stated, "the perspective creates the phenomenon". The quantum infra-reality does not present itself as being simply "out there", so that the observer has nothing more to do but notice it (according to the development and possibilities of his investigative means) as an obvious reality, objectively existent. The quantum universe does not conform to the metaphysical presuppositions of the classical model of reality. It cannot be considered anymore as simply "existing" (in the classical understanding of an objective, single state), in an aprioristic way to the observation act, uninfluenced by the intervention of the observer, by the frame he chooses to watch. In other words, in order to understand the quantum world, a *redefinition of the concept of "reality" as a correlative to that of "perception" and, finally, to that of "perspective"* was necessary.[14] Confronted with the Cartesian model of a reality whose essence is the extension (spreading) outside a thought that also validates it ontologically as an aprioristic *datum*, independent of the observation act, reality is no longer objectively given, nor independently objectifiable. The observer contributes to the "real-ization" of reality, without implying that he is the metaphysical instance that can absolutely confirm it *qua* reality. Nevertheless, the ontic aprioricity and the perseity of the modern vision give way to a new concept of reality — interactive, dynamic, and intrinsically related. Natural sciences cease to report about the physical reality in itself in favor of a discourse about reality as a system of relations (of not only local connections, but also non-local).

By positioning ourselves in the "referential system" of any religion, we can see that none of them speaks about the reality of what we call, with a widely general term, the "sphere of the Sacred" as imposing (even though ontologically self-consistent) with the force of evidence to any individual consciousness, with any objective or objectifiable necessity of a (macro)physical or intellectual fact (through a rational argumentation absolutely peremptorial); however, also not implying that the reality of the Sacred could become relative by linking it to the affective or imaginative faculty of the human subject.

Regarding Christianity (a religion whose central idea is precisely *the reality of God's presence* in Jesus Christ's persona), we certainly remember that this reality never imposes itself as an evident fact, independent from a certain implication/positioning of man towards it. On the contrary,

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14. This vision was generalized and refined by physicist Basarab Nicolescu, who proposed a theoretical model in which reality is conceived as an open structure of levels to which correspond, within the "texture" of the subject, certain levels of perception (Nicolescu [2007], pp. 43-45). We can follow, in the same spirit, that reality rather *unfolds* its levels, as the subject activates his or her corresponding levels of perception, which are, in fact, his or her own levels of reality.

the Incarnated God[15] assumes a complete anonymity (a perfect camouflage into the profane, as Mircea Eliade would have said) from the very beginning, precisely *in order to confirm man as a subject*; thus making way for his perceptual initiative, not forced in any way by means of a spectacular "denudated" godliness that would confiscate man's liberty, consequently annihilating him as a subject. In addition, even when the anonymity ceases, and Jesus asserts publicly His filial divine identity, His statements in this direction are never accompanied by probative miracles. Jesus consistently avoids the temptation to demonstrate irrefutably, through the means of ostensive miracle, the divine reality of His Persona, even though, as narrated by the Gospels, He was ultimately asked by the Jewish religious elite to do so. On the contrary, the Lord offered the revelation of His identity, and that of His divine reality, only to that one person opened to invest *faith* into the relation with Him. Moreover, in Christian terms, faith translates exactly man's availability to assume independently from *certainty proofing* a vision, and implicitly an existential engagement, that projects him over the seeming evidence of the sensorial plan toward the realm where "those unseen" reveal themselves as more real than "those seen". At the same time, faith is the basis of eschatological realities (*Hebrews*, 11, 1-3), more precisely of *the highest-degree reality*. Faith represents a completely free act, not constraint or causally determinated by evidence, by the acknowledgement of a fact obvious to everybody — however, it should not be confused with subjective gullibility. This free investment in trustfulness opens toward the believer a totally different way of *seeing* things, practically a new perceptual horizon in which "those of the future" are perceived as present here (*Hebrews*, 11, 20). In conclusion, *faith is capable to "extract" from the virtual the* ontos *of its object*[16], just as God brings forth to being everything by His call, as we have seen already.

Otherwise, what we have here is the occurrence of a fact universally acknowledged: everywhere in religion, the perception of the Sacred as "real" *is conditioned by the availability of man to assume for himself a radical change of mentality and behavior*, a mutation capable to open another perspective over reality, and over the relations with his own kind as well.[17]

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15. From the perspective of the Real-reality distinction, Incarnation represents the coming of the Real (of the "One who is" *per se*) into the reality of an assumed human nature. The Real (Jesus' godliness) does not denude itself in any way by Incarnation, it remains un-objectificated despite its ineffable expression in the reality of a human existence.

16. The texts are once more explicit on that: "What things soever you desire, when you pray believe that you receive them, and you shall have them" (*Mark*, 11, 24, and *loci similes*, *Hebrews*, 11, 27 etc.).

17. As a proof of the universality of this exigency, we offer the permanence of initiation rites in the history of humankind, the scenarios of which go invariably through the

Generally, the ascetic imperatives of religions condition the access to the Sacred by a transfiguration of the way of being and thinking. What produces this total change is not an obvious fact, nor one of a contextual or subjective nature, but a special kind of pressure from something man perceives as being over the "objective" reality and over what constitute the manifold, changing, relief of individual or collective psychism. In other words, the perception of the Sacred as an "irreducible real" (M. Eliade) is realized beyond the classical dichotomy between objective and subjective universe. That is, in a *trans-subjective* territory obeying different rules of perception, analogous perhaps only to those of holistic psychology. And that, only because a religious metamorphosis of life, of the perspective over the world and man altogether, guarantees the access to a supreme level of their reality.[18]

Back to Christianity, we should once more remember the imperative first pronounced by John the Baptist and further by Christ Himself, relevant to the fusing of horizons that we are proposing here: "Repent, for the kingdom of heaven is at hand!" (*Matthew*, 3, 1-2; 4, 17). Where the term *repentance* (gr. *metanoia*) has precisely the meaning of changing/renewal of mentality, of the perspective over the world; a mutation immediately followed by the *perception* of the "Kingdom of Heaven" as a *real*[19] topos by excellence. By placing himself through the means of the *metanoia* in an "angle of view" proper to God, from which the world is *seen differently*, man can access its *true reality*; which is none other than that of the "Kingdom of Heaven". Repentance, in the proper meaning of the Gospels, has the parameters of a change *ad fundamentis* inside man, a change resulting

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symbolic sequences of death and rebirth. Any person who intends to begin a religious experience is first required to die symbolically, in the sense of a radical and irrevocable departure from the old way of being. That with relevance to the idea we are following here; this ritual death symbolizes the radicalism of a tearing *vision* of the world, it is the condition of the possibility of starting an authentic religious life. That is why, within the typology of the initiation, "death" is followed by a ritual "rebirth"/resuscitation as a sign of the beginning of a fundamentally new *modus vivendi*.

18. Bertolt Brecht, a non-religious author, referred surprisingly to this relation between the answer to the question related to the reality of the Divine and the universal imperative of all religions regarding the change of life. Somewhere within the volume *Stories from the calendar*, the German playwright says, through a generic character, mister Keuner, who was abruptly asked if God exists: "I advise you to think whether your behavior changes according to the answer to this question. If it does not, we can renounce the question. If it changes, then I can help at least by telling you that you have made up your mind already: you need God" (Brecht [2001]).

19. Although the Liddell-Scott lexicon gives for *meta-noeo* "to repent", as well as "to change one's mind, to change intentions", in the vocabulary of the Gospels, and later in that of Christian asceticism, this term is used in a "strong", initiating way, of transformation at the level of the vision of the world (*Weltanschauung*), of redefining the way in which man, mentally and behavioristically, approaches the reality he lives in.

from a drastic, nevertheless "realistic", evaluation, done by the means of divine criteria, of his life up to that point, concomitant to his decision to start a new life freed from sin and death.

Besides, the fact that repentance (*metanoia*) introduces indeed the religious subject into a new anthropo-cosmic reality (which has a table of values fundamentally incommensurable in reference to our current one), thus opening the "perceptive" and axiological horizon of Divinity to man, displays Christ's exigencies pronounced in the *Sermon on the Mount* (*Matthews*, 5-7) thus tracing for man a profile almost revolting by its alterity, nevertheless a profile perceived from the divine "perspective". Consequently, the behavior of such a man includes manifestations that, by the common logic of behavior, can reach the absurd; but they are in fact, in the new reality opened by the *metanoia*, completely coherent: love even towards the enemies, turning the other cheek etc. The capacity to make such gestures derives naturally from the new condition of existence of the repented man, who perceives in his dense and ultimate reality as son of God, "through the eyes of God", his own kind as his brother, even though that one has erred badly.

As expected, and certainly understood up to now from the text, this chance and ability of religious man to accede to the ontologically consistent reality (his own and of the world) by changing the perspective is assured by the archetypal correlation between perspective and reality, given at the divine level. In this respect, the biblical text presents what can be rightly called a *prosopic ontology* (from the Greek word for face, *prosopon*). If, as already seen, the anthropo-cosmic being was conceived in its entirety in a paradigmatic frame configured by the divine ideas/wills, it will be ontologically ensured only if it continues to place itself "in the face of God"[20] (as in *Psalm* 104, 29), in "His visual perspective" accordingly. This "perspective" being of a conceptive kind, God can also "perceive" from its angle the most profound, "denuded and exposed" reality of all creatures (*Hebrews*, 4, 13).

The creation itself of man "according to the Image of God" (Gr. *kata*, in *Genesis*, 1, 27) evinces his inclusion from the very beginning inside such an iconic "conceptive-perceptive" frame that, according to the patristic exegesis, is nothing but the Effigy Itself and the Incarnated Son of God, Archetype of the human creature as well.

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20. It is about the same exigency that is referred to in the platonic language of the Fathers as con-formation of the creature (by participation) to God's models. We stress the fact that by proposing this perspectival language we do not intend to simply paraphrase metaphorically and theologically an alternative discourse, more or less exotic. Taking the risk of being accused of "perspectivism", we are trying a different hermeneutical vein in fact, one completely justified by the insistency of the biblical text on such perspectival terms.

In a most famous fragment, St. Maximus the Confessor speaks about Incarnation as the grounding and sense of creation, as the mystery in the "perceptive horizon" of which God brought everything into being: Incarnation, says he, is the godly scope, thought-out even before those that exist (*ho tes arches ton onton proepinooumenos theios skopos*) […] Towards that final target *looking*, God brought to existence the beings of those that exist (*pros touto to telos aphoron tas ton onton ho Theos paregaghen ousias*).[21] So, beings have access to reality only because God conceived them by the means of "peering (*aphoron*)" through a "conceptive-perceptive" perspective focalized[22] on the Effigy of the Incarnated Son — the iconic matrix of the cosmic and human being.

St. John Damascene said as well: "He (God) saw[23] all things before they were[24], holding them timelessly in His thoughts (*achronos ennoesas*); and each one conformably to His voluntary and timeless thought (*kata ten theletiken autou achronon ennoian*), which constitutes predetermination (*proorismos*) and image (*eikon*) and pattern (*paradeigma*), came into existence at the predetermined time (*en to prooristhenti kairo*)".[25]

Then, the fulfillment of one of the defining vocations of man, the ontological regality apt to manifest itself through governing the Universe according to the divine image (*Genesis*, 1, 26), depends, in its turn, on a proper perceptive positioning of man towards reality, this one presented from the very beginning as a multitude of levels (as Basarab Nicolescu would have said) or, in biblical terms, as the "trees of Paradise"[26]. That is,

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21. St. Maximus the Confessor, *Quaestiones ad Thalassium de Scriptura sacra* 60, P.G., t. 90, col. 621 A.

22. *Aphorao*, used by St. Maximus, means precisely "to look at, to have in full view" (see the Liddell-Scott lexicon).

23. The Greek term used here is *etheasato*, from *theaomai*, "to look on, to gaze at". Hence, it is a similar meaning, as in St. Maximus' *aphorao*!

24. That is, He had them assumed already as models in His "conceptive-perceptive" paradigm, He contemplated them in the Efigy of His Son, and this iconic positioning in the "divine perspective" was conferring them already a "proto-reality".

25. St. John Damascene, *Expositio Accurata Fidei Orthodoxae* I.9, P.G., t. 94, col. 837A, (English translation by the Rev. S. D. F. Salmond, on http://www.ccel.org/ccel/schaff/npnf-209.html).

26. There is no need to argument the cosmological signification of dendroidal symbolism, as well as its long career in the history of religions. All that is a definite acquisition of the morphology of religions and were commented extensively by Mircea Eliade. Altogether, the image of the Cosmos, symbol of life, seat of divinity, ax holding the world, or mythical ancestor of man (genealogical tree), the tree reveals a prodigious symbolical polysemantic. A true vegetal ideogram of the Cosmos — signifying by its double arborescence, radicular and coronal, the "sky" and the "earth", referring to the transcendent and immanent linked by the trunk as by an *axis mundi* —, the tree is also a structural synthesis at the human scale of the Universe, a cosmic tree as presented in

man can "*eat* of every tree" (*Genesis*, 1, 16) or, translating the symbols, he can institute and dwell by means of modifying in the perceptive paradigm a multitude of possible aspects/levels of the world/ reality (or possible worlds, if we are to talk in the terms of modal Logic). Again, the fall of man had as an essential cause the *corruption of perspective* over reality (*Genesis*, 3, 6-7), a change that made him institute and populate up until the present days a defaced reality, eroded by the fracture of opposites — the biblical ideogram of which is represented by the "tree of knowledge of good and evil".

Finally, the massive occurrence in the biblical text of the syntagm "in the face of God" (*enopion tou Theou*) and "in the eyes of the Lord" (*en ophtalmois Kyriou*) in relation with the theological positioning of man, legitimates once more an ontology isomorphic to that of the modern natural sciences. At the same time, one of the oratory formulae typical to the old and new-testamentary liturgy as well resumes the chorus "Lord, do not cast me from thee face!"[27], thus confirming the same thesis: the created being is insured ontologically only insofar as positions itself in the path of the "visual perspective" of Divinity. The message carried by the Gospels is a continuous invitation to secure the "perceptive" posture of God, the only one able to bring fulfillment to the human being — in this respect, the *summum bonum* of Christ's commandments is "…that you love one another as I have loved you" (*John*, 15, 12).[28]

Certainly, the examples can be multiplied; however, we believe that it would be excessive. Those already invoked are sufficient to detach a preliminary conclusion, of axial importance, for the meeting with scientific ontology: the body of religions with stress on Christianity anticipate a representation of reality that will be retrieved by the sciences only at the beginning of the 20th century — a representation contrary, *avant la lettre*, to the "sanctified" presuppositions of the classical model of the natural sciences. The religious vision proofs itself to be contiguous to the acquisitions of the actual scientific paradigm that talk about a reality that is not addressing an "objective", inert, *datum* facing an observing subject, a sort

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mythology. It even anticipates the image of a fractal structure. Based on the symbolic analogy tree/cosmic reality, I think that assimilating the "trees of Paradise" with the multi-level reality of today's ontology and cosmology is not too far-fetched.

27. There are variants as "*Behold* toward me/my prayer", "Lean Your *ear* toward me/my prayer" etc. Far from being simple anthropomorphic formulae specific to Hebrew religiosity, as stated by hasty exegetes, these syntagms reveal clearly a suggestion of interactive ontology.

28. The loving of enemies referred above would not be possible without this preceding transposition into the divine "visual paradigm" from whence man is not perceived as a foe anymore, but is noticed in his ultimate reality and consistency as "image of God".

of *ek*-sistence outside consciousness and independent from it, the structure and phenomenal manifestations of which would not change under the incidence of the observing and measuring process. Today, sciences talk about a reality constituted anthropically, sensible to the *presence* of the human subject. The anthropology subjacent to the scientific research of today reverts to a more "decent", even religious, scaling the position of the observing subject, lessening him from the "metaphysical" altitude where the classical model had placed him and rearticulating him ontologically and epistemologically with the observed reality. He no longer can believe that, toward this reality, he occupies a position from where he might be able to know it in an essential manner, and to express his knowledge about it in a purely observational language (*i.e.*, unaltered by the data of the subjective consciousness), a language that might give him the impression of definitive and complete assertions about the nature and behavior of reality.

Our next chapter will develop in an analytical manner the historical route covered by the changing of paradigm that has made possible today an unprecedented configuration of the Science-Tradition rapport.

The Perspective of Natural Sciences

Methodological premises for a pertinent scientific approach

Commenting on the Shakespearian dialogue used as *motto* of this paper, Bertrand Russell confessed that he always asked himself how could the queen have known that she was seeing "all that is"? This question pervades obsessively not only the minds of poets and philosophers, but those of scientists, too. Very few scholars did not express, in one way or another, their own opinions about the nature of reality. To what extent, without abandoning the probity that should characterize the scientific act, can it be postulated that something *is* — that an entity can be considered, objectively, as a part of reality? "This is the question"…

The difficulty of this interrogation is contiguous to that of defining certain terms found invariably in its various formulations; terms like *object*, *subject*, *reality*, and *perception*. Obviously, before deciding what exactly makes something be real or not, the terms of what we call *reality* should be precisely clarified.

The philosophy of science distinguishes mainly between three ways proposing a definition of reality. That is practical realism (Kant), in which the existence of certain postulates that can be objectively rendered is admitted. Next, dogmatic realism (Einstein), insisting that *whatever* postulate regarding the material world can be rendered objectively. Finally, there is metaphysical realism (Descartes), holding that, even though things

exist independently from the subject, we cannot know reality in a purely objective manner, everything being nothing but mathematical calculation.

Once again, we identify the implicit or explicit use of the terms mentioned above. On the other hand, it is obvious that between the concepts of *subject*, *object*, and *reality* there is a certain relation. For our purposes, we will start from the premise that the nature of the concept of reality is given by the totality of reports that can be constructed inside the conceptual triad *subject – object – reality*.

In this respect, our methodological approach will start from the scheme regarding the subject-object relations developed by Basarab Nicolescu; briefly, it is about a stylized exemplification of the rapports subject-object, exposed in historical succession. Scrutinizing the vision of the above-mentioned physicist, we can discern mainly four types of subject-object rapports, each one synthesizing an epistemological attitude defining a certain period in the history of ideas.[29]

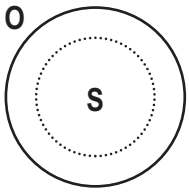

Figure 1 — Premodernity

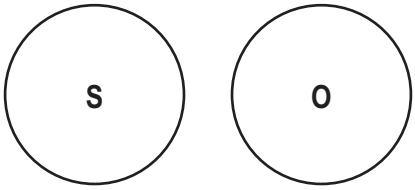

Figure 2 — Modernity

Characteristic for the pre-modern era is the fact that the Subject is "absorbed" inside the object (*Figure 1*). The Subject takes part in a reality described as a world of spirits, into which he inserts himself *via* the participation to ritual acts. Nature is not something from which we can "pluck" knowledge. The Object is not *known*, but allows *knowledge* about it, so that the Subject gets to know only what is revealed to him. In modernity, the Subject and the Object are each one constituted as self-standing entities (*Figure 2*). The Subject dominates the Object, tempting to subdue it.

29. Basarab Nicolescu, *Transdisciplinary Hermeneutic*, conference held at the Sambata-de-Sus Academy, 30 May 2009.

Postmodernism is characterized, regarding the relation between Subject and Object, by the disappearance of the Object, which finally ends up reconstructed by the Subject (*Figure 3*).

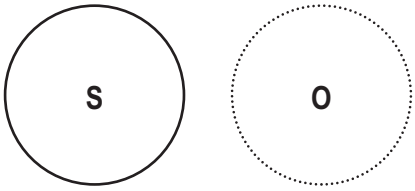

Figure 3 — Postmodernism

The transdisciplinary approach proposes a rebalancing of the relation Subject-Object through affirming a unity that conserves all distinctions between Object and Subject, inside the frame of a multiplicity of levels of reality (*Figure 4*). The Hidden Third (HT) mediates this "global cohesion" that averts the confusion (Nicolescu [2007], pp. 43-45).

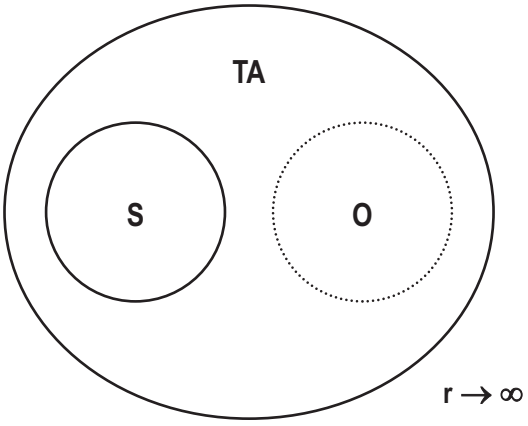

Figure 4 — Transdisciplinarity

Starting from this scheme (particularized accordingly to the exterior aspects of different theories and scientific currents), we will follow up the historical evolution of the idea of reality in science, parallel to the emergency of various epistemological streams. The concept of reality cannot be defined outside the relational hypostases Subject-Object; consequently, we appreciate that any definition must envisage a certain comprehension of these aspects.

In order to avoid a terminological mix-up, we adopt the distinction between Real and Reality operated by Nicolescu (2002 b). Consequently, Reality is that "that resists our experiences, representations, descriptions, imagining, or mathematical formalizations", while the Real is "what is".

"By definition, the Real is hidden forever, while Reality is accessible to our knowledge". In other words, we should renounce the illusion that science possesses the capacity to unveil "the things in themselves", the world in its "essence". Science is not capable to inform us, in an absolute way, on "what is", but only on what resists our efforts to describe, quantify, and understand.[30]

In the context of developing and interpreting the theoretical and experimental outcomes of modern physics, a number of other criteria relative to reality were proposed. For instance, for Born (1956), the idea of invariant is a key to understanding the concept of reality. On the other hand, he indicates that the old theories considering the amounts as invariants — for example, the distances in rigid systems, time intervals indicated by different clocks, or the masses of solid bodies — now appear as projections, components of invariant amounts, not accessible directly. The legitimate question that arises is if the new invariants are not, in their turn, projections as well in the frame of larger theories, of other invariants, of which we can legitimately ask the same questions — how can we be certain that we have established an invariant *in itself*, or, in a redundant formulation, an "absolute invariant"?

Another criterion of reality is formulated by Einstein, Podolsky, and Rosen in a famous article in which they assert that without disturbing a system in any way, if we are able to predict with certainty the value of a physical amount, then there is an element of physical reality corresponding to this value. Bohr however, argued that an ambiguity slipped into the formulation of this criterion referring to physical reality, precisely regarding the reference to the non-disturbance of the system. Criticizing the formulation of Einstein, Podolsky, and Rosen, Bohr (1958) stressed the importance of the very conditions that define the possible types of predictions concerned with the future behavior of the system.

Science does not probe the Real, the "what is in itself", but Reality, the things that interact through resistance with the knowing subject. The confusion between Real and Reality has, more often than not, as a result a heterogeneous mix of pseudo-philosophical rhetoric and scientific terms used abusively in importunate analogies. Consequently, we consider that this terminological distinction is due to put order into a segment of the discourse where inconsistency and ambiguity are habitual. Because one of the intentions of our work is the presentation of the concept of Reality in natural sciences, we will further consider the meaning described above, with respect to the understanding of the term *reality*.

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30. In Deutsch's reformulation, the criterion "if something resists, it exists" refers to the true statements behaving in a complex and autonomous manner, that can be taken into consideration as criteria for reality.

The becoming of modern science. Reality as total separation of subject and object

When we examine closely *Figures 1* and *2*, we see that the modern scientific revolution emerged as a complete "hatching" of the subject and its projection outside the object. Inside this complex process of passing from the pre-modernity of the Middle Ages to full blown modernity, we witness a dichotomy subject-object, or, as Constantin Virgil Negoiță put it, a sort of *pull-back* of the subject from the object. Thus, the subject detaches itself from the object in a way resembling that of an art critic taking a methodical distance from a work of art in order to evaluate it "objectively".

The question arising here is whether this epistemic *pull-back* was indeed necessary as an obligatory premise, initially fertile, of the emergence and development of the modern natural sciences. Could it have been possible to make science, indeed, as long as the subject subsisted absorbed within the subject? Could it have been possible to speak about a *resistance* of Reality as long as the knowing subject was perceived as being contoured evanescently in an objective and animated Reality?

Heisenberg, looking for an answer to these questions against the *theological* background of the times when modern science was born, did not hesitate to project forth the epistemological initiative of a separation between subject and object. He stated that a certain specific trait of Western Christianity, which he qualified steeply as "atheism" (Germ. *Gottlosigkeit*) had projected God as a far, distant, *Deus otiosus*, allowing for a paradigm in which man, as an autonomous subject in relation with God, could have considered nature, consequently, as an object separated from him. According to Heisenberg, the changing in attitude toward nature of the scholar, in such a way that God seemed hurled into the skies so far that regarding Earth as independent from God made sense, entitles us to talk about a loss of God specific to Christianity, thus being able to understand why other cultures were spared of such a development; maybe in connection to that development, nature also becomes an object of artistic representations, independent of religious themes; the ideal of an "objective" description or explanation of nature corresponds as well to this consideration of nature as independent not only from God, but from man too.

Without pleading *pro domo*, and without starting from the premise that the birth of modern science in Europe was the best in all possible histories of that ideatic flux, we need to argue that such a tendency toward "impiety" was not manifest in Eastern Christian theology as well. Here, the thinking of the Holy Fathers kept together the triune God-man-cosmos in an inseparable whole, a perception that always enabled the holistic, interdependent, approach of any of these terms — despite the "risk" (not necessarily pernicious) of not generating a "scientific thinking".

Like Heisenberg, Bickerton considers, too, that the progressive distancing from the exterior world is the price to be paid in order to know a few things about the world (Calvin [1996]). In other words, the disruption between subject and object was — and still is, according to certain opinions — an absolute condition, necessary in order to be capable today to talk about science (in the modern understanding of the term). Schrödinger's assertion (1974) according to which the abolishing of the Subject of Knowledge from the image of the objective world is the dear price that we had to pay for a satisfying image of the world can also fit in the same thematic register. The model in which reality is seen as an exteriority that the subject tries to subdue systematically seems to be one of the essential factors that made possible the jump to what we call today modern science. Admitting the fact that outside the subject there is a concrete object, *something* that *resists* to subject's efforts to describe and, finally, subdue it, seems to be one of the conditions linked to the epistemological frame that allowed modern science to appear in the West and not somewhere else.[31]

Basarab Nicolescu (2002 a) describes the dynamic of this changing of epistemological paradigm in the following terms: "Modern science was born from a brutal fracture from the old vision of the world. It is grounded on the surprising and revolutionary idea for the time of a complete separation of the knowing subject from a Reality supposed to be completely independent from the observing subject."

The fact that the object "reacts" in the same way to similar "actions" leads to the conclusion that physical Reality[32] is nothing but a sum of objects describable by the subject and, since the object has consistency, it can be considered to be "real" , not a mere illusion or interior construct of the subject. Because it has a physical consistency, because it "exists" and has a cohesion that seems more persistent than the mental flux of the subject, the object deserves to be studied, classified, measured, and engaged in a conceptual whole meant to explain the physical substrate of reality.

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31. It may be that the origin of the separation between subject and object, far from being just a methodological separation necessary to the constitution of modern science, goes back far from this moment, being identifiable within the separation of the western political theology, from Augustine, in *Civitate Dei* and *Civitate terrena*. This separation lays at the origin of the concept of modern state in which the laic state, institutionally objectivated, is the real, concrete, one, in front of the individual subject to whom it imposes its objectivity. In these circumstances, to the divine City only the territory of a subjective projection is conceded.

32. The founders of modern science did not rule out the possibility of existence of a supersensible Reality and of an uncognoscible Real, even though, in order to address them, they used a different terminology. However, our issue here is the concept of Reality in classical physics meaning.

The process through which the subject distances itself from the object is already visible at a close up of Galileo's statements, in the sense that from all knowledgeable natural means, the constitution of the universe should be considered as occupying the first place, meaning that by surpassing all the others by the generality of its content, it should surpass them in importance as well (Galileo [1953]). Galileo explicitly formulates methodological principles without which it should be very difficult to imagine modern science, in the sense that the knowledge of the effects of nature leads us toward the knowledge and causes, because otherwise the research would be blind. Consequently, it is necessary to have knowledge of the effects of the causes we are looking for. Obviously, in the reality model offered by the pre-modern concept it was not possible to talk about the "knowledge of the effects" and "finding of causes". Galileo also tried to establish the "characteristic and condition of the natural and true things" (*ibidem*). For him, the characteristic and condition of true things is that it is impossible for them to be otherwise; reality comprises in itself an object that behaves according to immutable laws, generating similar effects when similar causes act upon it. There is an exterior datum of the subject that produces quantifiable effects that, in their turn, lead us to reasonable causes, capable to be analyzed *via* perceptions by the sense organs of the subject — perceptions that are in a direct rapport with the phenomena generated by the object.[33]

More pregnant tones were given to this model of reality by Sir Isaac Newton, who postulated the existence of an absolute time and an absolute space as "recipients" in which objects move and interact. Absolute time, true and mathematic, flowing equally, without any connection to something exterior, in itself and according to its nature, and absolute space, taken in its nature unrelated to anything exterior, that remains forever the same and immobile (Newton [1999]) — these are the two Newtonian scholia promoting the model of an independent exterior physical reality. The subject has the role to decipher the mysteries of this rational reality perfectly determined by the laws of classical mechanics. We could say that the reality described by the Newtonian mechanics "resists", nevertheless "failing"[34] only to the capacity of the knowing subject to acknowledge the laws that "hold" all things together. Reality, in the classical acceptation, was more and more similar to a clock, the scientist himself being a sort of

33. It is interesting to see how Galileo (1914) analyzes the mechanism of perception and sensation, considering that the wave "born in the trembling of the body" produces the sound that spreads in the air, making the eardrum vibrate, becoming sound in the soul.

34. Very suggestive on the matter is Basarab Nicolescu's formulation: "Nature was offering herself to man as a mistress, to be dominated, conquered" (Nicolescu [2002 a]).

watchmaker destined to understand and predict it's functioning according to the laws formulated by the mechanics of Sir Isaac Newton.[35]

Local causality is one of the ordering factors of the world exterior to the subject. The subject possesses the faculty to notice and formalize the real causes of things (*i.e.*, according to Nicolescu, "the institution of a paradigm of simplicity"), the natural things possessing only the causes that are necessary in order to explain their appearances, the same natural effects being produced by same causes (Newton [1999]).

This age, characterized by optimism and total trust in the science's aptness to change the world, promotes the concept of a single Reality worth of this name. According to Basarab Nicolescu, that is the objective Reality, governed by objective laws, one of the consequences of the scientism defining this period in science history being the fact that it "incumbed a persistent and tenacious idea: that of the existence of a single level of Reality", of an objectivity uniquely determined by a strictly local causality characterized by an immutable continuity.

However, as Niels Bohr noticed as well, the objective world of the natural sciences of the last century was a limit-concept and not reality (Heisenberg [1971]).

Theory of relativity

The first change in the classical model came along the epistemological consequences of the restricted theory of relativity.

Born (1962) explains the "weakness" of the classical model, showing that the existence without any connection with the exterior of *absolute time* and *absolute space* seems strange for a scholar like Newton, who states his intentions as directed to researching only what is real and observable; however, something without any connection with the exterior cannot be acknowledged and, consequently, has no reality.

By demonstrating that there is no absolute reference system (*i.e.*, in which the observer has the possibility to measure the absolute parameters of space and time), the theory of relativity came with a reconsideration of the role played by the observer, the subject that is, in the physical description of phenomena exterior to him.

By detailing and adapting the scheme in *Figure 2*, we are able to see in the figure below, referring to the new model of Reality implied by the theory of relativity, an asymmetrical relation between Subject and Object, and an approach of the two entities. The Object is no longer that exterior, inalterable, structure imposing itself tyrannically to a Subject who was

35. Kepler formulated for the first time the metaphor of the watchmaker with the intent to show that the movement of heavenly bodies is more similar to that of a pendulum watch than of a divine organism.

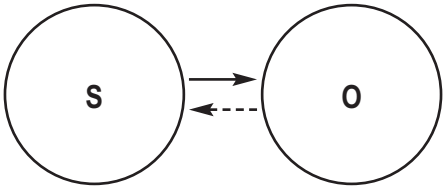

Figure 5
Theory of relativity

nothing but a simple observer of the phenomenal world around him. The profound structure of relativist Reality is no longer an immutable datum, but the result of the interaction between Subject and Object.

Quoted by Heisenberg (1971), Bohr illustrates this change of epistemic perspective, stating that what we can communicate through an objective language in the meaning of classical physics is only information about the facts, without any possibility of predicting future events eluding the observer or the means of observation; in this respect, the natural sciences of today reveal for any fact its objective and subjective characteristics.

The notions of time and space are deprived of the independency conferred to them by the axioms of Newtonian physics[36], now being linked in a subtle way to the reference system of the observer. In the context of the theory of relativity, the result of the measuring depends not on the *subject*, but on the *positioning of the subject*. For the first time in the history of science, the observing subject gains a slim ascendency over the objective external datum, while the concept of Reality gets new understandings by revealing the fact that we do not live in a kind of rigid space-time "receptacle, without any connection to anything external". By affirming the role played by the observer in the way the exterior world appears, the notion of Reality becomes more "elastic" and, without any anthropomorphizing, appears more "human" than the one created by Newtonian physics.

The quantum revolution

One of the consequences essential to the apparition of the quantum theory is a new approach of the concept of Reality.

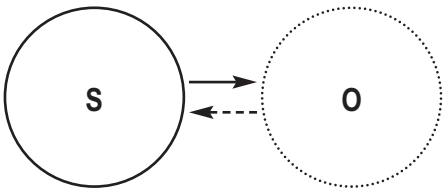

Figure 6
Quantum theory

36. Albert Einstein — *Fundamental Ideas and Problems of the Theory of Relativity*, *Nobel Lectures, Physics 1901–1921*, Amsterdam, Elsevier Publishing Company. Available at: http://nobelprize.org/nobel_prizes/physics/laureates/1921/einstein-lecture.pdf.

Figure 6 (previous page) renders, using the limitations of analogy, the transformation brought to the understanding of Reality by this theory. In the setup of the Subject-Object relational process (between observer and phenomenon), the Object tends to be "absorbed". It no longer possesses that rigid "impenetrability" of the classic theory and the distance from the Subject is considerably reduced. The quantum particle is "a completely new entity, irreducible to classic representations" (Nicolescu [2002 b]). The quantum theory shows the impossibility of localizing a quantum event precisely in space-time, the notion relative to the Object inherited from classical physics being replaced by that of event (relation, inter-connection). It is no longer possible to talk about separability in the classical understanding, because "the quantum event is not separable as an object"[37].

A supporter of the Copenhagen School, Heisenberg (1971) states that reality depends on the structure of our consciousness, the objective realm being only a small part of our reality. Regardless of our position toward the Copenhagen School, the fact that within the quantum theory the role of the observer is more pregnant than that attested by the theory of relativity is undeniable. Here, the observing subject of the theory of relativity assumes the status of subject participating in the consistency and coherence of objective reality.

After the *pullback* of the pioneering years of science, we witness, alongside the vertiginous development of modern physics, an increasing proximity between Subject and Object (Nicolescu [2002 b]). The initial interval in method, fertile and necessary according to certain epistemologists, seems to diminish; the subject and the object are getting nearer to a common point of equilibrium now. The diaphanous contour of the Object suggests its potentiality in relation with the capability of the Subject to actualize it through the observing (measuring) process. Quantum reality is no longer a homogenous and static datum, but, as Basarab Nicolescu points out, a perpetual oscillation between actuality and potentiality.

Reality in cyberspace-time

In the mid-1980s, the technical term "virtual reality" popped out, which quickly became fashionable within the mass-media. The possibility to make virtual holydays, to visit virtual museums, or to act in movies alongside virtual actors conquered immediately the public imagination, this spectrum of products integrating rapidly into the market. However, beyond those purely technical appearances, and ceasing to be a metaphor belonging to the sci-fi literature, the model of *cyberspace-time* generated a new perspective on the concept of Reality.

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37. Heisenberg goes even further, stating that symmetry is something more profound than the particle.

Hence, for this model we propose the scheme illustrated in *Figure 7*. We have come now to a reverse situation compared to that of pre-modernity, illustrated in *Figure 1*. Now, the tendency is that the Subject builds the Object intellectually, in fact remodeling a new Reality — in transdisciplinary terms, it is about the apparition of a new level of Reality, the level of cyberspace-time, as will be argued further on.[38]

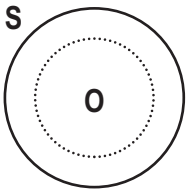

Figure 7 — The cyberspace-time Reality

Vince (2004) defines virtual reality as an image of reality in which physical objects, or anything else, are obsolete for building that reality. As for Deutsch (1997), he introduces the notion of *virtual reality generator*, as a device capable to manipulate our senses by bypassing their normal functioning. In this way, because the Subject builds up an Object to which he confers the characteristics and proprieties he desires, the proximity between Subject and Object is annuled.

The new created object can be physically impossible; nevertheless, it is imperatively necessary for it to be logically possible (Deutsch [1997]). Avoiding falling into solipsism, Deutsch extends the technical concept of virtual reality, showing that the link between the physical and virtual worlds is tighter than it may appear. Obviously, argues Deutsch, imagination is a form of virtual reality. Even more, the experience of the world acquired "directly" through the senses is also virtual because our external experience is never direct (*ibidem*). In accordance with Schrödinger (1974), who uses color perception as an example, the sensation of color cannot be explained through the objective representation of the physicist about light waves. Without fear of being suspected of subjective idealism, we can assert that what we usually call *color* or *sound* is nothing more than sensations constructed by our perceptive apparatus.[39] Simply, our experience is a

38. Basarab Nicolescu, *Transdisciplinary Hermeneutics*, a conference at the Sâmbăta-de-Sus Academy, May 30, 2008.

39. It seems that Democritus first noticed that. In a fragment transmitted by Galen, we hear that Democritus' opinion was that colors and tastes are according to the common human condition (*nomo*), although, according to the nature of things (*eteé*), there are only atoms and void. Similarly, Diogenes Laertios states that Democritus says that the atoms are the principles of all things, anything else only seeming to exist. Atoms and

"virtual" reality generated by our mind based on external sensorial data and a "software" functioning in our brain.[40]

According to Nicolescu (2002 a), virtual reality, considered on strictly technical grounds, is only an epiphenomenon of the cyberspace-time reality. Consequently, the main characteristics of the cyberspace-time are: it is natural and artificial altogether, of a material nature in various grades of materiality, it determines a new relation of transformation between mathematical equations and images, signals travel in it at the speed of light, the number of its dimensions is not necessarily four (three for space and one for time), it is governed by a non-classical logic and its causality is of a loop type (linear causality is abolished), and it is characterized by self-movement (submission to a principle of maximality stating that everything that could be done will be done).

For cyberspace-time, the status of Reality can be recognized in the sense of the definition accepted in the introduction of this study because, as stated by Nicolescu, in the so called "virtual" reality what resists is the mathematical equations.

The level of the cyberspace-time is legitimately instituted as another level of Reality because it possesses relevant characteristics in that sense:

a) it can be described as an ensemble, unaffected by the action of a number of general laws;
b) it sustains an opposition in fundamental laws and concepts to the macro-physical level of Reality (cyberspace and cybertime pose entirely different proprieties);
c) the terms that are irreconcilable on the microphysical level can be perceived as non-contradictory on the level of cyberspace-time Reality.

We cannot close this section without phrasing some interrogations in relation to the connotative meanings of the concept of reality in cyberspace-time. So, there is the question referring to the extent in which the "virtual" reality of cyberspace-time is a product of a creative imaginary, of an *imaginatio vera*. Is cyberspace-time reality a product of an authentic imagination, or of a destructive one? (Nicolescu [1991]).

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void are the only realities. Our perceptions are apparent and conventional (*nenomisthai*). In Schrödinger's understanding, Democritus introduces the intellect (*diamonia*), in conflict with the senses (*aisthesis*) about the real. In his opinion, the image of every individual about the world is, and stays forever, a construct of his spirit.

40. Stating that the map preceding the territory engenders the territory, places the authentic post-modern author Jean Baudrillard in the same line. In the postmodern vision, the whole Reality is a virtual Reality, although from reasons different from Deutsch's, and without implying any strictly technical connotations of the word *virtual*.

In André Chouraqui's interpretation, the first words of *Genesis* can be translated as "In His head Elohim created…". Thus, the factual creation of the world and man could have been preceded by a creation in the divine imagination. In this original interpretative translation, the physical Universe was preceded by a proto-universe that, in a sense, can be thought of as purely virtual. Could this imaginative capacity of instituting "virtual" worlds be, on the grounds of his constitution as theological subject according to the image and resemblance of God, conferred to man as well?

We are questioning as well the extent to which the cyberspace-time reality can be perceived as a reminiscence of the Parmenidean linkage between thinking and being, in the sense that the act of thinking is able to ground and legitimate reality. The answer to that question cannot dispense itself from an in-depth philosophical study following below.

Transdisciplinary reality

Analyzing the principle of objectivation characteristic to modern science, Schrödinger noticed that the scientific world became objective in such an odious way, that it blew away the chances of the spirit and immediate sensations and, our science being based on objectivation, it hence missed the opportunity of an adequate understanding of the Subject of Knowledge (Schrödinger [1974]). Precisely in this respect, Transdisciplinarity attempts at reconciling all models of Reality presented so far (see *Figure 4*), by restoring a dynamic point of equilibrium in the reciprocal conditioning between Subject and Object.

The conformity between human thought and the intelligence hidden in natural laws (Nicolescu [2002 b]) makes possible the existence of the mediation between Subject and Object, in a multiplicity of levels of Reality. Transdisciplinarity proposes an alternative to other models that promote either "dissolutions" of Reality, or an imbalance of interactions Subject-Object. Inside the transdisciplinary frame, distinctions such as "objective reality" and "subjective reality" become nonsensical, due to the fact that the levels of Reality that characterize the transdisciplinary Object are coherent with the levels of perception of the transdisciplinary Subject — that is, the transdisciplinary Subject is made up of the totality of the perception levels and the complementary non-resistance zone. The transdisciplinary Object together with the transdisciplinary Subject create an open unity (Nicolescu [2002 a]), while the Interaction term between Subject and Object can be reduced neither to the Object, nor to the Subject.

The transdisciplinary paradigm of Reality affirms the existence of a global coherence between Subject and Object, in which, at the same time, the distinctions are conserved. Transdisciplinarity postulates a non-local interaction between Subject and Object, mediated by a Hidden Third (HT) (Nicolescu [2007], pp. 43-45). The role of the Hidden Third is played by

the non-resistance area, which allows the unification, in their difference, of the transdisciplinary Subject and the transdisciplinary Object (*ibidem*). The non-local interaction mediated at a global level confers consistency to Reality. Even though they do not have any point of direct contact, the Subject and the Object inter-condition each other in a more subtle way, because both participate in the same Reality.

The role of Transdisciplinarity is to make both the objective subjectivity of Science and the subjective objectivity of Tradition coexist (Nicolescu [2002 b]) and to re-settle the human at the confluence of scientific honesty and the pathos of Tradition.

The Philosophical Perspective

Introductory considerations

We cannot have a mature perspective over the concept of reality without approaching the relation object-subject from the angle of philosophy, central to any type of discourse. Beginning with Parmenides, whose well-known sentence identifies knowledge to being[41], the terms of this relation are rather superimposing and implied, behind the simultaneity of the noetic and ontological levels. Thus, from the very beginning, simultaneity blocks any type of knowledge prevailing from the "objectivating" of the subject toward the object, reducing everything to a mere tautology. In the same time, however, we can argue that Parmenides' assertion presupposes the existence of a germinating dichotomy subject-object.[42]

This relation between the noetic and the ontological planes can be understood as a setting into the general frame of thinking the relation between subject and object. A first "breach" between these planes, only methodological though, took place with Plato: from a superposition of the relation (that could be seen as an identification between subject and object), a methodological "crumble" is first produced, becoming factual later, with Descartes. In Heisenberg's thought, as well as in Basarab Nicolescu's transdisciplinary methodology, unity is regained because the subject and the object, although distinct[43], presuppose a kind of interaction that makes knowledge possible. Hence, we are no longer able to express

41. *To gar auto noein estin te kai einai* ("for thinking and being are the same"); also Clement of Alexandria, *Stromata* VI, 23.

42. The Parmenidian sentence is typical for the cognitive paradigm of postmodernism, in which the subject cannot be separated from the object.

43. At least at methodological level, in order to ensure an "objective" character to knowledge.

the terms of a pure ontology, completely different from the knowledgeable subject, as was the case with the classical Cartesian model of science.

Then, a double perspective on reality, ontological and epistemological, becomes compelling. The legitimacy of a metaphysical criterion, which science can propose in its approach of articulating an objective and sensible discourse about reality, can be justified only in this double perspective, ontological-epistemological, where the "objectivity canon" ultimately comes from the interaction subject-object proposed by the transdisciplinary methodology.

The *Real* was always the obsession of thinkers. It was always supposed that, in search for the truth, beyond the great variety of facts and regularities accessible to empirical knowledge, there are simple fundamental structures of reality (Flonta [2004], p. 17). What remains to do in order to reach these structures is just to conciliate, to unify the three great levels of knowledge: observation, empirical knowledge, and theoretical knowledge.

No matter how abrupt and unexpectedly theological this assertion might seem, we cannot talk about any type of founding in the absence of apophatism. The platonic metaphysics — if we are to consider it first — already sends us toward this kind of founding. Today's science, as well as philosophy and theology, are founded apophatically at the level of the insertion of the indemonstrable, as discourse grounding. The recovery of the individual at the level of the universal raises the question of the possibility of a perspective from the part of science over a reality in constant change. The problem of the objectivity or subjectivity of science is being expressed, according to Basarab Nicolescu, by a mental construction based on the classical image of reality.

Irrespective of the paradigmatic context we are placing ourselves in, a discourse about reality necessarily draws a triple dimension (a metaphysical, epistemological, and analytical ontology), as well as certain connecting bridges, from the dialogue with other disciplines. We can no longer talk about reality in a de-contextualized and singular way. Thus, the discourse about reality implies a certain type of entities evidencing an ontological program and, at the same time, an epistemology, a theory of knowledge. In addition, the language (at the level of which we can hope to achieve the fusion of horizons in a transdisciplinary manner) plays a decisive role circumscribing the whole sphere of discourses about reality.

A coherent approach of reality presupposes to assume the problematic of the being and the possibility of knowledge about it. In this way, a triple perspective — metaphysical, epistemological, analytical — is compulsory (as mentioned above). If the analytical perspective is tributary to the 20th-21st centuries, the epistemological and, especially, metaphysical

perspectives draw the philosophical reflection of over two and a half millennia.

Reality is a correlative concept and cannot be thought about in the absence of the signification of other concepts. It can be thought only in relation to the concept of "appearance". The opposition between appearance and reality engenders an ontological and paradigmatic discourse about the knowledge of things and of the world, generating, among other things, a dialogue between science and theology. Ultimately, both discourses are, in one way or another, tributary to the philosophical language.

We cannot talk about language without taking into consideration the knowledge, because language and knowledge reckon each other. The limitations of the (anthropological) language necessarily draw a border between cataphatic and apophatic expression; however, the border being in fact man himself, they complete each other. We can refer to cataphatic and apophatic at the level of philosophical[44] and theological[45], as well as scientific[46] discourse. In this way, scientific knowledge instruments the cataphatic at the level of true and grounded opinion, while apophatism represents the "hard" aspect of the building technique in ontology[47], being the fundamental reference in theoretical constructions[48]. In Eastern Christian theology, cataphatic knowledge represents the contemplation of God in his reasons (*logoi*) disseminated at the level of natural, created reality. This knowledge with referrence to creation plays a necessary role in man's climbing toward God and is realized asymptotically, having as starting-point our opinions, more or less grounded, about reality. However, in this asymptotic climb toward the divine mystery, the cataphatic does not have total freedom. The possibility of cataphatic language is due to the analogical (not homological) correspondence between God's and the world's proprieties, expressed *via* obligatory symbolic terms, in which the proprieties of the world indicate, they elevate, however unfulfilling, toward God's proprieties. Hence, the cataphatic is bordered continually and, at the same time, included in apophatism, which is present at all levels of the spiritual climb.

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44. Cataphatism sends to the ontological plane of the sensible, while apophatism to the intelligible plane, which cannot be defined or postulated, but only determined negatively. The language plays a mediating role between the two ontological planes.

45. Here, cataphatism has an iconic role, the sign sending to the signified realities of creation, while apophatism represents a refusal of exhausting God's mystery in statements.

46. Cataphatism is found in empirical knowledge, where it has a symbolic function, while apophatism at the level of the construction of scientific theories.

47. *Apeiron* for Anaximandros, being for Parmenides, intelligible for Plato etc..

48. A good example would be the fact that, with Euclid, apophatism passes to geometry, too, the point being defined as the one that has no parts.

Finally, the three levels of scientific knowledge (observation, empirical knowledge, theoretical knowledge) presuppose, altogether, cataphatic and apophatic knowledge. In this way, the cataphatic character of the first three levels, implying as well scientific observations and the corresponding generalization, is continued by the apophatism of the third level (that of theoretical knowledge). In relation to empirical knowledge, the apophatism of the theoretical knowledge is being noticed not only when operating with indemonstrable but also when it is expressed in concepts that, although very distinct, are not abstracted from empirical observation (not possible in the absence of a previous theoretical frame). Consequently, scientific knowledge cannot separate itself from philosophical knowledge that, by definition, anticipates that part of the unknown that can be added to knowledge and, even more, the appeal to assumptions.

As there are limitations to any human endeavor, in any type of discourse we find ourselves the cataphatic language will always entail, on the limit, the apophatic one. By attempting to justify ultimate truths, we can decipher a similar methodology, grafted on an apophatic expression, in any paradigm. Finitude is a basic fact of the human being. Regardless that it is taken as a source of bitterness or soothing, there is no doubt that there are limitations to any human achievement, with reference to human resistance, resources, or life itself (Priest [2003]).

In order to have a complete vision of the idea of reality, it is important to mention that we have to call in the transdisciplinary methodology, in virtue of which we will have to operate with the following three distinctions: Real-Reality[49], subject-object and thing[50]-phenomenon. Those three, inter-definable and reciprocal, are distinguishing since the beginning of philosophical thinking, even though less obvious.

Since Plato, the three essential dimensions[51] regarding the way the world (reality) *is*, the way we can *know* about it and the way we can *talk* about it are put into equation.

With *Theaitetos*, one of the most difficult problems of philosophy, that regarding the *knowledge*, is opened. In this Dialogue, the way to knowledge gets to the criticism of certain pseudo-knowledge that, at the most, only indicates, by negative example, the way toward the real knowledge. On the other hand, the term *episteme*, indicating the maximum closeness to the pure forms of the being, that is the Ideas, is about knowledge pure and simple. *Episteme* implies not only the knowledge of an established

49. We must distinguish between *Real* and *Reality*. *Real* means what is hidden forever by definition, while *Reality* is linked to *resistance* in our experience (Nicolescu [2002 b]).

50. Thing-in-itself/noumenon.

51. Metaphysical, epistemological, and analytical (language) ontology.

relation, but also of a principle (*arche*). Knowledge is an intuition of the essence of things, Greek science being inseparable from metaphysics in that respect. When enouncing a truth unchangeable by circumstances, Plato states the universality and atemporality of the authentic knowledge. To know means getting over the diversity and instability of human opinions, thus reducing the multiplicity of things to the unity of a universal definition.

In *Theaitetos*, in his endeavor to define science, to show what knowledge means, Plato concludes in an aporetical (doubting) key that knowledge can be neither opinion, true opinion, nor true and founded opinion. While the *Sophist* attempts to find a solution to the idea of participation at the level of language, *Timaios* attempts a restructuration of thinking in order to understand, or even define, this matter. Ultimately, Plato's apophatism underlies the distinction between *becoming* and *being*. Hence, the relation between the intellect and the truth is possible in virtue of the existence of *Good*, on the side of the *Being* and not on that of the *Becoming*. Plato's philosophy cannot be other than apophatic and circumscribed by a negative logic. The access to the truth is due to the intermediation of the experience that appeals to the level of things in the world, where everything is ephemeral and relative. Only by relating to Idea, which is eternal, simple and absolute, we get access to the real knowledge.

Man, as a bearer of soul, has access to the knowledge of the intelligible world. The soul, like Plato's Ideas, makes the *truth* knowledgeable, a fact evidenced by the aporetical character of the Dialogues.[52] The space between truth and its appearance could not be covered by human logic only. The likeness of man with the divine, by its dynamic character, makes the climbing towards the intelligible ones feasible. We can attain the highest of understandings only through the analytical intellect, *dianoia* (*i.e.*, thinking by distinctions), and we can have an un-intermediated vision of the truth only at the level of the pure intellect, of the *nous*. Only certain contradictions, paradoxes brought to light by the study of sciences (that reveal the imperfection and incompleteness of sciences), have the capacity to awake the asleep *nous* in everyone's spirit. Hence, the real knowledge supposes a gradual reorientation of the intellectual scrutiny from "technical" issues to the "non-technical" ones, in order for the fully awaken *nous* to comprehend in a single embracement the whole *reality* — consequent to a sudden enlightenment as asserted by Plato in the *Seventh Letter* (Cornea [1986], p. 76). In this way, the knowledge of the Good[53] is linked

52. Due to the understanding of the link between the world of appearances and the world of the intelligible.

53. The Good is superior to the intellect and the being; it represents the supreme knowledge.

to the *image* of the soul and its corresponding *likeness* with divinity. Thus, by not possessing it by himself, man *tends* toward the real wisdom, since "wise indeed is the solely God"[54]. By its resemblance to Ideas, man's soul is immortal, a fact that cannot be demonstrated, presupposing rather an apophatic understanding. Immortality is not, strictly speaking, demonstrable, because it belongs, as any idea resulting from the direct intuition of forms, to the domain of revelation (Tecușan [1983], p. 42).

What reality[55] possesses indeed is the world of Ideas, the world of the intelligible. Ideas are independent from the material realities of things and phenomena. Ideas cannot be mistaken for logical realities or concepts of thought and, because their objectivity would be affected, they cannot reside in the human intellect. They exist in a world different even from the divine thought. The Ideas shows the characteristics of a supreme and unchallenging objectivity (Muscă [2002], p. 131). From the fact that they are self-supported entities, separated in an absolute way from the phenomenal world, it results that they can assure the objectivity of the thought in general and, especially, of philosophical thought. As Shand puts it, forms are not objects of the sensible world; sensible objects change and have properties that differ according to the point of view in such a way, that they are not entirely objective. In addition, Forms are not entities at the base of appearances, as atoms are. Forms subsist beyond the flowing of experience, space and time, in a transcendent and over-sensible, perceived ultimately exclusively by the intellect. Forms are pure essences, objective, and, as objects of knowledge, they comprise the characteristics demanded by knowledge itself (Shand [2002]). From the platonic perspective, at the level of the sensible world we can express only opinions describing an approximate reality[56], the real knowledge being realized only at the level of Ideas. Thus, man is situated between the sensible world and the level of Ideas.[57]

Platonism had a considerable influence on the Fathers of the Eastern Church, as well as over the Christian thinkers from the West. Moreover, it represented, and still represents, a reference in any attempt to construct or reconstruct an onto-metaphysical discourse. The philosophy and science of the 20th and the 21st centuries is often inscribed in a platonic tradition as well.

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54. Plato, *Socrates' Apology*, 23a.

55. The *Real* in Basarab Nicolescu's vision.

56. The empirical reality.

57. "Man is in the *middle*, between sensible world and ideas. He cannot give up the ideas because they are essential to him; he cannot neglect the sensible things either, because, willingly or not, he has to remember through them" (Jeanne Hersch).

From Platonism, three aspects were mainly assimilated in theology:

— *the existence of an ideal world*: there is an ideal world, where the immutable patterns of reality are called Archetypes; their existence is postulated, they being the necessary references in order to describe a world placed under duration and change; the world of Ideas is dominated by the supreme Archetype, sometimes called the Good, as in the *Republic*, or the One, as in *Parmenides*, or simply the Being, as in *Timaios*, or the Beautiful, as in the *Banquet* (Meredith [1995]);
— *the way in which the sensible world relates to the intelligible world*: the finite and time-dependent *Reality* of the seen world relates in different ways to the eternal world of the perfect Archetypes; in order to express this relation, Plato made use of terms like "participation" and "imitation"; in *Timaios*, the making of the visible world is reported, where Plato delimitates himself from a doctrine of creation in the strict sense of the word; God (in fact the Demiurge), explains Plato, searches for the perfect archetypes which he imprints in the preexistent matter, as a seal leaves its mark in soft wax; in this way, the philosopher explains the reasons in virtue of which things are as they are, while not telling anything, however, about their prime cause (*ibidem*);
— *man's soul is immortal*: each man holds within an immortal soul representing his life principle and the principle of his desires as well; the soul, prisoner of the body, is attracted toward the highest things by the internal dynamic of the *eros* in order to regain the initial dwelling in the skies; this natural appetence toward good and beautiful asks to be liberated and reactivated through moral and spiritual exercises, or, more precisely, thru *askesis* — a work necessary for the soul to regain its initial vision, taking care that the "wings" lost during the fall at the beginning of time to grow back; Plato gives a memorable account of this ascetic path by his cave metaphor (*Republic*, book VII), as well as by the discourse about the ascendant movement of the *eros* (*Banquet* — *ibid*.).

The problematic of the ontological consistency of the created world, although solved differently in the Platonic and the patristic thought, converges, nevertheless, toward a common solution, stipulating a *real* existence of the world. If Plato, in *Timaios*, implies the eternity of the matter, in such a way that the Demiurge appears rather an ordinate of the Universe, in the patristic thought we have an authentic creation: the created Universe is, in an absolute way, a new being.

According to Plato, the Universe appeared at one moment not "out of nothing", but from a previous state of chaos. The world is gendered not in an absolute way, but rather in a sense presupposing development. The Demiurge *creates* depending on the matter he has at his disposal, according to the models, in such a way that the resulting copies are as likely as possible to those. In *Timaios*, although the creation is not absolute, since the world is shown as existing forever, a real consistence is nevertheless stipulated, even if only at the phenomenal level.

Also with Plato, we can notice how the philosophical discourse about the world operates already with the three conceptual distinctions[58] mentioned previously. This will be reflected in the theological discourse, as well as in the scientific one.

The Subject-Object distinction

Schnädelbach (2002) asserts that our claims of knowing something are always questionable. What we know, due to perception, imagination, experience, or science, and we consider to be true and founded, might be shown to be false and unfounded. Where we begin to explain how things are indeed, it is not anymore a matter of accumulating new judgments, but of *judgments* about the *judgments* belonging to our knowledge. This kind of judgment transforms everything we know into an *object*, confronting it to the standards that we are ready to apply to the claims that we know something.

Within the philosophical thought, the *object* (in itself) is presented, in a first perspective, as what exists outside the subject, facing it off (postulated as a *reality* independent from the mental, as having an existence of its own). However, in another perspective, the object is described as dependent on the *subject* (there is nothing outside the mental entities, objects being not revealed as realities independent from the subject, but, somehow, as mental products). Within the first signification, the *object* is what is present, or the correlative of a cognitive activity (either sensible, or intellectual). Within the second signification, the *object* is placed between the knower and *reality* (non-present in itself, but adequately represented by the *object*). The first situation stresses what is inside the object and, due to the *object*, what can be seen, felt, heard, and conceptually understood. The second case stresses what is not manifest in the *object*, hence hidden.

If, for Plato, objectivity is provided by the separate and *real* existence of *forms*[59], beginning with Aristotle a new perspective over the guarantee of objectivity is opened. *Intelligible forms*, although immanent to empirical

58. Real-reality, subject-object, and thing-phenomenon.

59. At the intuitive level, there is a bridge between the intelligible world and the sensible world. The soul, resembling the Ideas, would access reality through language.

objects, can be separated from them by thought. The *form* expresses the unchanging *reality*, in virtue of which we can talk about proper or scientific knowledge. Aristotle shares with Plato the conception that, if knowledge is possible, then it can only be knowledge about what is *real*; and what is *real* is eternal and unchangeable. Briefly, the necessary truths that we know must be joined with their references to the according ontological objects. Hence, if proper knowledge exists, then we must deal either with the existence of a world of real objects, eternal and unchangeable, placed beyond the sensible world (Plato's standing), or with the existence of certain *real* proprieties, eternal and unchangeable, of the *sensible* world (Aristotle's standing — Shand [2002]).

Those two types of ontological grounding were variously emulated by the philosophical, the theological, as well as the scientific discourses.

If St. Augustine, in conformity to Platonic tradition, stipulates that the objects of knowledge are eternal and independent from the human mind (belonging to an eternal and immutable mind of God), St. Thomas Aquinas follows the Aristotelian line referring to essences.[60] Universality becomes a property of thought and language.[61]

With Descartes and Leibniz[62], the distinction subject-object begins to stay at the basis of the reconstruction of discourse about the fundamental nature of reality. Hence, the spirit, the *subject* (whose essential propriety is thinking), faces off the matter, the *world*, whose essence is spreading those substances (the world and the spirit) owing their existence to God (the supreme substance). In Leibniz's vision, too, we refer to ultimate substances grounding the reality.[63] If, for the rationalists, the fact that the world possesses a fundamental structure that can be understood only through reason presupposes a *reality* beyond appearances (involving necessarily an absolute subject-object distinction), for the empiric philosophers all material knowledge is given only through experience.

As a very strict empiricist, Berkeley maintains that the limits of what is intelligible or is useless to talk about must be referring to something from within our experience (Shand [2002]). In the spirit of this thinker, we

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60. Essences do not exist before, or independent from, the individual things.

61. To Ockham, universality is first a propriety of ideas and second of the language that expresses the ideas, not of entities or natures distinct from individual characteristics of the things in the world (Shand [2002]).

62. We owe to rationalism the idea that the world possesses a real fundamental structure, that can be intuited (logically) through reason, but without presupposing an aprioristic methodology of science.

63. The monads — defined by Leibniz as simple, without the possibility of being changed or destroyed. Hence, the *real* is only what happens inside them, at the same time being the principle of what exists (of *reality*).

can assert the ontological doctrine stating that only about the ideas within the mind, as well as about the minds themselves, it can be said that they exist, because it is senseless to talk about things that may exist in some other way, as long as the expressions used in such a discussion are not necessarily linked to an idea (*ibidem*). Thus, the material substance eliminated, God becomes the sole *real* cause of our ideas and feelings. The fact that matter does not exist in *reality* leads us to the conclusion that there is nothing outside the mental entities.

Along with Frege and Husserl, a new page in the history of thought opened. In order to answer the question regarding "What is a thought?", or at least to look for a plausible answer to that question, it is vital that the answer should not be psychological. Hence, bearing in mind that the foundation of logical laws cannot be determined by psychological research, the *expulsion* of thoughts from the mind imposed itself with necessity. Michael Dummett shows that the *expulsion* of thought from the mind (*i.e.*, from the interior world of own experiences) and from the physical world represents Frege's *stronghold* against psychologism. This leads to a kind of Platonism, to the Fregean mythology of the third world and, finally, to the linguistic turn that allows the objective treatment of thoughts completely distinct from internal mental phenomena. The fact that psychologism conceives of thoughts as something subjective ultimately leads to the illustration of the fact that they are un-communicable. Nevertheless, the expulsion of thoughts from the mind is not grounded only on the argument of objectivity, but also on the fact that we cannot assert that concepts (not describable as contents of consciousness) appear in the mind as mental images do. The *return to thought* makes possible the act of judgment. This implicitly shows that, to be communicable, thoughts cannot be private phenomena of the consciousness. They must be considered objective, because only in this way can they be transmitted without spare by the language. According to Frege, the thought stays in close relation with the truth. Consequently, it cannot be asserted that concepts appear in the mind in the same way mental images do, because they cannot be described as contents of the consciousness (they are not mental contents). Thought is not dependent on psychic processes because nothing happening in the brain is able to explain what exactly is conferring signification to our verbal expressions.

Thoughts are not contents of the mind (they do not belong to the internal world) and do not belong to the external world either — the world of material objects in which we all live. In this case, there is nothing left to us but to state, to postulate eventually, the existence of a *third world*, that of thoughts. Thoughts are out of space and time. They do not interact causally with other objects and do not act causally over other objects.

Their existence does not depend on the different ways of expression or understanding; however, they can be articulated by different individuals in different circumstances, in many different ways. Thoughts do not possess the characteristics of reality in the way objects within the physical world do; they are not entities subjected to changes and transformations. As already stated, thoughts suppose a *third world*. "[…] the law of gravity […] is completely independent from all that is happening in my brain and from any change or alteration of my representations of it. Nevertheless, the comprehension of this law is a mental process! Right, but a process on the limit of the mental that, consequently, cannot be fully understood from a strictly psychological point of view. Here, we are dealing with something that is not mental anymore in the proper sense: *thought*. And, perhaps, this process is the most mysterious of all" (Frege [1897], p. 145).

Like Frege, Husserl does not deny the reality of the external world (of the being of the external world); however, the objective access to it is based on consciousness. We are interested in objects as they appear to the consciousness in their universal or essential aspects, by which all objects of the same kind, if they are to be what they are, must possess certain characteristics; in Husserl's view, phenomenology, which is the true philosophy, follows the goal of being a *science of the essences*, or an *eidetic science*, essences being independent from any individual conscience and absolutely objective and universally valid. Also, without essences or significations objects mean nothing to us; essences, conferring to objects the signification of *being*, are ultimately phenomena of the consciousness (Shand [2002]). By that, reality is perceived at the level of the invariants.

The thing-phenomenon distinction

The dichotomy *thing-phenomenon* invites us to a double reflection, ontological and epistemological. The discourse about the relation between subject and object also brings out another kind of dichotomy, respectively *thing* (in itself)-*phenomenon* and, ultimately, *real-reality*. In fact, those three pairs of concepts are, as already said, inter-definable.

The object of knowledge is represented by the experience or by the phenomena. To the phenomena, however, corresponds something unknown, an X named by Kant *thing in itself*. The concepts and principles of the existence are applicable only to *phenomena*, not to the thing in itself, because they cannot surpass the experience — they do not have a transcendent use (Andrei [1997]). The phenomenon and the thing in itself gain different statuses. Phenomena occur in space and time, being given to us by experience. However, the thing in itself cannot be known, we not being able to say anything about it; it can be thought about, but not acknowledged. Reality is expressed by appearances (phenomena). Kant believed

that Newtonian mechanics explained not a *reality* beyond appearances, but the appearances themselves (Shand [2002]).

Things in themselves exist independently from human knowledge, and constitute the basis of the appearance. By his transcendental idealism, according to certain interpretations, Kant was a phenomenalist and a noumenalist as well. In addition, he stated the existence of the works in themselves as resisting phenomenalist reduction. In this context, we can refer to two philosophical doctrines, from the perspective of which the world would be constituted, on the one hand, by a multitude of objects independent from any observer (an externalist perspective), while, on the other hand, the description of the objects in the world would make sense only inside a theory (an internalist perspective).

Realism[64] is opposed, conventionally, by nominalism and idealism altogether. However, what interests us is the fact that any form of realism supposes the existence of a *reality*, of a certain exteriority that is able to be researched objectively, such that the *reality as a subject of thought* should become independent from the human spirit. Reality is not dependent on the knowing consciousness and does not belong solely to the cognitive act. The truth is independent from any observer. The formulation of the problem by metaphysical realism presupposes the existence in themselves for all objects, and we use a kind of lasso in order to catch some of them (Putnam [1981]). If direct realism excludes any form of idealism and phenomenalism, representational realism accepts that there is a particular, non-physical, intermediator — a veil of the perception. Putnam rejects *metaphysical realism*, according to which the knowledge of reality as it is is possible, as well as *conceptual relativism*, according to which there is no truth, no real knowledge. He maintains that the fallibility of knowledge must be admitted, and the act of knowing must be seen as an interaction between our conceptual schemes and reality.

The problem of the external world is ultimately reduced to an epistemological issue. For Locke, Berkeley (for whom there is nothing outside mental entities — matter does not exists in reality), and Hume, it is evident that we can know only the *phenomena* and not the essence of things. The question regarding the substance, or essence, of things is not legitimate as long as we do not know anything about them, and can acknowledge only what is inside us. Even if a stand of the phenomena existed (a substance of a kind), we would not be able to have an epistemological access to it; even more, it would be only an illusion.

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64. There are several types of realism: realism of the common sense (usual things are real), scientific realism (postulated theoretical entities are real), psychological realism (mental states are real).

The existence of an external world within the frame of analytical philosophy was rendered in terms that expressed the relation between language and reality. To Wittgenstein, the boundaries of language became the boundaries of the world.[65] However, this logical mirror of the world was ultimately broken. Wittgenstein, in the second part of his works, stated that the way of philosophy is, first, a lucid and sincere effort to reeducate and honestly acknowledge that a professional philosophy (he rejected the linear-traditional way of philosophy and any indoctrination) is not possible. Nonetheless, while searching for truth, philosophy does not project ultimate realities, but shows that the apparent unsolvable problems are in the end generated by language and not by the nature of reality or the things in themselves. We have to deal with a sort of arbitrary that leaves to be understood that reality is independent from thought and from language. There are certain conventions between language and reality that, by their very nature, belong to the human.

De re is another way to assert the fact that to any particular objects belong particular properties — it is used in modal logic, where the construction of possible worlds is founded on the *real* world. *I.e.*, any truth of the *real* world is valid in any of the possible worlds as well. "I don't know, I always agreed to what Bishop Butler said: 'Any of the things is what it is, and not another'" (Saul Kripke). To Kripke, objects can have modal properties (*de re* modality) — what separates him from Quine — and he maintains that any object in the actual world, or in any other possible world[66], is necessarily identical to itself. Building his argumentation on *de re* modality (the fact that an object has essential proprieties), Kripke (1980) demonstrates that we can discover the essence of an object by empirical means, of course, taking into account the distinction between aprioristic and necessity as well. Moreover, he asserts that, as it is possible to learn a mathematical truth in an *a posteriori* mode (and the mathematical truth cannot be contingently true), it is likewise possible to access, in an empirical mode, *a posteriori* necessary truths. Something can belong to enounces known *a priori* and, nevertheless, could be known also by people through experience. As such, we have necessarily metaphysical truths reachable by empirical methods, this being sustained by a strong realist intuition. The essentialist maintains that objects possess not only accidental proprieties, but also essential ones. Eventually, this leads to the statement that objects possess the statute of things in themselves and,

65. His ontology is based on facts, not on things, the real world being made up of facts.

66. For him, the possible worlds are the way in which the world could have been, or states, or histories of the *whole* world, practically any counterfactual course of history. The terminology of the possible worlds can be replaced, but not in an absolute way, by the modal idiom *it is possible to…*

even more, their essential proprieties could be discovered empirically. This idea is not accepted by the majority of the thinkers. For example, Quine shows that necessity is not contained in the things we talk about, but in the way we talk about them. We notice here how problematic the acceptance of the fact that there is a possibility of knowing the essential proprieties of things is. It would implicitly suppose a categorical distinction between subject and object, or a methodology in which the epistemological perspective is plainly distinct from the ontological one.

Unlike science, that teaches us new facts and has a strong explanatory role, philosophy has as its goal a clarifying research of concepts, its role being not constructive, but critical by excellence. Even though philosophy is not expected to build theories, to give explanations, it contributes to "enlightenment" because conceptual clarification can ensure *the whole understanding* of controversial issues; in this way, it is fully apt to furnish *rational* "revelations"; even more, the type of understanding furnished by philosophy through analysis and conceptual clarification is vital to theoretical success (Adrian-Paul Iliescu).

The "late philosophy" practiced by the author of *Philosophical Researches* relies on the *reeducation* of people's thinking against the general tendency to standardize a particular model of thinking. The philosopher would be called to defend our mind from the pressure of this leveling roll, to help us to perceive the complexity of life and the diversity of our experiences (Flonta [2004], p. 17). We find ourselves in front of a particular relativism, altogether "cultural" and "cognitive", where *reality* has a dependency toward thinking and language as well. Everything is linked to a form (situation) of life such that "truth, reality, knowledge, moral values and other of the kind are *our* truth, *our* reality and so on; they are not absolute but relative and limited to us" (Grayling [1988]). Reality is not self-supporting, it does not have an essence that we have to grasp absolutely, but is built as a partner (it remains open, developing asymptotically as a form of life) to our language, which is not an ideal one. The success of its use depends on an appropriation of a "technique or social practice", not to a "mental algorithm". Thinking, on its part, far from being an "invisible" and private process, is articulated within the perspective of certain forms of life which are guided by particular rules. Usually, the deciding factor over the meaning of expressions is the context. Hence, we cannot talk about an autonomy of language. There is always "a linguistic agreement" grafting on "an agreement in the life form".

Real-reality distinction

In his article "Sense and limits of exact sciences", Max Planck distinguishes between the *naïf-real* (that is the scientific image of the world,

which is not definitive, but ever changing) and the *metaphysical-real* (the absolute *real*). Scientific activity, crossing over from the old image of the world to the new one, leans asymptotically toward the *definitive real* (that is the realization of an image of the world that would not demand an upgrading), a goal it will never reach. This *real* world, absolute in metaphysical understanding, is independent from the human factor escaping comprehensive knowledge.

However, Einstein (1949) believes in the possibility of creating a model of reality that would represent the things as they are, not as mere approximations and probabilities of manifestation. In a sense, he thinks true the fact that pure thinking is apt to penetrate the *real*, as dreamed by the people of the Antiquity.

Basarab Nicolescu distinguishes between *Real* and *reality*, unifying in a particular perspective the views of the previously mentioned authors. He accepts the premise of a *real* world in its absolute meaning, as stated by Planck, stipulating nevertheless that we have to keep in mind the fact that the scientist himself is constitutive of the Universe. In reference to Einstein, Nicolescu agrees that a model of *Reality* can be built, which is not able, however, to decipher the *Real*.

Heisenberg (1971) declares that the thing in itself (the smallest parts of matter and referring mostly to the fact that we no longer can trace a limit between how the things exist and the way we acknowledge it) cannot be accepted as existing. The concept of matter is thus dissolving at the inferior limit that is in the realm of the smallest spatial dimensions, into the concept of mathematical form. Ideas are more fundamental than objects. Somehow, Heisenberg makes a step toward the transdisciplinary methodology stating that in the future it will be difficult to decide in the case of the advance of science if it is a progress of physics, of the theory of information, or of philosophy. The future evolution will be precisely the unification of science, the over-passing of the historical boundaries between different special disciplines.

The answer Planck is looking for by asking: "What really means this continual changing of what we are calling *real*?" targets, in his view, the assumption of a *goal-real* (metaphysically), and of an infinitely perfectible *real*, precisely in the virtue of the previous. It is important to mention that the new image of the world does not cancel the older one. Each new supplemental condition will make the new image of the world appear simplified. However, no matter how close we come to the *ideal* image of the world, from the point of view of the exact sciences, an uncrossable gap between the phenomenological world and the *real* metaphysical world always remains, generating a constantly efficient tension that could never be eliminated — a tension acting inside the authentic

researcher as an inexhaustible source of his thirst for knowledge (Flonta [2004], p. 17).

Like Planck, Einstein (1949) points out the value of the freedom of creation of the human spirit. In this context, he raises the question of our ability to find the right way anymore. The answer to that problem refers directly to mathematics: we are entitled to believe that nature is an outcome of the simplest mathematical ideas we can imagine. In both cases, the *metaphysical-real* (absolute) is at stake, that we tend to reach step-by-step, in a monotonously progressive manner, by passing from what is more particular to what is increasingly general (Flonta [2004], p. 17). Before the experiment, it will always be the imagination, the free creation of the human spirit, the creative principle of which is based on mathematics. Even though experience remains a strong criterion in the mathematical building of physics, the creative principle resides in mathematics.

The representation of reality is shaken with the introduction of a discrete discontinuous structure of energy by Max Planck. The discontinuity issue would question the classical realism that presupposed continuity, local causality, determinism, objectivity etc. Important to mention is the objectivity issue. We go back to Socrates' philosophical saying that he repeated so many times: "Know yourself!" Has Nature something to say about ourselves? Is it true that by knowing the Universe I am able to know myself?… Can we be satisfied thinking of science an ensemble of operative recipes on the plane of direct materiality, but without signification on the plane of the Being? Accept *how*, but forget *why*? To chase the Being outside the realm of science? (Nicolescu [2002 b]). Actually, the question is whether we can make a distinction between the objective and the subjective at the level of science.

Basarab Nicolescu argues that it is impossible to talk categorically about the absolute objectivity of science. The quantum Universe implies a participation of the subject. Therefore, there is a particular type of interaction between *subject* and *object*. The Subject/Object issue was at the center of the philosophical reflection of the founding fathers of quantum mechanics. The point of view I express here is in complete accord with that of the founders of quantum mechanics, Heisenberg, Pauli, and Bohr, who, like Husserl, Heidegger, and Cassier, contested the fundamental axiom of modern physics: the total separation between Subject and Object (Nicolescu [2002 b]). Therefore, we cannot refrain from asking why we are still acting according to obsolete representations of the world, to old concepts, and not try to assume the quantum image?

In order to eliminate the ambiguities in the representation of *reality* under a single aspect — keeping in mind that the images relative to the world changed anyway and certainly will change in the future as well —

Basarab Nicolescu introduces the notion of *levels of reality*. Thus, reality is a social construct (having an inter-subjective character) and, at the same time, possesses a trans-subjective dimension as well, in the sense that there are experiments that can jeopardize any scientific theory. Basarab Nicolescu shows that, at the present time, we can talk about four levels of reality: macrophysic, microphysic, cyberspace-time and superstrings (considered by some scholars as the final fundament of the universe). It is worth noticing that, since 1942, Heisenberg has introduced the idea of regions of realities, which comes close to the concept of *levels of Reality*. Crossing from a level of reality to another, we notice a rupture of laws and fundamental concepts. In order to justify the presence of coherence, presupposing a transmission of information from one level to another, we can presume the existence of a "*non-resistance zone* to our experiences, representations, descriptions, images, or mathematical formalizations. Any level of *Reality* exists in this zone. The non-resistance zone corresponds to the sacred. The sacred is rational, but cannot be rationalized" (Nicolescu [2002 b]).

The issue of the *Sacred* introduces the possibility of elaborating a coherent discourse on reality. Basarab Nicolescu asserts that reality is in accordance with Gödel's theorem (relative to arithmetic and applicable to any mathematic that includes arithmetic), which can be deciphered only by operating on "logical principles". Hence, we have an open unity of knowledge. This process of knowledge is dynamic and opened.

Transdisciplinary methodology
It is founded on three postulates:

> "The existence in Nature, and in our knowledge about Nature, of different levels of Reality and perception.
> Crossing from one level of Reality to another level of Reality is made with the help of the logic of the included middle.
> The structure of the ensemble of the levels of Reality is a complex one: each level is what it is, because all other levels exist at the same time" (Nicolescu [2002 b]).

Unlike the one-dimensional classic thinking, where Reality presupposes a single level, the transdisciplinary vision takes into consideration a multidimensional reality.

An important aspect of the theory that we have to take into consideration is the *included middle*. Thus, we need three terms in order to define the new logic: A, non-A, and T. The relation between these terms is represented intuitively by a triangle in which A and non-A define one level of reality, with T (a state representing a third dynamism) being placed on

another, different, level.[67] The antagonistic couples cannot come to terms on the same level of reality, because a single level can generate only opposite stands; isolated from the other levels, it becomes self-destructive. However, the question arises if, by admitting the existence of an infinity of aspects, we are not shifting the problem and dissolving the *real* in a multitude always inaccessible in its wholeness. This is precisely the historical merit of Lupasco[68]: he admitted that the infinite multiplicity of the *real* can be restructured, being deduced from only three logical terms, concretizing by that the expectation of Pierce (Nicolescu [2002 b]).

Even from the beginnings of quantum mechanics, physicists were interested in formulating a new logic to solve the emerging conceptual problems. According to Basarab Nicolescu, even today, a large number of scientists are still hesitating to abandon the Boolean way of thinking, referring to the world of the experience by the traditional language. Niels Bohr was the first to transfer the contradiction from the plane of existence to that of language, asking the physicists to accept concomitantly A and non-A, though not simultaneously on the same plane of investigation. Nevertheless, the logical consequences of the complementary principle meaning that there is a principle of contradiction organizing and structuring the new vision of Reality (Nicolescu [2002 b]) introduces Lupasco into the equation. In Lupasco's vision, reality has a "ternary structure", and the possibility of being of the Universe is given by that *contradiction*.

In nowadays' physics, space-time is not a fundamental concept. Consequently, we are able to define space as a simultaneity of events. Space appears as a contradictive conjunction, while time appears as a contradictive disjunction (Nicolescu [2002 b]).

Based on the logic of the included middle, we can state that there is a possibility of describing a coherence between the levels of reality. However, the knowledge remains always open. In other words, the action of the logic of the included middle on the different levels of reality indicates an *open*, Gödelian, structure of the ensemble of levels of reality (Nicolescu [2002 b]).

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67. This logic is inspired by quantum physics, where an event is not only a corpuscle or a wave, and where we deal with the impossibility of a precise localization in space-time of a quantum event. A quantum event is altogether continuous and discontinuous. In the bootstrap theory, nature is conceived as a global entity, and the notion of precise identity of a particle is questioned. Practically, there is no object in itself with a proper identity. A particle cannot be defined separately, its existence being linked to all others, or, as Basarab Nicolescu put it, "A particle is what it is only because all other particles exist in the same time".

68. Stéphane Lupasco (1900-1988) was a French philosopher of Romanian origin, who reconciled to a certain degree philosophy and science, based on a common thinking founded on the principle of universal existence as an irreducible contradiction.

It must be mentioned that in the case of transdisciplinarity we talk of a *transdisciplinary Object* consisting of the ensemble of levels of *Reality* and its complementary zone of non-resistance, and of a *transdisciplinary Subject* defined by the ensemble of the levels of perception and, respectively, by its non-resistance zone. In order for the *transdisciplinary Subject* to be able to communicate with the *transdisciplinary Object*, it is necessary that the two non-resistance zones be identical. This point of contact, interaction between the *Subject* and the *Object*, cannot be reduced to either of them. Therefore, in the case of transdisciplinary knowledge, we have a ternary vision (Object, Subject, and Interaction) different from the classical one where we got a binary structure (Subject and Object).

Kant does not doubt that there exists an independent-from-mental reality ; to him, this is a postulate of reason. He refers to the element of this independent-from-mental reality in different terms: thing-in-itself (*Ding an sich*), noumenal object, or noumen, collective — *noumenal world*. However, we cannot express any concept about noumenal things. Even the notion of noumenal world is a sort of limit of thinking (Putnam [1981]). He states that the objects of internal senses are ideally transcendental and not transcendental. *Reality* is but the way in which we perceive things.

The nature of reality was, as we could see so far, the obsession of any thinker no matter his paradigmatic discourse. The changing nature of sensible phenomena could not express itself in a coherent way so that it could guarantee any objectivity. The Greek philosophy has par excellence the merit of stating that we can have an objective and coherent discourse about the world in the absence of any type of invariants. In fact, the becoming, the dynamic, is not describable and this fact was known from the very beginning of philosophy. The impossibility of bathing twice in the same water of the same river is a fact that must be understood as a confirmation of the impossibility of freezing the flow in the form of *substance* or *object*. The flowing, the process, the becoming, explain us the fact that "other waters" enthrall us in every moment (Haranguș [1999]).

What transdisciplinary thinking proposes to us mainly is to understand nowadays' world in virtue of the unity of knowledge. Knowledge is neither *external*, nor *internal*: it is internal and external at the same time. The study of the Universe and the study of the human being sustain each other (Nicolescu [2002 b]). This way, the vertical recovery of the human being is pursued, meaning that science cannot be reduced to one aspect only, to researching the exterior world exclusively based on the sense organs, although essentially it is a prolongation of these under this aspect. In this way, an important meaning is given through recognizing the place of man in the process of knowledge.

The ontological engagement of science presupposes an epistemological holism, too. The entities belonging to reality depend on the way we research the reality. The ontological engagement is done at the level of a well man-made construction that encounters the experience only at the peripheral level of the system. Out of this holistic interpretation of science, we infer that we can revise even logics and mathematics — though they are not simple generalizations of some empirical statements. This is in order to reestablish the harmony between our opinions and experiences, thus ensuring a relation between language and the world, placed as far as possible from errors. The sum total of our opinions is seen by Quine as a "field of dynamic forces" in which we can distinguish only gradually between approaching experience and departing from it. The stake in virtue of which we can admit (choose) the assertions as true or false, is not given by repeatable models of expression, but of individual events in order to avoid not only the ambiguities derived from negligence, but also the systematic ones. The sentences of logics or mathematics, or those of ontology are not beyond this field. Only certain pragmatic reasons are able to revise them so easily, not some special guarantees of truth. Abandoning or altering them can generate important changes in the system of knowledge (Hügli & Lübcke [1992]). In this way, Quine shows that it is senseless to search for a border between statements that are the expression of experience or those that are generally valid. Such a border does not exist. This fact is even more grounded and justified when any statement is able to escape revision. Quine asserts that even the revision of the excluded middle was proposed as a mean for the simplification of quantum mechanics.

We notice that the interrogations concerning the nature of reality refer at the same time to aspects of ontology, of epistemology, and of language theory as well. The fact that science is dependent on both language and experience shows that we cannot talk about reality from the perspective of a unique discipline. In order to decipher what is beyond certain dichotomies, and at the same time to re-signify certain concepts, it is vital to operate the real-reality distinction in the terms of Basarab Nicolescu. If *reality* saves both the *phenomenon*, and the knowing *subject*, then we can decipher at the level of the *real* deeper meanings belonging to the *thing-in-itself* and to the *object*. At the level of *reality,* we cannot talk about the outer world in absolute terms and we cannot talk about the inner world. From the transdisciplinary perspective, at the level of all discourses about the real reality, there is a certain type of complementarity that gives us the confidence of approaching the correct and coherent understanding of the world.

Thus, Transdisciplinarity envisages in the same time what *is*, *between* disciplines, *within* the different disciplines, and *beyond* any discipline. Its finality is represented by the understanding of the present world, one of its imperatives being the unity of knowledge (Nicolescu [2002 b]). Hence, within the transdisciplinary vision based (not only) on quantum physics, where the concept of the ultimate constitutive element of matter is practically ignored, can we regain the *metaphysical One*, the *Parmenian canon of the being*?

Epilogue

Perhaps, because of the risk of giving the impression, totally opposite to the intentions stated in the beginning, of a closed and self-sufficient engagement, it could have been more suitable to withhold the temptation of writing an epilogue to our paper. By selecting an ending, nevertheless, we are doing that not aiming at summarizing conclusively the presented ideas, but to prevent any possible discomfort that the baffled (of placing the orthodox theology in a transdisciplinary context) reader could experience. We specify that, such a positioning of theology should not appear by any means as illegitimate in the sense that the discourse of orthodoxy would risk to dilute, or even lose, its identity, crossing over to the realm of an anonymous spirituality. The transdisciplinary methodology, totally in resonance with the spirit of Christianity, inaugurates within scientific knowledge a way of methodological and terminological flexibility that allows for the widening of the horizon of knowledge beyond reductionist models and linguistic clichés. A similar thing was done in the domain of the spirit by the Fathers of the Church, who never showed any intention to "sanctify", idolatrously, the philosophical system in whose paradigm they talked — or a particular conceptual frame, or even the theological vocabulary that they often forged semantically by transvaluating the philosophical language of the moment — but to save the ever ineffable significations from beyond these means of expression and knowledge.

Regarding the vision over reality, we could see that theology resists even the toughest and most recent exigencies that the scientific and philosophical analysis of this concept rises and largely anticipates. Theology will not come with a fossilized discourse about reality, in quasi-definitive formulas, but it will not lose either the identity ethos of its ontological discourse because of its flexibility. Hence, we can propose a fusion of horizons of the concept of "reality" in the very meaning of this syntagm avoiding elegantly the previously mentioned extremes: a dynamic and self-transcendent process regarding the creation of a new horizon of

knowledge out of many, respecting completely however their identity.[69] This new horizon opens over a "shared understanding" of the issue in discussion, understanding that it does not blunt in syncretical manner the particular relief specific to the horizons that fused. It is a *new vision* of the world emerged from the fusion of horizons, enriched, not simply resulting from the sum of different, more or less complementary, points of view.

Therefore, inasmuch as the Eastern Christian theology does not build its own discourse on reality out of closed and immutable concepts sealed to semantic and opposable (to those of the present-day scientific ontology) refinements, we argue that a fusion of horizons and, implicitly, *the understanding itself* in a transdisciplinar territory is possible. As stated in this paper, this mutual understanding can be based on at least two consistent ideas: the ontic and epistemic "sensibility" of reality toward human involvement, and the distinction Real-Reality — the latter derived in patristic theology from the non-essentialist grounding of the created reality "out of nothing". If this fusion is capable to sketch a modest draft of a new *Weltanschauung*, we ultimately leave it to the reader and to time to decide…

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69. Within the metabolism of knowledge, in any moment of the cognition process, *understanding* itself implies a fusion of horizons. Hence, this syntagm does not refer to a contingent methodological construct, precious yet disposable in its exotic character, it is not a mere particularity of the epistemological discourse, but expresses the *normality* of the cognition act.

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Two Theories of Levels of Reality
In Dialogue with Basarab Nicolescu

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Introduction

Not long ago I had a chance to contact Basarab Nicolescu. During the past few years, we have both been engaged in developing what we call the theory of levels of reality, without really knowing what the other was doing. To the best of my knowledge, this is the first time that the two theories have been explicitly compared. Indeed, open discussion of the pros and cons of the two proposals may prove beneficial to both of them, because it may help clarify their presuppositions, provide clearer presentations of their results and eventually pave the way to new problems worth addressing. Both theories have a number of theses in common (*e.g.* the difference between levels of reality and levels of organization; see Nicolescu [2002] and Poli [2004]) as well as putting forward remarkably different claims. Clear recognition of their similarities and differences, and frank discussion especially of the latter, may therefore contribute to the development of a conclusively more robust theory of levels of reality.

Before beginning the said critical comparison, I would point out that both Nicolescu and myself have defended the importance of the organic nature of reality, albeit in markedly different ways. Nicolescu openly relies on the tenets of *Naturphilosophie* and in particular on the vision advocated by Jacob Böhme and set out in his award-winning book on Böhme (Nicolescu [1991]). As a consequence, "an attempt to elaborate a new philosophy of Nature" comes to be seen as "a privileged mediator of a dialogue among all the areas of knowledge", which amounts to saying that the elaboration of a new philosophy of nature "is one of the highest priorities of transdisciplinarity" (Nicolescu [2002], p. 65).

As far as my own proposal is concerned, my theory of levels of reality is a component of a more classically oriented idea of dynamic ontology. Aristotle and Leibniz are two of the great philosophers of the past who sought to develop a categorical system of dynamic nature. Closer to our times are the endeavors of Brentano, Husserl, and Hartmann in Europe and of Peirce and Whitehead in the United States. By standing on their shoulders, we will perhaps be able to see a little bit further. Even if the two proposals proceed along different routes, in principle they are not orthogonal to each another.

Another thesis shared by both of us is that "reality is structured *via* a certain number of levels" (Nicolescu [2002], p. 49). Unfortunately, however, I see no reason to accept the subsequent claim "for the sake of clarity, let us suppose that this number is infinite" (*ibidem*, p. 50). I, for one, do not see any robust reason in favour of the demanding claim that there should be an infinite number of levels of reality, and, in any such case, an explicit argument in support of it should be provided. Interestingly, the claim of an infinite number of levels of reality seems to run counter to other aspects of the theory defended by Nicolescu. If we consider that the only levels of reality explicitly mentioned by Nicolescu are the quantum and the macro-physical world (see below), the idea of an infinite number of levels is at odds with the distinction itself between levels of reality and levels of organization.

According to Nicolescu, transdisciplinarity is based on three pillars: levels of reality, the logic of the included middle, and complexity. I myself accept a version of the theory of levels of reality, whilst I reject the logic of the included middle; and from what I have been able to understand, my view of complexity is rather different from Nicolescu's. This may also be the most appropriate place to admit that I am unable to understand some of the subtleties of Nicolescu's theory of transdisciplinarity: for instance, its claims that "the place of transdisciplinarity is a place without place" (Nicolescu [2002], p. 117) or its systematic use of twin expressions such as "immanent transcendence" *vs.* "transcendent immanence" (*ibidem*, p. 128). Being unable to grasp the intended meaning of these expressions, I will omit their analysis.

This paper focuses on Nicolescu's theory and relies on his *Manifesto of Transdisciplinarity* (2002). In order not to interrupt the flow of the argumentation, I have summarized some of the main theses of my own theory of the levels of reality in the Annex at the end of paper.

The Backgrounds of the Two Theories of Levels of Reality

By way of introduction to the two different theories of levels of reality developed by Nicolescu and myself, it is helpful to state their respective backgrounds. As already mentioned, Nicolescu considers the theory of levels of reality to be one of the three requisite components of a new vision called "transdisciplinarity". The other two requisite components of transdisciplinarity, besides the theory of levels of reality, are the logic of the third included and complexity, which I shall respectively discuss in the sections and below.

Transdisciplinarity today comes in different guises, as a simple search on the web will prove. Here I will consider only the view of transdisciplinarity elaborated by Nicolescu. The first step towards understanding transdisciplinarity is to distinguish transdisciplinarity sharply from both multi- and inter-disciplinarity. According to Nicolescu ([2002], p. 42), multidisciplinarity studies a topic from several different disciplines at once, whilst interdisciplinarity addresses the problem of transferring a method from one discipline to another (*ibidem*, p. 43). On the other hand, transdisciplinarity is mainly interested in "the understanding of the present world, of which one of the imperatives is the unity of knowledge" (*ibidem*, p. 44). It is precisely this goal of the unity of knowledge that obliges one to consider "that which is at once between the disciplines, across the different disciplines, and beyond all disciplines" (*ibidem*).

One might perhaps add that the task of transdisciplinarity is to bring to light, to make visible, the usually hidden links among the various disciplines.

In this respect, it is important to acknowledge that "disciplinary research concerns, at most, one and the same level of reality" (Nicolescu [2002], pp. 44-45). Ever more precisely, "in most cases, it (= disciplinarity) only concerns fragments of one level of reality" (*ibidem*, p. 45). I can only add that I entirely agree with the latter two quotations. Furthermore, "transdisciplinarity concerns the dynamics engendered by the action of several levels of reality at once" (*ibidem*). Again, I totally agree.

The only difference worth noting is that I understand "the dynamics engendered by the action of several levels of reality at once" to be the core subject of ontology. This is a first interesting outcome: what Nicolescu takes to be one of the defining features of transdisciplinarity corresponds to what I take to be one of the defining features of ontology. Perhaps a not entirely obvious outcome.

Nicolescu himself partly admits that his theory has an ontological bent as well: "The meaning we give to the word *reality* is pragmatic and

ontological at the same time" (Nicolescu [2002], p. 20). Although I am unclear as to the connections between the pragmatic aspects and the ontological ones, I am happy enough with this at least partial acknowledgment of the ontological side of transdisciplinarity.

Given this first, possibly unexpected, result, interest grows in what in the end constitutes a level of reality. As before, a quote may suffice: "By 'level of reality' we intend to designate an ensemble of systems that are invariant under certain laws". Which amounts to saying "that two levels of reality are different if, while passing from the one to the other, there is a break in the laws and a break in fundamental concepts (such as, for example, causality)" (Nicolescu [2002], p. 21). I could not express my own ideas any better.

Before I add some of the necessary details, it will be helpful briefly to return to the problem of the unity of knowledge. Philosophy has long shown that there are two main routes to achieving the unity of knowledge: the various kinds of knowledge may be unified because their object is one or because their method is one. The former route presupposes that the world (the universe) is one; each kind of knowledge (each discipline) may consider only some aspects of the world (its material constitution, for instance) or some of its entities or parts (such as the living entities populating the world). The unity of the world is the ground for the unity of knowledge about the world. This view is essentially ascribable to Aristotle and can be termed the ontological understanding of the unity of knowledge. The opposite view is the epistemological one initially developed by Descartes. This second perspective starts from the thesis that all forms of knowledge that we are able to develop are always *our* forms of knowledge. If we want to rely on knowledge that is as certain and evident as possible, our only option is to check and assure the internal consistency of our theories.

However important consistency may be, it is nevertheless a feature internal to theories. Much more relevant is whether a theory is able to grasp, even to a limited extent, some aspects of reality.

As far as I can tell, scientists of whatever bent do their best to know how the reality of interest to them actually works, be it microphysical particles, the Na-K pump within cell membranes, the onset of depression, or the divorce rate in wealthy countries. I have deliberately provided radically different examples from sciences as diverse as physics, biochemistry, psychology, and sociology. In short: all the sciences have a basic ontological orientation and it is therefore legitimate to claim that for them the ontological side prevails over the epistemological one. This is precisely the starting-point of the theory of levels of reality that I have been developing for more than ten years.

The situation at hand is the radical opposition between the fact that the world (= reality) is one, and the fact that we seemingly need an ever-growing number of disciplines, sub-disciplines, and technologies to understand the many sides of this same world. Since we do not have anything like a "science of the sciences", ontology seems the only categorical framework within which we can address the problem of synthesizing the multiplicity of accounts provided by the complex array of disciplines and technologies.

As far as I can tell, the theory of levels of reality is precisely the general framework able to provide the categorical tools with which to distinguish and coordinate the various disciplinary and technological outcomes. Some categories will be universal, *i.e.* valid for all kinds of reality, whilst others will be domain or local categories, *i.e.* valid only for some kinds or modes of reality.

The theory of levels of reality should encompass each and every science: not only the natural sciences — something that can be taken as obvious — but also the cognitive and social sciences. In other words, "reality" does not mean "physical" reality, for also psychological and social phenomena are real (on occasion dramatically so).

For me, all the sciences have a basic ontological orientation. They seek to understand the world and our experience of it. Ontology, as an autonomous discipline, studies the links among results obtained by the various sciences. The problem is that the pictures yielded by the different sciences are categorically different, and no conceptual framework able to synthesise them properly is available. Consequently, an adequate ontological framework still has to be elaborated.

Ontology needs the achievements of all the sciences if it is to accomplish its aims. Even if we accept the Philosopher's claim that, by virtue of the problems it addresses, ontology is *philosophia prima* (first philosophy), then because of the answers it proposes, ontology can be only *philosophia ultima* (last philosophy). In between there lies science.

On the other hand, Nicolescu seems to start from the more restricted thesis that "reality" should only be understood as "physical" or "material". It is not by chance, then, only two main levels of reality are explicitly mentioned by the *Manifesto of Transdisciplinarity*: one corresponding to quantum physics and one roughly corresponding to classical physics, namely: "the quantum level, which is a level of reality different from the macrophysical level" (Nicolescu [2002], p. 25). These two levels can be taken as showing that the micro-structure of the world obeys laws very different from those valid for the mesoscopic structure of the world, such as global *vs.* local causality (or nonseparability *vs.* separability). Whilst I obviously agree with the claim that the ontological nature of the quantum

world is different from the nature of the macrophysical world, I would further claim that organisms, minds and societies — in their own way different from those characterizing physical entities — instantiate authentically different levels of reality.

If I have understood Nicolescu correctly, his theory firmly distinguishes levels of reality from levels of perception. Strictly speaking, for him levels of perception are not levels of reality. Yet I do not understand why physics alone should be deemed real. For me, also perceptions and cognitions are real, albeit in a way different from that in which physical entities are real (and we know that the latter can be real in at least two different ways: the quantum and the macro). Furthermore, social phenomena also have their own family of levels.

Before turning to a more detailed analysis of these issues, I must address the problems of the logic of the included middle and complexity, the two other pillars of transdisciplinarity.

The Logic of the Included Middle

While Nicolescu's analysis of physical levels is crystal-clear and arises from a thorough acquaintance with the current understanding of physics, his references to logic and logical frameworks starts from a perspective very distant from the contemporary understanding of logic. This raises a serious problem: whilst I fully accept the claim that our understanding of logic may still be limited, and that many surprises may be in store, we nevertheless have a *prima facie* obligation to rely on what we have so far understood and the results obtained. Those wishing to propose an alternative formal framework have the substantial obligation to provide compelling arguments in favour of their alternative proposal. If they fail to do so, they are not in a position to reasonably ask other scholars to accept their proposal. To date, the logic of the included middle has been entirely at odds with contemporary logics: properly speaking, the logic of the included middle cannot be called a logic at all. Its structure is underspecified, no formal derivation rule has been established, no theorem derived, no metatheory developed. In short, none of the criteria for legitimately speaking of a *logic* has been fulfilled. It may well be that all these developments will come about in due time. However, to date, the requirements for considering the logic of the included middle a real logic have not been met. This has an immediate consequence: if the logic of the third included cannot be seriously considered a real logic, the idea of grounding transdisciplinarity on it radically undermines the viability of the idea itself of transdisciplinarity.

In this regard, the second article of the *Charter of Transdisciplinarity* warrants a brief discussion. The article runs as follows: "The recognition of the existence of different levels of reality governed by different types of logic is inherent in the transdisciplinary attitude. Any attempt to reduce reality to a single level governed by a single form of logic does not lie within the scope of transdisciplinarity" (Nicolescu [2002], p. 148). I unreservedly accept the idea that an array of different logics may be needed to model different levels of reality. However, I am unsure as to the exact meaning of the qualification "types" of logics. To what does the article refer? To the difference between, say, propositional and predicative logics? Or to the need to use, say, temporal or modal logics? I, for one, am confused by the reference to "types" of logic. Something more important, however, is implicit in the article: upon taking it for granted that different levels of reality may need different logics, the most relevant question becomes: How are the various levels of reality tied to each other? What connections link the various levels? What logic, if any, should be adopted to model these ties? Is there any single logic connecting the various levels, or should we resort to a number of different logics according to the case? Interestingly, the *Manifesto of Transdisciplinarity* forcefully defends the claim that one single logic, namely the logic of the third included, should be used to articulate the links between levels. Moreover, the connection between levels of reality and levels of perception must also adopt the logic of the third included. On the other hand, the *Charter of Transdisciplinarity* is significantly silent on the links between levels. Perhaps not even those who have endorsed the *Charter of Transdisciplinarity* are entirely sure about the logic of the included middle.

What I find difficult to understand is the tension between the claim that the *only* logic linking the different strata of reality is the logic of the included middle and the author's candid admission that "no one has succeeded in finding a mathematical formalism that permits the difficult passage from one world to another" (Nicolescu [2002], p. 21). I presume that I can read "level" for "world". I am entirely in favour of the latter claim (and obviously thoroughly against the former one). Within my own framework, in fact, I have never sought to specify the logic linking the various levels to each other. Since the various strata of reality are so categorically different, I see no real problem in humbly admitting that there may be no logic between them. It may well be that the very idea of an inter-strata logic should be rejected.

Complexity

Complexity is the third pillar of transdisciplinarity. Unfortunately, the analysis of complexity provided by the *Manifesto* is cursory and unspecific. To make matters worse, the claim is advanced that "the logic of the included middle is perhaps the privileged logic of complexity" (Nicolescu [2002], p. 30). The further remark that "privileged" should be understood "in the sense that it allows us to cross the different areas of knowledge in a coherent way" is not much help. Since I do not know of any specific treatment of complexity conducted from the point of view of this theory of transdisciplinarity, I am not in the position to add more specific observations.

Levels of Perception or the Psychological Stratum?

According to Nicolescu, "The different levels of reality are accessible to human knowledge thanks to the existence of different levels of perception, which are found in a one-to-one correspondence with levels of reality" (Nicolescu [2002], p. 55). This quote marks the point of maximum difference between our two theories. To abbreviate the many questions that can be raised, the issue is why psychology (or cognitive science) is not seriously taken into consideration. Insofar as we are interested in the physical world, we all assume without further ado that we must pay all the necessary attention to physics and its results. Similarly, if we are interested in perception or any other psychological phenomenon, the first step is to pay all the necessary attention to psychology and its findings. I accept that ontology may eventually reach the conclusion that some scientific data are not entirely reliable and may need deeper consideration. However, this will be the outcome of profound and highly precise analysis and cannot be assumed *a priori*. Now, if there is something that psychology has supported with an astonishing range and amount of experimental data is that the perceptual connection with the external world is far from being one-to-one.

As regards physics, no one can seriously speak today about physics without acknowledging quantum phenomena. Likewise, any serious discourse on perception cannot but acknowledge that it has its own internal laws and the connection with the perceived world is many-to-many.

However, even if the admittedly too restrictive one-to-one claim is amended, the problem remains as to whether perception should or should

not be taken as an autonomous level of reality. My answer is that psychological phenomena form a specific level of reality, and perception should be considered a specific sub-level within the psychological level.

The Laws of the Levels

As already said, in most cases the exact connecting links between levels of reality are still unknown, or only partially known. This serious lack of knowledge notwithstanding, we are nevertheless able to specify some of their most general properties. The *Manifesto of Transdisciplinarity* mentions three theses formulated by the physicist Walter Thirring (Nicolescu [2002], p. 63). Let me repeat them in some detail:

1. The laws of any inferior level are not completely determined by the laws of a superior level… That which is considered to be fundamental on one level may appear accidental on a superior level, and that which is considered to be accidental or incomprehensible on a certain level can appear to be fundamental on a superior level.
2. The laws of any inferior level depend more on the circumstances of their emergence than do the laws of a superior level. The laws of a certain level depend essentially on the local configuration to which these laws refer… Certain internal ambiguities concerning laws of an inferior level of reality are resolved by taking into account the laws of a superior level.
3. The hierarchy of laws evolves at the same time as the universe itself. In other words, the birth of laws occurs simultaneously with the evolution of the universe. These laws pre-existed at the "beginning" of the universe as potentialities. It is the evolution of the universe that actualizes these laws and their hierarchy.

I have no principled difficulty in accepting these three laws. Since each of them comprises a number of different aspects, these should be distinguished. The second law, for instance, seems to include the idea that all the categories of a particular level of reality perform their determining function jointly. This is indeed a profound intuition, explicitly presented by Nicolai Hartmann, one of the greatest figures in the field of the theories of levels of reality (see Hartmann [1952], p. 65). An immediate consequence of the solidarity linking together the categories determining a level of reality is that categories occurring in various levels have meanings at least partially different since they interact with different sets of categories.

As a matter of fact, Hartmann's laws of the dependence and independence between levels go deeper than Thirring's into the details of inter-level connections. Let me copy the relevant passages from my article "The basic problem of the theory of levels of reality", pp. 274-275. Given that the difference between strata and layers has not yet been introduced, I will continue to use *level* generically (and modify the text accordingly):

The following are the laws of dependence:

1. Every level comprises categories of the lower level, but in no case do the categories of a higher level appear in a lower one. The assumption of categories from one level to another can only operate upwards, never downwards.
2. This reappearance of the categories is always limited. It does not occur as regards all the categories of the lower level, nor does it extend to all the higher levels.
3. The categories passed from lower to higher levels undergo change. They are transformed by the character of the higher level. What persists unchanged is always only a fundamental categorical aspect.
4. The reappearance of lower categories never constitutes the character of the higher level. This always stems from the intervention of a categorical "novelty" which is independent of the lower categories and consists in the emergence of new categories. The change occurring in the elements that reappear is brought about by the introduction of the "novelty" (Hartmann [1952], pp. 75-76).

The first three laws of autonomy are as follows:

1. The fundamental categories encompass all the various ontological levels. However, they display features at every level which are specific to that particular level (because they interact with the complex of categories at that level).
2. The categories of the lower ontological levels are the foundation for the higher ones, but they are indifferent to the higher categories.
3. The categories of the lower levels are stronger than the categories of the higher levels, but they have lesser structural power.

From the above laws, the consequence can be immediately derived that "no level of reality constitutes a privileged place from which one is able to understand all the other levels of reality" (Nicolescu [2002], pp. 54-55). On the other hand, neither Hartmann's, nor Thirring's laws imply

that "a level of reality is what it is because all the other levels exist at the same time" (*ibidem*, p. 55). I do not think that physics, say, became in any way different when life began or when the first society emerged. Lower levels, Hartmann claims, are indifferent to higher levels.

Levels Everywhere

According to Nicolescu, transdisciplinarity is a thoroughly-levelled framework and includes not only levels of reality, but also levels of perception, levels of understanding, levels of confusion, and levels of silence. According to the canons of transdisciplinarity, it is very likely that my theory of levels suffers from a very high level of confusion, perhaps the maximal one. Be that as it may, one would nevertheless ask whether all these levels are of the same kind, *i.e.* whether they obey the same structural rules. As far as levels of reality are concerned, we have seen that the idea itself of level is grounded on "systems that are invariant under certain laws". More precisely, "two levels of reality are different if, while passing from the one to the other, there is break in the laws and a break in fundamental concepts" (Nicolescu [2002], p. 21). In short, my interpretation of the last two quotes is that two levels are different if they require a different set of ontological categories. Would it be correct to extend this understanding of level of reality to the other types of levels, too? Possibly not. The trouble is that left underspecified is the intended meaning of the many other types of levels mentioned by the *Manifesto*. The levels of confusion, for instance, are defined as a "lack of respect for the unique and singular role that each level of reality and each level of perception plays within the open unity of the world" (*ibidem*, p. 111). However, I cannot say that this definition is a great deal of help; nor is of much help the subsequent listing of the main types of confusion (*i.e.* "forgetting the discontinuity of levels of reality and levels of perception, replacing them implicitly with continuity" (*ibidem*), assuming one level of reality and many levels of perception (*ibidem*, p. 112), assuming many levels of reality and one level of perception (*ibidem*, p. 113).

The Multireferentiality of the Theory of Levels

Multireferentiality is one of the main claims of the theory of levels, and both Nicolescu and myself openly defend it.

A few quotations may suffice: "The discontinuity that is manifested in the quantum world is also manifested in the structure of the levels of

Reality. That does not prevent the two worlds from coexisting. The proof: our own existence. Our bodies contain simultaneously a macrophysical structure and a quantum structure" (Nicolescu [2002], p. 21). This is entirely correct. I would only add that our bodies contain also a biological structure, which is something very different from both their micro- and macro-physical bases. Furthermore, our bodies are the grounds for utterly different phenomena, such as the minds we happen to have and the many widely articulated social roles we perform.

By Way of Summary

The following table summarizes some of the present paper's main outcomes:

	Questions	Answers	
		NICOLESCU	POLI
1.	What is a level of reality?	An ensemble of systems that are invariant under certain laws	The referents of a coordinated group of ontological categories
2.	What distinguishes levels of reality?	Laws, concepts	Categories
3.	Are levels of reality discrete or continuous?	Continuous	Discrete
4.	Are levels of reality all of the same kind or are there different types of levels?	Same type	Different types

The answers to questions 1 and 2 are almost equivalent, while the answers to questions 3 and 4 are patently different. Annex A will spell out some of the differences in some detail. As regards the theory of levels of reality, the main difference between Nicolescu's and my own theory concerns whether psychological phenomena should be taken as forming a specific level of reality. According to Nicolescu, the answer is no, because psychological phenomena pertain to levels of perception. Yet I do not see why psychological phenomena should not be considered a specific level of reality. A further difference is that Nicolescu's theory does not seem to have room for social phenomena, while mine sees them as constituting another level of reality, different from, but not unrelated to, the material and the psychological levels.

Annex

It is fair to claim that no general consensus exists on how to define, to describe or even to sketch the idea of level of reality. This Annex presents a fragment from my essay "Ontology: The Categorial Stance". As far as my own framework is concerned, it adopts a *categorial* criterion: the levels of reality are characterized (and therefore distinguished) by their categories. The main subsequent distinction is that between universal categories (those that pertain to reality in its entirety) and categories that pertain solely to one or some levels of reality.

Most authors prefer instead to adopt an objectual standpoint, rather than a categorical one. Arguing in favor of the objectual standpoint has the undoubted advantage that it yields an elementary definition of level: a level consists of a collection of units. From this point of view, the series of levels is a series of objects interacting at different degrees of granularity. A model of this kind is accepted by a large part of the scientific community, because it depicts the widely held view of levels based on a reductionist approach. Higher-order groups of items may behave differently, even to the point that it is impossible to calculate (predict) their specific behavior, but in the end what matters is that they can all be reduced to the lower *atoms*.

If this were indeed the way matters stand, then the general neglect shown towards the problem of the levels would be justified.

In order to deal with the real complexity of the problem of levels, the general picture must be altered so that it becomes possible to study not only *linear* hierarchies, but *tangled* ones as well. This conclusion bears out the approach which undertakes a categorial analysis, compared to the one which studies items in iteration.

An argument in favor of the approach *by objects* is the ease with which it is possible to pass from an object-based description to a process-based one: if a level is defined by items in iteration (where the items can be canonically conceived as objects), then a level can be characterized by a dynamic. A multiplicity of structurally stable dynamics, at diverse levels of granularity, may articulate a multiplicity of levels. However, if it turns out that the structuring in levels does not respect a universal principle of linearity, then one is forced to restrict the multidynamic frames to their linear fragments. Which is precisely the situation of the current theories of dynamic systems. On careful consideration, in fact, the predominant opinion is that there is only one multi-dynamic (multi-layered) system: the one described by the natural sciences. Other forms of knowledge are scientific to the extent that they can be located in the progressive series of

supraformations (groups of groups of groups of items, each with its specific kinds of interaction). Hence the alternative: a discipline is scientific to the extent that it can be located in the series of aggregation levels — if so, it can be more or less easily reduced to the base level — or it cannot be thus located and is consequently not a science: it has no citizenship in the realm of knowledge and is scientifically stateless.

The distinction is widespread among three basic realms or regions (or strata, as I will call them) of reality. Even if the boundaries between them are differently placed, the distinction among the three realms of material, psychological, and social phenomena is essentially accepted by most thinkers and scientists. A major source of discussion is whether inanimate and animate beings should be placed in two different realms (this meaning that there are, in fact, four, not three realms) or within the same realm. The latter option defends the thesis that a phase transition or something similar connects inanimate and animate items.

From a categorial point of view, the problem of how many strata there are can be easily solved. Leaving apart universal categories (those applying everywhere), two main categorial situations can be distinguished: (a) Types (Items) A and B are categorically different because the description (codification or modeling) of one of them requires categories that are not needed by the description (codification or modeling) of the other; (b) Types (Items) A and B are categorically different because their description (codification or modeling) requires two entirely different groups of categories. Following Hartmann, I term the two relations respectively as relations of over-forming (*Überformung*) and building-above (*Überbauung*).[1] Strata or realms of reality are connected by building-above relations. That is to say, the main reason for distinguishing as clearly as possible the different strata of reality is that any of them is characterized by the birth of a *new* categorial *series*. The group of categories that are needed to analyze the phenomena of the psychological stratum is essentially different from the group of categories needed to analyze the social one, which in its turn requires a group of categories different from the one needed to analyze the material stratum of reality.

Over-forming (the type (a) form of categorial dependence) is weaker than building-above, and it is used to analyze the internal organization of strata. Each of the three strata of reality has its specific structure. The case of the material stratum is the best known and the least problematic. Suffice it to consider the series atom-molecule-cell-organism (which can be extended at each of its two extremes to include sub-atomic particles and ecological communities, and also internally, as needed). In this case,

1. Even if my vision is substantially different from Nicolai Hartmann's, his contribution is a required starting-point for anybody interested in the problem of levels of reality.

we have a clear example of a series that for the most part proceeds by levels of granularity. Compared to the material realm, the psychological and social ones are characterized by an interruption in the material categorial series and by the onset of new ones (relative to the psychological and social items). More complex types of over-forming are instantiated by them.

A terminological note may be helpful. I use the term *level* to refer in general to the levels of reality, restricting the term *layer* to over-forming relationships, and the term *stratum* to building-above relationships. I will eventually use the expressions *sub-layer* and *sub-stratum* when analysis requires them.

The question now arises as to how the material, psychological, and social strata are connected together. The most obvious answer is that they have a linear structure like the one illustrated by the left side of *Figure 1*.

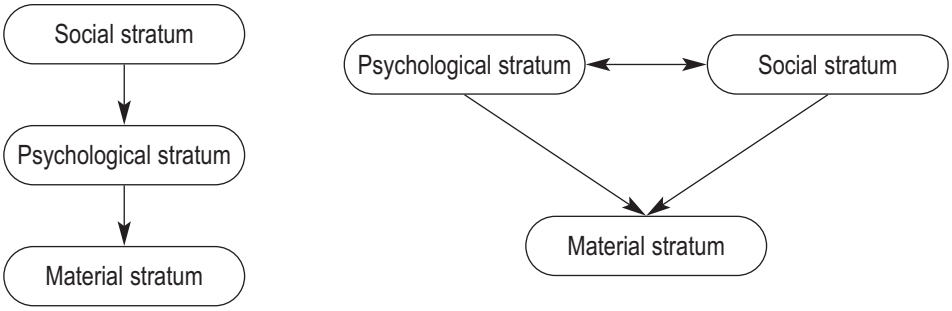

Figure 1

Left: Linearly organized strata *Right*: Strata with bilateral dependence

On this view, the social realm is founded on the psychological stratum, which in its turn is founded on the material one. Likewise, the material stratum is the bearer of the psychological stratum, which in its turn is the bearer of the social one. The point of view illustrated by the left side of *Figure 1* is part of the received wisdom. However, a different option is possible. Consider the right side of *Figure 1*.

Material phenomena act as bearers of *both* psychological, *and* social phenomena. In their turn, psychological and social phenomena reciprocally determine each other. Psychological and social systems are formed through co-evolution, which means that the one is the environmental prerequisite for the other.

The next step is to articulate the internal organization of each stratum. Analysis shows that the internal organization of the three strata exhibits different patterns.

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La philosophie empirique contre l'imagination

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Aux XVII^e^ et XVIII^e^ siècles, la philosophie européenne a soumis à une profonde critique les traditions héritées du Moyen Âge. L'Âge de la Raison a eu pour conséquence le désenchantement de la pensée mythique et merveilleuse du millénaire antérieur. Une extraordinaire censure idéologique et philosophique, multidimensionnelle et pluri-tropique, a refoulé les thèmes et les symboles de tout imaginaire considéré hétérodoxe.

Il est intéressant d'observer que, dans un premier temps du moins, jusqu'au XVIII^e^ siècle, la censure religieuse, exercée autant par l'Église catholique, surtout après le Concile de Trente, que par les églises protestantes, et la censure rationnelle professée par les représentants de la « nouvelle science » n'étaient pas en contradiction. Par contre, elles partageaient les mêmes fondements spirituels, plus précisément l'idée du primat de la raison. Forgée et raffinée dans la méthode syllogistique de l'École, la théologie chrétienne, dans sa variante scolastique, se rencontrait avec les axiomes de Descartes qui font de la raison la méthode d'analyse et le critère de certification de la vérité.

Ce n'est que vers la fin du XVII^e^ siècle, avec l'ascension de l'empirisme, que le nouveau critère imposé par la philosophie anglaise, celui de l'expérimentation, provoquera le divorce entre la science et la religion, entre la raison et la fantaisie. À la différence de la tradition cartésienne, Francis Bacon, Thomas Hobbes, John Locke ou David Hume doublent et même remplacent, en tant que critère de vérité, la consistance rationnelle par le témoignage des sens.

Dans son *Novum organum* de 1620, Francis Bacon distingue deux procédés cognitifs, celui déductif, et celui inductif : « Il y a et il ne peut y avoir que deux voies pour la recherche et pour l'invention de la vérité.

L'une, partant des sens et du particulier, s'élance d'un coup d'aile vers les axiomes les plus généraux et, s'appuyant sur ces principes comme sur une vérité inébranlable, rend ses jugements et invente les axiomes moyens. C'est la voie suivie aujourd'hui. L'autre dégage les axiomes à partir des sens et du particulier, en s'élevant de façon continue et graduelle pour parvenir enfin au plus général. C'est la vraie voie, mais elle n'a pas été essayée. »[1] La première voie est celle des docteurs de l'École, qui instrumentent les vérités révélées chrétiennes avec la méthode aristotélicienne. La voie proposée par Bacon, offerte comme un « nouveau organon » et une « grande restauration » de la vérité, se veut un « art » d'« interprétation de la Nature ».[2]

Les deux pôles ontologiques qui font possible cette bifurcation méthodologique sont Dieu et la Nature, le Créateur et la création. Les vérités des Dieu se constituent en « lumières divines », que Descartes continuait de mettre à la base de son épistémologie en tant que garantes de la rectitude et de la cohérence de la raison humaine, alors que les lois de la Nature sont des « lumières naturelles ». Les organes cognitifs de l'homme qui permettent l'appréhension de ces deux lumières sont la raison et les sens. Autant la raison et les sens peuvent produire des théories et des représentations correctes de la réalité. Les problèmes de l'entendement humain apparaissent au point de conjonction entre les deux facultés, dans l'espace intermédiaire occupé par l'imagination et les notions communes, reçues (les idoles).

Francis Bacon ne s'attaque donc ni aux « lumières divines » (comme tous les philosophes du XVII^e siècle, il conserve Dieu dans le système), ni à la raison humaine. Pour ce qui touche à Dieu, il prend soin de présenter sa méthode comme un complément de la théologie et non comme un démolisseur de la foi : « Nous demandons en priant et en suppléant que les affaires humaines ne fassent pas obstacle aux divines, que l'ouverture des voies des sens et l'éclat plus grand donné à la lumière naturelle ne suscitent pas incrédulité et ténèbres en nos esprits envers les mystères divins ; mais que plutôt, d'un entendement pur, débarrassé de ses fantaisies et de ses chimères, et pourtant livré et soumis sans condition aux oracles divins, nous rendions à la foi ce qui est à la foi »[3]. Sur la distinction néoplatonicienne entre *eidos* et *eidolon*[4], Bacon oppose les idées de

1. Francis Bacon, *Novum Organum* (introduction, traduction et notes par Michel Malherbe et Jean-Marie Pousseur), livre I, aphorisme 18, Paris, PUF, 1986, p. 105.
2. *Ibidem*, p. 77.
3. *Ibidem*, p. 72.
4. Pour l'évolution de ces concepts chez les Néoplatoniciens de la Renaissance, voir Erwin Panofsky, *Idea. Contribution à l'histoire du concept de l'ancienne théorie de l'art* (traduction de l'allemand par Henri Joly, préface de Jean Molino), Paris, Gallimard, 1989.

Dieu (*divinae mentis ideae*) aux idoles de l'esprit humain (*humanae mentis idola*)[5]. Les premières sont, évidemment, vraies, tandis que les secondes sont le plus souvent fausses.

Bacon ne s'interroge pas, non plus, au sujet de la véracité des idées purement intellectuelles et de la consistance des lois logiques, et ne nie pas la capacité de la raison de construire la vérité. Il est vrai que, à la différence du théologien, qui établit son système sur la révélation (les « oracles divins »), le philosophe est obligé, lui, de fonder ses démarches, plus modestement, sur son entendement seul. Néanmoins, l'intellect est bien capable, par ses opérations spécifiques, de produire des raisonnements valides.

Le fait dont doute Bacon, en opposition avec les cartésiens, est la capacité de la raison de se défaire des erreurs et de retrouver le droit chemin par ses propres forces dans le labyrinthe des fausses opinions. Les fantaisies et les notions reçues risquent le plus souvent de submerger et d'obnubiler les facultés discriminatoires de l'intellect : « La corruption de la philosophie par la superstition et le mélange de théologie étend bien autrement ses maux et gagne profondément les philosophies, soit dans leur totalité, soit dans leurs parties. L'entendement humain, en effet, n'est pas moins soumis aux impressions de l'imagination qu'aux impressions des notions communes. »[6]

L'attaque de Bacon cible donc l'espace intermédiaire entre les sens et l'intellect, occupé par l'imagination et les « superstitions ». Les fantaisies humaines sont d'autant plus pernicieuses qu'elles sont partagées par plusieurs individus et qu'elles reçoivent ainsi la garantie et l'autorité de la tradition. « Rien ne plaît plus au grand nombre — déplore Bacon — si ce n'est ce qui frappe l'imagination ou ce qui enchaîne l'entendement dans les liens des notions communes. »[7] Les objets illusoires qui assiègent l'entendement et empêchent la « restauration des sciences » sont de quatre genres : les idoles de la race (*idola tribus*), les idoles de la caverne (*idola specus*), les idoles de la place publique (*idola fori*) et les idoles du théâtre (*idola theatri*).[8] À la différence des cartésiens, qui incriminent l'imagination en tant que faculté du psychisme individuel, Bacon accuse plutôt ce qu'on peut appeler l'imagination collective, les chimères partagées.

Pour arriver au « mariage vrai et légitime entre la faculté empirique et la faculté rationnelle »[9], il faut donc évacuer d'entre les deux la masse

5. Francis Bacon, *Novum Organum*, *ed.cit.*, livre I, aphorisme 23, p. 106.

6. *Ibidem*, *ed.cit.*, livre I, aphorisme 65, p. 125.

7. *Ibidem*, *ed.cit.*, livre I, aphorisme 77, p. 138.

8. *Ibidem*, *ed.cit.*, livre I, aphorisme 39, p. 110.

9. *Ibidem*, p. 72.

considérable de fictions individuelles et collectives. Et si la raison a des problèmes à faire distinction, de par elle-même, entre le vrai et le faux, Bacon propose aux philosophes d'emprunter l'autre voie, « celle qui n'a pas été essayée », celle des sens. La méthode consiste à « établir des degrés de certitude, à préserver les sens par une sorte de réduction, à rejeter au contraire, le plus souvent, le travail de l'esprit qui suit les sens : enfin, à ouvrir et à aménager une voie neuve et sûre de l'esprit, à partir des perceptions sensibles elles-mêmes »[10]. Selon Bacon, « la meilleure démonstration est de loin l'expérience, pourvu qu'elle tienne ferme à cela même qui est expérimenté »[11], et non pas la cohérence et l'autoconsistance logique invoquées par les cartésiens.

Fort du critère de l'expérience, Francis Bacon procède à la critique de l'occultisme et de la « pensée enchantée » en général. Les mythologies populaires, « les fables, les superstitions, les sornettes que les nourrices instillent goutte à goutte aux enfants ne laissent pas de dépraver gravement leur esprit ». Formés dans ce climat pédagogique infus, la plupart des individus sont enclins à donner crédit à tous les « mensonges reçus et vantés »[12]. Même certains savants, ceux qui pratiquent la magie naturelle ou la magie superstitieuse, se laissent « porter par des conjectures oiseuses et des plus faciles »[13]. La solution pour faire lumière dans ce labyrinthe est de chasser et de refouler « tous les spectres de l'imagination avec une sorte de religion et d'exorcisme »[14].

L'appel à la confirmation par l'expérience s'avère fatal pour les *mirabilia* de l'imagination enchantée du Moyen Âge. Pour entamer l'*instauratio magna*, Francis Bacon propose aux philosophes de dresser « une collection ou une histoire de tous les monstres, les naissances ou les créations merveilleuses, et, en un mot, de toutes les choses nouvelles, rares et extraordinaires de la nature »[15]. Ce panorama servirait à distinguer les objets réels des objets illusoires, c'est-à-dire à séparer les vérités des idoles de toutes sortes. La « grande censure de l'imaginaire » renaissant par la théologie (selon l'analyse de Ioan Petru Culianu[16]) est ainsi relayée autant par le rationalisme cartésien, qui traite la fantaisie comme la « folle du

10. Francis Bacon, *Novum Organum*, *ed.cit*., p. 94.

11. *Ibidem*, Livre I, aphorisme 70, p. 130.

12. *Ibidem*, p. 84.

13. *Ibidem*, Livre I, aphorisme 85, p. 146.

14. *Ibidem*, p. 85.

15. Francis Bacon, *Noul Organon* (traduction de N. Petrescu et M. Florian), Bucarest, Éditions de l'Académie de la République Populaire de Roumanie, 1957, p. 155.

16. Ioan Petru Culianu, *Éros et Magie à la Renaissance. 1484* (avec une préface de Mircea Eliade), Paris, Flammarion, 1984.

logis », que par l'empirisme baconien, qui voit en elle la fille égarée qui doit être chassée de la maison.

L'assaut contre la forteresse des superstitions est repris par Thomas Hobbes dans *Léviathan* (1651). Le philosophe anglais part de la définition du miracle comme « une œuvre de Dieu (distincte de la manière, fixée lors de la création, dont elle s'opère selon la nature) accomplie pour rendre manifeste aux élus la mission confiée à un ministre extraordinaire en vue de leur salut »[17]. Tout en acceptant la présence du sacré dans l'histoire, surtout pendant le ministère du Christ, Thomas Hobbes critique les faux miracles, beaucoup plus nombreux, des charlatans qui dupent la populace. Ces mystifications sont rendues possibles par l'ignorance et l'aptitude pour l'erreur, communes à tous les hommes, et spécialement à ceux qui ont une moindre connaissance des lois et des causes naturelles.

Pour expliquer les égarements de l'opinion publique, Thomas Hobbes développe une psychologie à trois étages, comprenant les sens, l'imagination et la raison. La base de sa psychologie est représentée par les organes sensoriels. Prenant parti contre les adeptes de l'apriorisme des idées, Hobbes pose l'axiome qu'il n'y a pas de construction mentale qui n'ait pas premièrement passé par les sens : « À l'origine de toutes nos pensées se trouve ce que nous appelons sensation (car il n'y a pas de conception dans l'esprit humain qui n'ait pas d'abord, tout à la fois ou partie par partie, été engendrée au sein des organes de la sensation). Les autres dérivent de cette origine. »[18] Les organes des sens, « pressés » par les corps extérieurs soit immédiatement (le goût, le toucher) soit médiatement (la vue, l'ouïe, l'odorat), transmettent cette pression à l'intérieur, par les nerfs, vers le cerveau et le cœur. Ces organes répondent à leur tour par une contre-pression ou une résistance dirigée vers l'extérieur, engendrant des « semblants », des « fantasmes » des corps extérieurs, qu'on appelle sensations (lumières, couleurs, sons, goûts, etc.).

Comme le démontre Yves Charles Zarka, Hobbes fait un choix métaphysique fondamental quand il traite les sensations non comme des apparitions de l'être, mais comme des fantasmes, des images subjectives. « Le phénomène n'est plus manifestation de l'être, au contraire, c'est désormais une représentation subjective qui nous sépare de la chose. Corrélativement, l'imagination (*phantasma*), qui était chez Aristote la capacité de faire apparaître les choses perçues comme choses de telle ou telle sorte, devient chez Hobbes la faculté de conservation et de reproduction

17. Thomas Hobbes, *Léviathan. Traité de la matière, de la forme et du pouvoir de la république ecclésiastique et civile*, part III, chapitre XXXVII (traduit de l'anglais, annoté et comparé avec le texte latin par François Tricaud), Paris, Éditions Sirey, 1971, p. 466.

18. *Ibidem*, part I, chapitre I, p. 11.

des images mentales. On comprend, dès lors, que le fantasme devienne une représentation subjective qui ne ressemble pas à la chose. Percevoir, et par suite imaginer, c'est donc moins un mode d'être au monde, qu'une façon de ne pas y être, ou mieux, d'en être séparé. »[19]

Au deuxième étage de sa psychologie, Thomas Hobbes situe l'imagination. Si les sensations sont des images, des fantasmes, parfaitement distinctes des choses extérieures, les éléments de l'imagination sont des *sensations déchues*, les réminiscences obscurcies des images créées par la perception : « L'imagination n'est donc rien d'autre qu'une sensation en voie de dégradation […] De là vient que l'imagination est d'autant plus faible que le temps est plus long, qui s'est écoulé après la vision ou la sensation de quelque objet. »[20] Thomas Hobbes conflue ainsi fantaisie et mémoire, imagination et souvenir (« l'imagination et le souvenir ne sont qu'une seule chose »[21]). Si la sensation est une représentation, un simulacre, l'imagination est poussée encore plus loin en dehors de l'ontologie, puisqu'elle elle n'est qu'une survivance ou la rémanence de ce simulacre.

Il est vrai que ce « malaise ontologique » permet à l'imagination une plus grande liberté face aux choses extérieures. À part les représentations directes des objets, comme celle d'un homme et d'un cheval (l'imagination simple), la fantaisie peut combiner ces représentations, comme dans l'image d'un centaure (l'imagination composée). En fonction de l'état de l'homme qui imagine, il y a plusieurs formes d'imagination composée : l'imagination dans l'état de veille (les fictions, les rêveries), l'imagination pendant le sommeil (les rêves) et l'imagination qui ne distingue pas entre l'état de veille et de sommeil (les apparitions et les visions). Les apparitions sont des rêves que l'homme pense avoir vus en état de veille. Ces accidents sont dus à des circonstances et des émotions fortes, qui troublent la faculté discriminatoire de l'individu.[22]

Or, selon Hobbes, c'est de cette ignorance ou incapacité de faire distinction entre les sensations et les représentations, d'un côté, et les rêves, les apparitions et les visions, de l'autre côté, qu'est née la religion des gentils d'autrefois, qui croyaient aux satyres, aux faunes, aux nymphes, aux sylphes, aux spectres et aux gnomes, et des hommes d'aujourd'hui, qui continuent de croire aux fées, aux fantômes et aux gobelins. La sorcellerie est également visée par cette accusation, non pas parce qu'elle aurait commerce avec le diable, mais parce qu'elle perpétuerait une confusion

19. Yves Charles Zarka, *La Décision métaphysique de Hobbes. Conditions de la politique*, Paris, Librairie Philosophique J. Vrin, 1987, p. 35.

20. Thomas Hobbes, *Léviathan*, *ed.cit*., part I, chapitre II, pp. 14-15.

21. *Ibidem*, p. 16.

22. *Ibidem*, pp. 16-18.

pernicieuse. Quoique l'attitude envers la sorcière et le magicien ait changé (le philosophe ne les considère plus comme des apostats, mais comme des charlatans ou des naïfs), on voit que la censure empirique ne manque pas de prendre le relais de la censure religieuse.

L'Ennemi, le diable lui-même, n'est plus une créature réelle, extérieure, qui tente et corrompt les hommes ; il est le faux jugement, la corruption de la faculté de discrimination entre la fantaisie et la réalité. Si le monde contemporain de Hobbes est un Royaume des Ténèbres, cela est dû aux faux prophètes qui ont transformé les fantaisies des poètes païens en une Démonologie, propageant une « doctrine fabuleuse touchant les démons, qui ne sont que des idoles, ou fantasmes du cerveau, dénoués de toute nature réelle qui leur soit propre et distincte »[23]. Les êtres surnaturels, merveilleux, sont ainsi résorbés dans la psychologie, en tant que combinaisons fausses opérées par l'imagination. La fantaisie est la source des erreurs et doit être surveillée attentivement par les hommes de bon sens.

Moins d'un siècle plus tard, dans ses *Two Dissertations Concerning Sense, and the Imagination. With an Essay on Consciousness* (1728), Zachary Mayne reprendra l'idée que « l'Imagination est presque toujours, dans un degré ou un autre, dangereuse et préjudicielle pour l'Entendement »[24]. Si l'Intellect ne reste pas sur ses gardes à toujours trier les idées que lui procure l'imagination, il risque de certifier ces fantaisies comme vraies et pertinentes, alors qu'elles ne sont que peu ou nullement en relation avec la matière de ses pensées et méditations. C'est dans cette besogne que les sens peuvent apporter un instrument efficace de discrimination entre les idées correctes et les représentations fantaisistes.

Utilisant la raison comme critère de certification de la vérité, des rationalistes comme Descartes, Spinoza ou Thomas Browne pouvaient distribuer la nouvelle science et la théologie scolastique du même côté de la barricade intellectuelle. Avec l'introduction du critère de la vérification empirique, la religion risque de retomber assez vite, malgré les précautions prises par Francis Bacon, dans le domaine opposé à celui de la science.

Un premier pas en est fait par John Locke, quand il fait la distinction entre la raison humaine et la révélation divine. La Raison, affirme Locke, est « une Révélation naturelle, par où le Père des Lumières, la Source éternelle de toute Connoissance, communique aux Hommes cette portion de vérité qu'il a mise à la portée de leurs facultés naturelles ». Symétriquement, « la Révélation est la Raison naturelle augmentée par un nouveau

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23. Thomas Hobbes, *Léviathan*, *ed.cit.*, part IV, chapitre XLIV : « Des ténèbres spirituelles dues à une interprétation incorrecte de l'écriture », pp. 626-627.

24. *Apud* Michael V. DePorte, *Nightmares and Hobbyhorses. Swift, Sterne, and Augustan Ideas of Madness*, San Marino, The Huntington Library, 1974.

fond de découvertes émanées immédiatement de Dieu »[25]. Locke accepte l'axiome des lumières divines, mais il n'en fait plus le garant des fonctions de l'intellect. La raison de l'homme s'applique aux choses de la nature ; ses instruments cognitifs appartiennent aux lumières naturelles du monde créé. Les lumières divines sont une surcharge qui peut bien envahir et surclasser les contenus de l'intellect humain, lui apportant une « révélation » dans le sens métaphysique et mystique du mot, mais elles restent un don extérieur et un accident par rapport au fonctionnement intrinsèque de l'intellect humain.

John Locke prend ainsi position contre le néoplatonisme de la Renaissance, selon lequel les idées des hommes sont des copies des idées de Dieu (*formulae idearum*), des empreintes laissées par les sceaux de la réalité métaphysique. Les prémisses polémiques de Locke sont « qu'il n'y a point de Principes innées dans l'esprit de l'Homme » et « qu'il n'y a point de Principes de pratique qui soient innés ». Bien qu'elle est isomorphe structurellement à l'Intellect divin, et de par cela elle peut en recevoir et retravailler les révélations, la raison humaine n'est pas en contact immédiat avec les pensées de Dieu et n'est pas nourrie d'une manière ininterrompue par celles-ci. C'est ce clivage entre les lumières divines et les lumières naturelles qui rend possible l'apparition des erreurs.

À ce point, Locke lance une attaque plus spécifique contre le néoplatonisme, à savoir contre la théorie de l'enthousiasme telle qu'elle avait été reformulée par Giordano Bruno et développée par les platonisants de Cambridge. Critiquant l'idée que « l'enthousiasme est […] une révélation immédiate […] plus commode et plus courte qu'un raisonnement long et pénible »[26], Locke argumente que toute révélation doit être en quelque sorte certifiée ou en tout cas accompagnée par la raison humaine. Une révélation est vraie et correcte, si elle met en accord et couvre la distance entre les lumières divines et celles naturelles. Sinon, dans l'intervalle peuvent s'insinuer des « illuminations » irrationnelles, qui prétendent refléter la vérité, mais qui ne sont que des chimères. L'enthousiasme est une Révélation sans Raison qui donne libre cours aux fausses croyances et superstitions : « Je veux parler de l'Enthousiasme, qui laissant la Raison à quartier, voudroit établir la Révélation sans elle, mais qui par là détruit en effet la Raison & la Révélation tout à la fois, & leur substitue de vaines fantaisies, qu'un Homme a forgées lui-même, & qu'il prend pour un fondement solide de croyance & de conduite »[27].

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25. John Locke, *Essai philosophique concernant l'entendement humain*, traduit par [Pierre] Coste, édité par Émilienne Naert, Paris, Librairie Philosophique J. Vrin, 1989, p. 584.

26. *Ibidem*, p. 398.

27. *Ibidem*, p. 583.

La source des égarements de l'entendement devient, encore une fois, la fantaisie qui, profitant de l'écart entre les lumières divines et l'intellect humain, y insère ses propres constructions. « Y a-t-il quelque chose plus propre à se précipiter dans l'erreur que de prendre l'imagination pour guide ? » s'interroge Philalète, un partenaire du dialogue philosophique de Locke. Ceux qui le font sont des dupes, des fanatiques auto-manipulés par leurs propres désirs : « Leur fantaisie devient une illumination et une autorité divine, & leurs desseins sont une direction infaillible du ciel, qu'ils obligés de suivre ». Théophile, le second partenaire, n'est pas moins tranchant : « Quelques personnes idiotes, ayant l'imagination agitée, en forment des conceptions, qu'elles n'avaient point auparavant »[28].

Quels sont les moyens pour rejeter les fausses images de la fantaisie ? Conformément à leurs priorités axiomatiques, les rationalistes pensaient que les erreurs pouvaient être isolées et déconstruites par l'application correcte et cohérente des lois de la raison et de la logique. Dans l'aval de « l'autre voie » montrée par Francis Bacon, les empiristes confient le rôle de contrôle à l'expérience. Dans le débat entre les souteneurs de l'*a priori* ou de l'*a posteriori* des idées, John Locke lance l'argument de poids de la *tabula rasa* : « Supposons donc qu'au commencement l'Âme est ce qu'on appelle une Table rase, vide de tous caractères, sans aucune idée, quelle qu'elle soit »[29]. Locke prend soin de préciser que, par idée, il se réfère à tous les contenus mentaux, à « tout ce qui est l'objet de notre Entendement lorsque nous pensons », donc non seulement aux « notions » et aux « espèces », mais aussi aux « fantômes » et aux illusions.[30]

En accord avec la théorie qu'il n'y a pas d'idées innées, Locke donne pour source de toutes les idées soit les objets extérieurs (qui fournissent à l'esprit les idées des qualités sensibles), soit les opérations de l'esprit lui-même. Les principales activités mentales sont, en accord avec ces deux sources, la « pratique » et la « spéculation ».[31] Les autres activités, comme la mémoire et l'imagination, ne produisent pas d'idées nouvelles, elles ne font que recombiner les représentations acquises. La mémoire est un dépotoir d'« idées dormantes », qu'elle met à la disposition des jeux de l'imagination, de la vivacité d'esprit, de l'invention.[32]

L'esprit possède plusieurs instruments combinatoires : distinction, comparaison, composition, nomination, combinaison, séparation, etc.

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28. John Locke, *Essai philosophique concernant l'entendement humain*, *ed.cit*., pp. 398-400.

29. *Ibidem*, p. 61.

30. *Ibidem*, pp. 5-6.

31. *Ibidem*, p. 62.

32. *Ibidem*, p. 106.

Par leur intermédiaire, il obtient, à partir d'idées simples, produites par l'expérience des sens, les idées complexes. En général, les idées peuvent être claires ou obscures, distinctes ou confuses, réelles ou chimériques, complètes ou incomplètes, vraies ou fausses. En tant que provenant des sens, « les idées simples sont toutes réelles & conviennent toutes avec la réalités des choses ». En tant que constructions, les idées complexes peuvent être autant vraies que fausses, réelles ou chimériques. Pour les distinguer, il faut en appeler à la certification empirique : « […] celles-la sont chimériques qui sont composées de telles collections d'idées simples qui n'ont jamais été réellement unies, qu'on n'a jamais trouvé ensemble dans aucune substance, par exemple une créature raisonnable avec une tête de cheval jointe à un corps de forme humaine »[33].

Les erreurs sont donc des idées complexes, formées par les opérations combinatoires de l'esprit, qui n'ont pas de support dans la réalité. Si la raison ne doit accueillir que les idées claires, distinctes, réelles, complètes et vraies, la fantaisie est le domaine des idées obscures, confuses, chimériques, incomplètes et fausses. L'imagination reste le paria de l'entendement humain, en tant que source secondaire et alternative d'idées erronées, alors que la pratique et la raison sont les sources privilégiées respectivement d'idées simples et d'idées complexes correctes.

Leibniz, dans ses *Nouveaux essais sur l'entendement humain* (publiés *post mortem* en 1765), commentaire dialogué en marge de l'œuvre de Locke, combat l'empirisme radical de celui-ci, mais n'est non plus intéressé par la réhabilitation de l'imagination. Ainsi, il ramène et réduit les distinctions de Locke aux définitions de Descartes concernant les idées claires / confuses et de Spinoza concernant les idées réelles / chimériques. Sa critique vise à réintroduire l'apriorisme de la raison, plus précisément la possibilité de distinguer le vrai du faux en utilisant les critères intrinsèques de l'intellect : « Le meilleur est de dire que les idées possibles deviennent seulement chimériques lorsqu'on y attache sans fondement l'idée de l'existence effective, comme font ceux qui se promettent la pierre philosophale, ou comme feraient ceux qui croiraient qu'il y a eu une nation de centaures »[34]. Ce n'est pas par la vérification pratique, mais par la surveillance des opérations et des associations logiques qu'on peut assurer la justesse de l'entendement. La fantaisie ne trouve pas non plus de place dans le rationalisme mathématique de Leibniz.

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33. John Locke, *Essai philosophique concernant l'entendement humain*, *ed.cit.*, pp. 296-298.

34. Gottfried Wilhelm Leibniz, *Nouveaux essais sur l'entendement humain*, Chronologie, bibliographie, introduction et notes par Jacques Brunschwig, Paris, Flammarion, 1990, pp. 198, 205-206.

Enfin, le processus de dépréciation de l'imagination à partir de la position empirique est mené à terme par David Hume. Tout en partant de sa « décision métaphysique » fondamentale, Thomas Hobbes avait affaibli l'imagination du point de vue ontologique. Les sensations (imagination simple) et les visions, rêves et apparitions (imagination complexe) sont toutes des fantasmes, les premières conformes toutefois aux choses, les secondes le plus souvent erronées. À son tour, John Locke, pour désigner les représentations mentales, a préféré au terme de « fantasme » celui d'« idée ». Ce nouveau couple psychologique, dans lequel les fantaisies ne sont plus assimilées aux sensations mais aux idées, ne réussit cependant pas à ennoblir les produits de l'imagination, bien au contraire. Au processus de dévaluation ontologique des fantasmes mis en marche par Hobbes, s'ajoute ainsi le processus de dépersonnalisation de la fantaisie, sa réduction à une autre fonction mentale, réalisée par Locke et Hume.

Plusieurs analystes de l'évolution des idées, de Bertrand Russell à André Robinet, ont mis en relief la tendance des philosophes des siècles XVII-XVIII à réduire l'appareil psychique à deux fonctions, les sens et l'intellect.[35] De même que Locke ne reconnaissait dans l'appareil psychique que les sensations et la raison, la pratique et la spéculation, David Hume affirme que « toutes les perceptions de l'esprit humain se ramènent à deux espèces distinctes que j'appellerai impressions et idées »[36]. Les impressions sont les sensations, les perceptions, les passions et les émotions qui envahissent l'esprit en venant de l'extérieur ; les idées sont les images affaiblies circulant dans la pensée et le raisonnement. Dans une autre définition, Hume parle d'impression de sensation (comme le froid et le chaud, la soif et la faim, etc.) et d'impression de réflexion, qui est « une copie qui subsiste après que l'impression a cessé, et c'est cela que nous appelons une idée ; cette idée de plaisir ou de douleur, en revenant à notre âme, produit des impressions nouvelles de désir et d'aversion, d'espoir et de crainte »[37]. Avec les termes d'aujourd'hui, on pourrait appeler les deux concepts de Hume images perceptives et images imaginaires. En tout cas, ce qui ressort immédiatement est que les images imaginaires, ou impressions de réflexion, sont assimilées et résorbées dans l'idée. Par l'inflation du concept d'idée, l'intellect arrive à englober la fantaisie.

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35. Bertrand Russell, *La philosophie de Leibniz* (traduit par J. et R. Ray avec une préface de l'auteur), Paris, Éditions des Archives Contemporaines, 1970 ; André Robinet, *Justice et terreur. Leibniz et le principe de la raison*, Paris, Librairie Philosophique J. Vrin, 2001.

36. David Hume, *L'Entendement. Traité de la nature humaine*, livre I, partie I, section I (traduction inédite par Philippe Baranger et Philippe Saltel ; présentation, notes, index, bibliographie et chronologie par Philippe Saltel), Paris, Flammarion, 1995, p. 41.

37. *Ibidem*, livre I, partie I, section II, p. 48.

Quand elles circulent en dehors de la raison pure, les impressions de réflexion sont de deux types, idées de la mémoire et idées de l'imagination. Les idées de la mémoire sont des impressions conservées qui peuvent revenir dans l'esprit avec la vivacité et dans l'ordre initial, reconstruisant une image des expériences passées. Les idées de l'imagination sont plus faibles et ne sont pas tenues de respecter l'ordre et la forme des impressions originelles. Autrement dit, à la différence de la mémoire, l'imagination a la liberté de « transposer et de changer ses idées. Les fables que nous trouvons dans les poèmes et les romans placent ce principe hors de toute discussion. La nature y est totalement bouleversée et il n'est question que de chevaux ailés, de dragons qui crachent le feu et de géants monstrueux »[38].

La différence entre la mémoire et l'imagination consiste cependant moins dans la nature des idées (simples/complexes) ou dans l'ordre de ces idées (conforme à l'expérience/complètement libre), mais plutôt dans la « force » et la « vivacité » de la première en comparaison avec la seconde. David Hume arrive ainsi à esquisser, d'une manière assez floue et imprécise, mais très poignante, le concept de certitude de réalité. C'est la présence ou l'absence de cette intuition garante de réalité qui fait la distinction entre la perception et la mémoire, d'un côté, et la fantaisie et le rêve, de l'autre côté : « Un homme peut laisser aller sa fantaisie à feindre une série d'événements passés : il n'aurait aucune possibilité de distinguer cette fiction d'un souvenir du même genre, si les idées de l'imagination n'étaient plus faibles et plus obscures »[39]. Cette idée, très à la mode à l'âge baroque et préfaçant les débats actuels sur les réalités virtuelles, avait déjà été formulée par Descartes, qui en avait fait un argument pour sa méthode de doute systématique. David Hume tranche le problème de l'incapacité de décider entre les représentations de la réalité et celles du rêve, en postulant une différence d'intensité décisive entre les idées de la mémoire et celles de l'imagination.

Les impressions perceptives et les idées de la mémoire possèdent une charge de réalité assurée, à la différence des idées de l'imagination et des idées de la raison (raisonnements démonstratifs et raisonnements probables), qui sont moins denses, plus raréfiées et spectrales. Ni l'imagination ni l'intellect ne sont capables de produire la certitude de réalité, ni de la transférer d'une idée à l'autre. « La raison ne saurait jamais nous assurer que l'existence d'un objet quelconque implique toujours celle d'un autre ; de sorte que, lorsque nous passons de l'impression d'un objet

38. David Hume, *L'Entendement. Traité de la nature humaine*, *ed.cit.*, livre I, partie I, section III, pp. 51-52.

39. *Ibidem*, livre I, partie III, section IV, p. 147.

à l'idée d'un autre, nous ne sommes pas déterminés par la raison, mais par la coutume ou par un principe d'association »[40]. Autrement dit, la raison ne peut pas garantir l'existence réelle des choses désignées par ses idées, le seul critère de distinction entre les idées correctes (ayant un référent réel) et les idées fausses (sans référent) est la vérification par l'expérience.

Les confusions et les erreurs sont dues justement à des associations incorrectes entre certaines idées et certaines impressions. Cette combinaison illicite est appelée par Hume « opinion de croyance », à savoir « une idée vive reliée ou associée à une impression présente ». Les croyances sont des idées qui s'arrogent illégalement le statut d'impressions. « L'effet de la croyance est donc d'élever une simple idée jusqu'à l'égalité avec nos impressions, et de lui conférer une influence similaire sur les passions. Cet effet, elle ne peut l'avoir que si elle fait que l'idée s'approche de l'impression en force et en vivacité. »[41] Grâce à cette « intensification », les croyances arrivent à influencer les passions et les actions des individus avec la même force que les impressions des événements et des choses extérieures.[42] Comme le remarque Michel Malherbe dans son livre sur David Hume, « par opposition à l'existence donnée, qui est originaire, la croyance pose des existences absentes, qui relèvent d'un pouvoir fondamental d'illusion »[43].

Une imagination vigoureuse est bien capable de produire des images vives qui brouillent le critère de réalité. « Quand, par suite d'une fermentation extraordinaire du sang et des esprits, l'imagination acquiert une vivacité telle qu'elle désorganise tous ses pouvoirs et toutes ses facultés, il n'y a aucun moyen de distinguer la vérité de la fausseté : toute vague fiction ou toute idée confuse, ayant la même influence que les impression de la mémoire ou les conclusions du jugement, est reçue au même titre qu'elles et agit sur les passions avec la même force. »[44] Les fous et les fanatiques sont des gens incapables de séparer la fantaisie des sensations, des souvenirs et du jugement, tandis que les charlatans et les « beaux parleurs » ont le pouvoir de provoquer des confusions similaires dans l'entendement des autres.[45]

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40. David Hume, *L'Entendement. Traité de la nature humaine*, *ed.cit.*, livre I, partie III, section VII, pp. 161-162.

41. *Ibidem*, livre I, partie III, section X, p. 188.

42. Voir *ibidem*, livre II, partie III, section IV, p. 281.

43. Michel Malherbe, *La philosophie empiriste de David Hume*, Paris, Librairie Philosophique J. Vrin, 1976, pp. 128-129.

44. David Hume, *L'Entendement. Traité de la nature humaine*, *ed.cit.*, livre I, partie III, section X, pp. 191-192.

45. Voir André-Louis Leroy, *David Hume*, Paris, PUF, 1953, chapitre III « Le progrès de l'imagination ».

Dans un traité ultérieur, *Enquête sur l'entendement humain* (1748), David Hume revient au problème des « opinions de croyance », y compris le christianisme. Pour offrir un instrument capable de distinguer le vrai du faux, il reprend un argument que John Tillotson avait énoncé dans son *Discours contre la transsubstantion* (1648). L'argument, de nature purement empirique, pose que l'évidence que nous avons sur la vérité de la religion chrétienne, fournie par la déposition des apôtres, est moins directe et immédiate que le témoignage contraire de notre expérience pratique. Donner le consentement à une théorie comme celle de la présence réelle du corps de Jésus Christ dans l'eucharistie, en défaveur de l'évidence des sens, serait contre les règles du raisonnement correct. David Hume se félicite d'avoir élaboré ce raisonnement qui, « s'il est juste, servira pour toujours d'arrêt, auprès des sages et des savants, aux erreurs superstitieuses de toute espèce »[46].

L'argument ne se veut pas athée, il ne s'attaque pas à l'existence de Dieu et aux fondements du christianisme. Seulement, il détruit le couple méthodologique entre raison et théologie et distribue la science à la rationalité et la religion à la foi. La dissemblance entre les idées de la raison et les idées de la foi provient des choses et des événements extérieurs reflétés par ces idées. La science a pour domaine d'observation les phénomènes uniformes et répétables, alors que la religion est le champ des miracles, que Hume définit comme « une violation des loi de la nature » par un acte déterminé de la volonté de Dieu ou par l'intervention d'un agent invisible.[47] Possible en principe, vrai dans l'histoire, un miracle ne peut toutefois pas être « prouvé » comme une loi de la nature. C'est pourquoi soumettre « notre très sainte religion » aux critères de l'empirie, épreuve qu'elle n'est pas disposée à subir, serait une méthode sûre de la discréditer.[48]

Bien qu'il sécurise de cette manière le territoire de la religion, Hume n'est pas disposé à lui céder les traditions fabuleuses de l'Antiquité et du Moyen Âge. La distinction entre les lois de la nature et les miracles de Dieu ne sous-tend pas la différence entre les impressions de sensation et les impressions d'imagination. Tous « les merveilleux récits des voyageurs, leurs relations d'aventures étonnantes, d'hommes étranges et de mœurs inhabituelles » ne sont que des productions de la fantaisie. Si ces fables ont eu un grand crédit dans l'opinion publique, à l'encontre de la règle de l'uniformité des phénomènes de la nature, c'est qu'elles ont excité « la tendance naturelle des hommes au merveilleux »[49]. La « pensée enchantée »

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46. David Hume, *Enquête sur l'entendement humain* (chronologie, présentation et bibliographie par Michelle Beyssade), Paris, Flammarion, 1983, p. 184.

47. *Ibidem*, p. 188.

48. *Ibidem*, p. 206.

49. *Ibidem*, p. 193.

est ainsi réduite à des impressions d'imagination, vigoureuses et vives sans doute, mais pas moins improuvables et fausses.

En conclusion, si les philosophes rationalistes traitaient l'imagination comme la « folle du logis » et la source des erreurs, les empiristes la subordonnent et la font dériver des sensations et des perceptions. Les images de la fantaisie sont des *duplicata* affaiblis et aléatoirement recombinés des images reçues par les sens. Cela revient à dire que, pour garantir la véracité et la rigueur de l'entendement humain, il faut toujours vérifier les images et les idées subjectives en les rapportant et en les réduisant à leur source, les choses extérieures. Cette nouvelle attitude philosophique (et en général le changement plus large et diffus de la position de l'homme européen face à la réalité) a eu des répercussions incalculables dans l'histoire des idées. Pour ne citer qu'un exemple, en littérature elle a déterminé la reformulation du pacte fictionnel établi entre l'auteur et son public, c'est-à-dire l'apparition de la convention réaliste et le rejet de la fiction, le remplacement des « romances » avec le roman moderne.

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Virtual Ontology / Real Experiences

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Introduction

This paper is threefold. It is positioned against the background of a philosophical problem that refers to the human ability of knowing oneself and God as One. In the philosophical literature the positive answer to this problematic is usually delegated to the mystical realm; in the realm of concrete practical experiences the answer would have been negative as based on the apparent impossibility of connecting the human with the divine in real life. Such a connection is often posited as being "beyond the limit of all human understanding" (Kearney [2001], p. 104) and delegated to the mystical realm. This paper's argument is that while this connection may seem to exceed human understanding, it does not have to remain as such. To construct the argument of how to overcome the great divide that separates the human from the divine, the paper will examine three sources crossing over philosophy and natural science and grounded on a common foundation represented by the logic of the included middle.

The first is Basarab Nicolescu's ([2002a]; [2002b]; [2005]) program of transdisciplinarity. The second is the cutting edge of contemporary science called *coordination dynamics* that posits the natural world in terms of "The Complementary Nature" (Kelso and Engstrom [2006]). The third is a broad corpus of work by French philosopher Gilles Deleuze whose striking ontology of the virtual and method of transcendental empiricism will constitute the paper's focus. In brief, disciplinary or *in vitro* knowledge is based on the classical logic of the excluded middle that induces a separation between subject and object and reduces the nature of knowledge to knowing merely the "objective" facts of the external world.

Nicolescu (2002) posits transdisciplinary, or *in vivo*, knowledge as exceeding scientific knowledge of the external world independent from

the subject. Yet, transdisciplinary knowledge does not reject science altogether. It is founded on the logic of the included middle that connects subject and object. The holistic (*in vivo*) intelligence enabled by a triadic relation brings in the dimension of meaning which is traditionally (*in vitro*) considered subjective, *i.e.*, located outside science. Transdisciplinarity presupposes passing through a transpersonal dimension and developing a transrelational attitude.

We need to better understand such a transpersonal element of experience. Kelso and Engstrom (2006) use the *tilde* ~ as a symbol for relation that reconciles the apparently dualistic opposites and assert that in "the case of human beings, complex nonlinear self-organizing systems of energy~matter have managed to evolve to the point of organizing a sense of self~other" (p. 253). A self-referential relation establishes meaningful correlations between/across the different levels constituting a system in the form of *complementary* pairs connected *via* the *coordination dynamics* enabled by the logic of the included middle. Contemporary mathematician Louis Kauffman (1996) calls it *virtual* logic that "goes beyond reason into a world of beauty, communication, and possibility" ([1996], p. 293). The dichotomies of "either-or" thinking (*in vitro*, as Nicolescu would say) are being transcended and traversed by virtue of the "both-and" (*in vivo*) science of coordination dynamics.

To clarify further the problematic of self-reference, the paper will present Deleuze's larger ontology that expands the limits of our understanding and perception and posits Being in terms of two *enfolded* levels of reality: virtual and actual. The virtual is *not identical* with the actual; the relation between them is com-pli-cated (*le pli* is "fold" in French). Significantly, "the virtual is not opposed to the real; it possesses a full reality by itself. The process it undergoes is… actualization" (Deleuze [1994], p. 211) that, due to Deleuze's philosophical method of transcendental empiricism, enriches human experience with an extra, religious or spiritual, dimension, especially if we understand the meaning of *re-ligio* literally as a self-referential process linking backward to its (virtual) origins.

The virtual and the actual are related triadically in the manner of Charles Sanders Peirce's semiotic structure of signs. A triadic structure of a genuine sign enables a correspondence or communication between two seemingly disparate levels. It is the actualization of the virtual potentialities in real experience that enables us to make connections or *bridges*, as Nicolescu says, between different levels of reality. The triadic logic forms a self-referential structure folding back *via* a relation symbolized by *tilde* ~. The different levels therefore "communicate" with each other *via* a feedback loop, in accordance with Nicolescu's transdisciplinary knowledge that therefore cannot but be grounded in the relational dynamics where terms form a complementary pair rather than being dualistic opposites.

Importantly enough, the concept of communication exceeds verbal exchange, encompassing much broader semiotic categories representing what Deleuze called *transversal communication*. The supposedly mystical experience with which we started this paper would be, in Deleuze's terms, an event of the actualization of potentialities or awakening of perceptions by raising them to a new power oriented towards a virtual object of perception that remains as yet *imperceptible*. The dynamics of the process is analogous to the coordination dynamics of the "self~other" complementary relation. What plays the role of "~" would be, for Deleuze, an immanent *affect* that together with *percepts* forms new *concepts*, new understanding. Affective understanding transcends what is usually given to sense-perceptions in ordinary experience: *empiricism is radically transcendental*. Hence, it is in the reality of our human experiences that the transversal connection, a necessary condition for "the famous mystical principle of *coincidentia oppositorum*, beyond the limit of all human understanding" (Kearney [2001], p. 104), is being established.

The paper will have demonstrated, however, that expanding the limits of human understanding to encompass an extra affective, or transpersonal, dimension should enable us to build a bridge over the gap between the dual opposites. What was traditionally called the mystery of *coincidentia oppositorum* is grounded in Deleuze's totally realist ontology that understands cosmos in terms of virtual reality comprising several levels of existence. At the conclusion of the paper a specific example of applying and using the logic of the included middle in practical experience will be introduced and described in detail. The Deleuzian transversal communication as a constituent part of the semiotic system becomes established in practice and therefore demonstrates how our real-life human experience become enriched with deeper, spiritual, significance, moving us closer thus to knowing self and other (other minds, God, Nature, etc.) as One, provided we understand the symbolic "language" embedded in such transversal communication that links together the disparate levels of reality.

Transdisciplinarity

The term "transdisciplinarity" as used by Basarab Nicolescu (2002a; 2002b; 2005) refers to overcoming the split between the sciences and humanities. Transdisciplinary knowledge belongs to what Nicolescu specifies as *in vivo* knowledge that exceeds scientific knowledge of the external world as independent from the subject. Bound to the internal world of human subjectivity, it necessarily includes a system of values

and meanings exceeding objective facts alone. Yet transdisciplinary knowledge does not reject science, instead it is based on new scientific foundations (to be addressed in the following section) so that disciplinary and transdisciplinary knowledge *complement* each other. Positing what he calls *transdisciplinary education* in the context of the increased specialization and fragmentation of knowledge, Nicolescu (2005) comments that "transdisciplinarity" was first coined by Jean Piaget in 1970 as something between and across the disciplinary divide. Nicolescu reminds us that the UNESCO report of the *Commission internationale sur l'Éducation pour le vingt et unième siècle*, chaired by Jacques Delors, strongly emphasized four pillars of a new kind of education: *learning to know, learning to do, learning to live together with, and learning to be*. *Learning to do* will have included the creative emergence of novelty and bringing to light our creative potential. Moving from static knowledge to the dynamic process of *learning to know* based on the actualization of potentialities means becoming capable of creating multiple connections or *bridges*, as Nicolescu calls them.

Disciplinary, *in vitro*, knowledge is based on the classical logic of the excluded middle that induces a separation between subject and object and reduces the meaning of knowledge to knowing merely the "objective" facts of the external world. The new transdisciplinary *in vivo* knowledge, however, is founded on the logic of the included middle that connects subject and object so that they will have, in Nicolescu's words, *corresponded* to each other. Analogously, transdisciplinarity refers to dynamics pertinent not to a single level of reality, but simultaneously across and between several levels of multidimensional reality.

Contrary to the so-called spectator theory of knowledge limited to the objective knowledge of external world, transdisciplinary knowledge is founded on the *interactions* between the external world of objects and a subjective world of "inner knowledge" (*in vivo*) that ancient philosophers called *Gnosis*. Contrary to analytic thinking that induces a separation between the mind and the world when an individual mind *observes* the natural world with the cool gaze of a Cartesian *Cogito*, a subjective mind that *participates* in the world demonstrates a holistic intelligence which exceeds conceptual thought alone. Such holistic intelligence derives from understanding the harmony between mind and world. Mind and nature cease being binary opposites, but are related or coordinated, thus complementing a theoretical *episteme* with practical *phronesis* resulting from the feedbacks between knowledge and action; the unity of knowledge.

The relation between a knowing subject and an object to be known has a triadic *vs*. dyadic structure; the terms of the relation are not dualistic opposites, but are engaged in correspondence, in conversation, in communication. Such mutual connection — a symbolic *bridge* between the terms — establishes a network as the proper structure for knowledge.

The triadic relation as a foundation for network is akin to a feedback loop connecting in a non-linear manner subject and object, cause and effect, self and other; or any other binary opposites, for that matter. The apparently *independent* dual opposites in fact form an *interdependent polar structure* in which both poles are bridged. Epistemologically, therefore, transdisciplinary knowledge is based on a logic where terms form a complementary pair *vs.* being dualistic opposites: they are connected or interrelated.

Since the days of Aristotle, classical syllogism is based on the logic of the excluded middle, which means, as Nicolescu reminds us, that there is no middle or third term which is at the same time both A and non-A. But the logic of the included middle is a multivalent logic containing all three elements, A, T (the third term), and non-A. Therefore, this logic is structurally equivalent to the triad of sign-object-interpretant embedded in what Charles Sanders Peirce called a genuine sign (*Figure 1*):

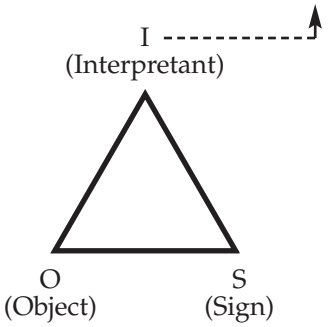

Figure 1

Logic as semiotics includes a third term as an interpretant "located" between a sign and its object that performs the function of the included Third or included middle in the overall Peircean relational trichotomy. Interpretant is what provides a sign with its meaning which however can always be interpreted further (as symbolized by the dotted line); *i.e.*, meanings evolve. Peirce posited a category of "Thirdness" or mediation, without which no communication, synthesis, integration, or evolution are possible. Such unorthodox logic (really, a contradiction in terms within strictly analytic reasoning in the framework of *in vitro*, disciplinary, knowledge) is akin to what contemporary mathematician Louis Kauffman (1996) calls *virtual,* or archaic, logic that "goes beyond reason into a world of beauty, communication and possibility" (Kauffman [1996], p. 293) as well as beyond given facts into a world of interpretable symbols, values, and meanings. For Kauffman, it is virtual logic that allows us to move from one world of ideas to another, from one level of description to another; from one level of reality to another.

The emphasis on communication indicates that there exists an interdependent network in which each level as if "speaks" to each other, desperately trying to understand each other's expressive "language", to thus create *shared* meanings along the communicative link embedded in a triadic relation. Logic is not a pure invention of logicians, but is a *ratio* that always already exists in human praxis, and the world perfused with genuine signs, *i.e.* grounded in the triadic relational dynamics, would be orderly and harmonious by its very nature. No wonder that Nicolescu is adamant that transdisciplinarity leads to the emergence of the interrelational or, better to say, transrelational attitude and passing through transpersonal dimension of experience. The terms in the logical relation do not oppose but sustain each other because of the included third.

The constructive, creative logic of the included middle is what "energizes reason… [and] provides the real possibility and the means for opening of communication across boundaries long thought to be impenetrable" (Kauffman [1996], p. 293). To summarize, *in vivo* knowledge is not just a static knowledge of the "objective" facts *per se*, but the dynamic understanding of meanings that not only differs in principle from predictability and knowledge of facts, but by necessity brings in the dimension of meaning, purpose, and value which is traditionally (*in vitro*) considered "subjective", *i.e.* located outside science (read: classical, "normal" science). But are meanings doomed to forever stay outside science?

The Science of Coordination Dynamics

If not "normal" science, then what? What is the governing dynamics that informs transdisciplinary knowledge? Back in 1972, it was Ludwig von Bertalanffy, the founder of the General Systems Theory, who first addressed the insufficiency of the analytical procedures of classical science based on linear causality between two basic variables, and attracted our attention to "new categories of interaction, transaction, teleology" (Bertalanffy [1972], p. xix) as problematizing the old mechanistic paradigm: indeed, interactions between more than two objects create an unsolvable problem within the equations of classical mechanics. Importantly, the "interactions do not have to be *physical*; they can also be thought of as a transference of *information*" (Cilliers [1998], p. 3) that takes place along Nicolescu's *bridges* constituting the networks of conversations or correspondences embedded in transdisciplinary, *in vivo*, knowledge.The said transference is the defining feature of the new science of coordination dynamics embedded in the world conceptualized as "The Complementary Nature" (Kelso & Engstrom [2006]).

Kelso and Engstrom use a squiggle, tilde ~, for pinpointing the *relation,* the symbolic punctuation for reconciling apparently dualistic opposites, and assert that in "the case of human beings, complex nonlinear self-organizing systems of energy~matter have managed to evolve to the point of organizing a sense of self~other" (Kelso [2006], p. 253). Different disciplines have their own *complementary* pairs that, rather than being alien to each other in the manner of Cartesian dualism, are connected *via* what Kelso and Engstrom specify and present as the science of coordination dynamics. Different "self~other" (self~not-self) pairs do belong to a variety of discourses; their commonality is derived from the same relational dynamics "contained" in the logic of the included middle that brings in the transpersonal dimension: human mind transcends the boundaries of an individual ego and cannot be separated from the collective, relational, and social domain: individual~society is one such "self~other" complementary pair in which the terms of the relation sustain each other.

Among complementary pairs in which the terms are related, or coordinated, are the following: cause~effect; *res cogitans~res extensa*; rationalism~empiricism; science~humanities; organism~environment; immanence~transcendence; body~mind; nature~nurture; being~becoming; certainty~uncertainty; novelty~confirmation; conscious~unconscious; and so on to ultimately include the bridge between the human and the divine that would also be functioning as interdependent polarities *vs.* irreconcilable opposites. Kelso and Engstrom ([2006], p. 20) comment on shamanism as a precursor to Taoism and Confucianism in Chinese philosophy in which the "principle of *yin~yang* [is] an icon symbolizing the fundamental conflict of opposites in nature". Conflict or unity? Or something in-between?

Defining the complementary nature as "a set of mutually depended principles responsible for the genesis, existence, and evolution of the universe", Kelso and Engstrom ([2006], p. 39) use a "complementary pair" as a minimal unit of analysis akin to Leibniz's monad — a paradoxical windowless window serving as the means for studying and understanding the complementary nature as a whole. Sure enough, as noticed by Kelso and Engstrom ([2006], p. 193), "coordination dynamics bristles with apparent… paradoxes". The semiotic triangle in *Figure 1* represents a rather paradoxical structure because of its self-reference. It is precisely "sentience and self-reference [that] have been making trouble for philosophers for centuries" (Kelso and Engstrom [2006], p. 253). The self-referential relation tilde ~ is what establishes the meaningful correlations between/across the different levels, dissolving the dualistic split between private experience and the public world.

It is almost ironic how in the course of the modern epoch the complementary science~magic pair has gradually become separated into dualistic opposites. While acknowledging what the pure reason of modernity considered to be a supernatural action, the attempt to explain this very action was made in terms of the method of classical science customarily connecting cause and effect directly, without any symbolic mediation. The "prompt" conclusion was therefore in terms of some anomalous effect, as in magic, without attributing the possibility of existence to yet "another kind of causation" (Peirce CP, 6.60). But the natural world is not limited to its solely mechanical aspect, similar to human experience not being reducible to blind action and reaction. What is customarily called magic, then, may in fact be considered a science of hidden relations — akin to coordination dynamics — that are capable of producing real effects when their cause is not at all obvious. The apparent dichotomies and antinomies of the old "either-or" narrow reasoning are now being transcended and traversed in accordance with the new "both-and" science of coordination dynamics equally applicable to natural and socio-cultural systems. Importantly, coordination dynamics as governed by self-organization, *i.e.* "spontaneous formation of patterns in open systems" (Kelso and Engstrom [2006], p. 112), does not require the presence of a *physical* coordinator.

Indeed, such a relational dynamics of experience that sounds foreign to materialist science has all along been familiar to religious thinking. The relational, complementary structure of Nature is the very condition of its knowability by the method of analogy — or likeness — that, while preeminent in spiritual teachings with regard to essential kinship and Oneness with the world, remains foreign to physical causality that deliberately separates the observer from what is observed. Mystics, however, as well as creative artists or true philosophers, play an intensive, *participatory* role *vs.* remaining detached observers. Their presence in the world proceeds in accordance with "subtle and seemingly mysterious ways. What one perceives affects what one does and what one does affects what one perceives" (Kelso and Engstrom [2006], p. 41).

Even if seemingly "getting information" from the realm that appears inaccessible to sense-perception, they (mystics, artists, philosophers, poets, lovers, madmen…) still "do not conjure things out of thin air, even if their conceptions and productions appear as utterly fantastical. Their compositions are only possible because they are able to connect, to tap into the virtual and immanent processes" (Ansell Pearson [1997], p. 4) embedded in Gilles Deleuze's virtual ontology. This information is what Kelso and Engstrom call *functional*, *i.e.* "*meaningful* and *specific* to any kind of coordinated activity… Information is functional if it allows people to communicate… learn and remember. Functional information can take many

forms, and many forms can realize functional information. …According to coordination dynamics, functional information transcends the medium through which parts and processes communicate" (Kelso and Engstrom [2006], pp. 98-99). We can construct another semiotic triangle with its included middle of information as the third term to the usual dyad of matter and energy (*Figure 2*):

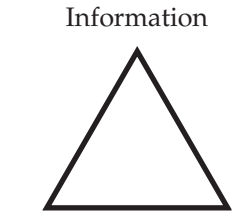

Figure 2

One example of functional information would be what Deleuze called the *transversal communication* that confers shared meanings on experience. This link, or communication, in which "the observer and the observed are one" (Kauffman [1996], p. 295) is what guarantees self-reference embedded in the multileveled, virtual~actual, world.

Deleuze's Ontology of the Virtual

This paper began with a promise to explain how the apparently dual opposites of real human experience and the transcendental realm of the divine can be bridged so that this mystical connection does not remain "beyond the limit of all human understanding" (Kearney [2001], p. 104). The transdisciplinary science of complementary nature and coordination dynamics took us closer to solving the riddle of reconciling the opposites. Gilles Deleuze's philosophical method of transcendental empiricism and his ontology of the virtual will take us even closer.

Deleuze's method is empirical by virtue of the object of investigation being regarded as real, albeit sub-representative, experience, yet it is transcendental because the very foundations for the empirical principles are *a priori* left outside the common faculties of perception so as to require a transcendental analysis of their implicit conditions. In this respect, transcendental empiricism purports to discover conditions that exist prior to the actual commonsensical experience. According to Deleuze's ontology, there is more to the world as compared to how it appears to common sense.

The observable facts are not all there is to experience: the dynamic understanding amounts to creating meanings in/for novel experiences and events that may confront us. Thinking is not a pre-given exercise of some cognitive faculty, but is always a second power of thought, born under the constraints of experience as a power, an *objective* capacity embedded in the total experiential situation, which is able both to affect us and itself become affected. As Deleuze says, something in the experiential "world forces us to think. This something is an object not of recognition but a fundamental 'encounter'… It may be grasped in a range of affective tones" (Deleuze [1994], p. 139).

Such a forceful perilous act of thinking demands attention to our implicit assumptions so as to be able to express them explicitly: this is a self-reflective element in Deleuze's philosophy. The experiential world is *folded*, and "we go from fold to fold" (Deleuze [1993], p. 17) within the unfolding experience. The fold is described as *the inside of the outside*, *i.e.* a self-referential relation functioning in accord with "the logic of sense" (Deleuze [1990]), the logic of the included middle. And the functioning of this logic is grounded in Deleuze's larger *virtual ontology*, according to which the virtual level is not opposed to the real, but itself possesses a full reality; what it apparently opposes is merely the level of the actual.

The realm of the virtual exceeds the possible. The possible can be realized, and the real *thing* is to indeed exist in the image and likeness, as the saying goes, of the possible *thing*. But the virtual is always already real — even without yet being actual! The Deleuzian object of experience is considered to be given only in its *tendency* to exist: the very nature of any "thing" is, according to Deleuze, just an expression of tendency. Virtual tendencies have the potential of becoming actual through the double process of different/ciation of the transcendental and "initially undifferentiated field" (Deleuze [1993], p. 10). The universe of knowledge is structured and Ideas are intensive multiplicities. How should we understand this notion? The unfolding proceeds not like a regular linear information processing between input and output, inside and outside, but on the very border along what Deleuze called a line of becoming which "is the in-between, the border or line of flight or descent running perpendicular to both" (Deleuze and Guattari [1987]) in the fold. This line, as Deleuze says, underlying its mediatory quality, "has only a middle. The middle is not an average; it is fast motion, it is the absolute speed of movement. A becoming is neither one, nor two" (Deleuze and Guattari [1987], p. 293), says Deleuze, presenting us with a powerful visual metaphor for the third term in the relation constituting the logic of the included middle.

Deleuze uses some terminology from the theory of communication that belongs to the family of complex systems, namely: how information

is transmitted in a channel as a sign/signal system. A signal is produced at the moment of coupling between two heterogeneous series of events operating at different levels. This does not mean that "something" actually flows through the channel, just that a relation, or interaction, is being established. A sign as a "bit" of information is Janus-faced: it provides a link as a squiggle "~" constructing a semiotic bridge between events without actually passing from one to another (*cf.* DeLanda [2002]), but rather being engaged into what Leibniz would have called "a dance of particles folding back on themselves" (Deleuze [1995], p. 157). A sign has to be Janus-faced because of its own self-reference. It closes "as if" on itself; however — and this is crucial — by its very closure, or coupling, it is capable of becoming another sign, contributing to the process of *becoming* along the multiplicity of levels.

According to Deleuze's radical empiricism, thinking, while exceeding solely rational thought, is still "fundamentally linked to a logic — a logic of multiplicities" (Deleuze [1987], p. viii) in accord with "a theory and practice of relations, of the *and*" (*ibidem*, p. 15). It is the relational dynamics constituting the logic of the included middle that forms the *triad* of affects, percepts, and concepts. It is the presence of *affect* — or desire, or love, or Eros — that connects the levels of reality by crossing over, or traversing, the difference between the virtual and the actual and exceeding the reductive model of purely analytic thinking. One has to "pursue the different series, to travel along the different levels, and cross all thresholds; instead of simply displaying phenomena or statements in their vertical or horizontal dimensions, one must form a transversal or mobile diagonal line" (Deleuze [1988], p. 22), a line of flight or becoming. Becoming is not reduced to terms of a relation; it is a relation *per se* as a pure sign that maintains an ontological priority. The dynamics proceed in a double movement of differentiation (with a *t*) by means of which differences in intensity establish a flow of information; and differenciation (with a *c*), by means of which unobservable virtualities do actualize themselves.

The logic of multiplicities means that there is no simple addition of information even if Deleuze uses the conjunction "and" to describe the process. The information becomes active or what Kelso and Engstrom call functional. The *and* of Deleuze is the in-between squiggle *tilde* ~ as a symbol for the mediating relation constituting a triad of a Peircean genuine sign based on the ontological difference between the virtual and the actual that itself is capable of making a difference of the second order in the world of real experiences. This logic would have represented "not the emanation of an 'I', but something that places in immanence the always other or a Non-self… I do not encounter myself on the outside. I find the other in me" (Deleuze [1988], p. 98). This is a process of summation that,

while suggesting a simple adding of information, in fact *intensifies* it (the multiplicity is intensive!) by means of forming a logical product akin to multiplication, to forming power series. Deleuze is adamant that "there is not a simple addition, but a constitution of a new plane, as of a surplus value" (Deleuze and Guattari [1987], p. 313).

The addition will have indicated the linearity of the process. But a triadic relation is based on a non-linear dynamics of experience interrupted now and then by "a new threshold, a new direction of the zigzagging line, a new course for the border" (Deleuze [1995], p. 45). By virtue of experimentation, thinking-as-becoming escapes the old habitual frame of reference within which the movement along the line of flight seems like a sort of immaterial vanishing through some imaginary event horizon, and creates its own terms of actualization, thereby leading to the "intensification of life" (Deleuze and Guattari [1994], p. 74) by means of "an increase in valence, a veritable becoming" ([1987], p. 10). What Deleuze calls *becoming* means always *becoming-other* in accord with the foundational self~other complementary pair embedded in the science of coordination dynamics.

In terms of Deleuze's ontology of the virtual (*cf.* Boundas [1996]; May and Semetsky [2008]; Semetsky [2009]), it is the dynamics of pure events that constitutes virtual reality. The actual does not resemble the virtual in the manner of Plato's model and copy. Deleuze presents us with *reversed* Platonism. The two are related not mimetically, but semiotically; they are *different*, and it cannot be otherwise because the virtual is posited just as a tendency, therefore *no-thing*. Virtual tendencies as potentialities or *no-things* become actualized as though created *ex nihilo* and embodied in the actual *things*, in the guise of new objects of knowledge, new meanings. The nuance is significant: it is "[f]rom virtuals [that] we descend to actual states of affairs, and from states of affairs we ascend to virtuals, without being able to isolate one from the other" (Deleuze and Guattari [1994], p. 160).

Ontologically, "Being as Fold" (Deleuze [1998], p. 110) is grounded in the very *difference* enfolded in the virtual~actual nexus. Difference is not an individual construct as a feature of personal uncertainty or Cartesian doubt: it is a quasi-ontological category and is considered by Deleuze "the *noumenon* closest to phenomenon" (Deleuze [1994], p. 222). The difference makes thought encounter a shock, or crisis, embedded in the objective structure of an event *per se*, thereby transcending the faculties of perception beyond some apparently "given" data of sense-perceptions. An encounter with difference is intense, and the intensity of difference is a function of affect or desire as complementary to a purely cognitive understanding. Precisely because of experience being excessive, *i.e.* spilling

above and over the cognitive confines of an individual mind, the infamous object of desire would be "the entire surrounding which it [desire or affect] traverses" (Deleuze and Guattari [1987], p. 30) forming, as such, a transversal connection between affects, percepts and concepts in a triadic relation of the included middle embedded in the Moebius strip of the Deleuzian folds of Being. Another semiotic triangle (*Figure 3*) illustrates a structural analogy with *Figures 1* and *2*:

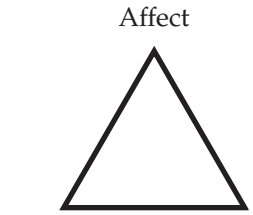

Figure 3

Deleuze used a biological metaphor of a rhizome to describe a model for knowledge-structure akin to Nicolescu's transdisciplinary, *in vivo*, knowledge. As a symbol for unlimited growth through the multitude of its own transformations, the rhizome is contrasted with a tree, the latter symbolizing the linear and sequential reasoning rooted in finite knowledge. The tree metaphor accords with the infamous tree of Porphyry, which is an example of the classificatory system, or a hierarchical structure based on precise definitions that serve as the foundation for rationally justified knowledge. The tree of Porphyry incorporates an arborescent reasoning, *i.e.* a type of syllogistic logic based on the method of division — of the excluded middle — to form a precise catalogue. The hierarchical structure precludes any interdependence, relationships, or harmony between "things" located at separate branches of the sacramental tree, contrary to the rhizomatic network of relationships based on the logic of the included (in-between) middle. This network, in contrast to a map representing a given territory, engenders the very territory to which it is supposed to refer. Accordingly, a static representation of the order of references gives way to a relational dynamics of the order of meanings when concepts are created in experience.

A concept inhabits the empirical happening; it is, as Deleuze and Guattari say, a living concept, but the practical task is "to set up… to extract" (Deleuze and Guattari [1994], p. 160) the meaning of the event in the newly created concept; to treat concept not as object of a prior recognition, but "as object of an encounter, as a here-and-now… from

which emerge inexhaustibly ever new, differently distributed "heres" and "nows"… I make, remake, and unmake my concepts along a moving horizon, from an always decentered center, from an always displaced periphery which repeats and differenciate them" (Deleuze [1994], pp. xx-xxi). It is the very repetition of the different that is the essence of transcendental empiricism grounded in the ontology of the virtual. What is defined as the ontological Outside is both virtual and yet real by virtue of its very pragmatics, that is the effects it produces at the level of human actions and experiences. As affective, experience is as yet a-conceptual and is not limited to what is immediately perceived: it needs mediation or interpretation for the creation of concepts, creation of meanings by virtue of learning from experience *per se*.

Deleuze's model of learning is based on the explication of extra-linguistic signs embedded in experience among which may be involuntary memories (similar to those awakened by Proust's famous *madeleine*) or images as potential (virtual) sources of meanings in accord with the logic of sense, the logic of multiplicities. The logic is grounded in Deleuze's radical empiricism because "only empiricism knows how to transcend the experiential dimension of the visible" (Deleuze [1990], p. 20) — or sensible, in Platonic terms — therefore establishing a *relation* by virtue of connecting in practice with the realm of the invisible, but nevertheless intelligible, using a Platonic term again. The underground sprout of a rhizomatic plant, rather than having a traditional root, has a stem, the oldest part of which dies off while simultaneously *rejuvenating* itself at the top. This naturalistic metaphor for creativity is potent because it is precisely when the old is dying off that the new may be created. At this critical point, a rhizomatic line would zigzag, as Deleuze would say, into a new direction, therefore betraying "the principle of linear progressive 'building up knowledge'" (Deleuze [1995], p. 139) as prescribed by the *in vitro* model. Learning is "infinite… [and] of a different nature to knowledge" (Deleuze [1994], p. 192), but that of the nature of a creative process as a method of inventing concepts in practice.

The creation of concepts in experience demands, for Deleuze, "the laying out of a plane" (Deleuze and Guattari [1994], p. 36). To think means to construct the plane of immanence — to actually show that it is there rather than merely "to think" it — so as to "find one's bearings in thought" (Deleuze and Guattari [1994], p. 37) by means of stretching, folding, unfolding, enfolding, *i.e.* by multiple movements of this plane's intensive lines of becoming. At the level of perception by regular senses, such zigzagging non-local connections would have remained imperceptible. But learning by means of the interpretation of facts, re-valuation of experience and "an apprenticeship in signs" (Bogue [2008]), enables one's perception

to vitally increase in power due to the logic of summation, thereby tending to *becoming-percept, i.e.* becoming able to perceive something previously imperceptible.

Connecting the experiential dots in the multileveled rhizomatic network enables one to make sense out of the disparate bits and pieces of information, *i.e.* de-stratify one's old way of thinking by means of some novel interpretations, by the dynamic understanding of meanings implicit in the experiential events; thus constituting a process called by Deleuze and Guattari *transformational pragmatics*. The transformation along the transversal line of becoming actualizes the virtual and as such is real even if physically "we don't see it [the line of becoming], because it's the least perceptible of things" (Deleuze [1995], p. 45).

While not all virtualities may become actualized in the present, they are nevertheless real. Maximilian de Gaynesford (2001) relates Deleuze's philosophy to the fourth- to fifth-century theology, and Michael Hardt (1993) indicates a subtle connection of Deleuze's thought to Scholastic ontology. In Scholastic terminology *virtual* means ideal or transcendental, but not in any way abstract or just possible: it is maximally real, *ens realissimum*. Because virtual ideas exist as implicit tendencies, they define the immanence of the transcendental field. The transversal communication along the *in-between* line of becoming enables one to potentially cross the threshold of one's old habitual universe of thinking and acting by virtue of forming "an echo chamber, a feedback loop" (Deleuze [1995], p. 139) embedded into the semiotics of experience. What is traditionally called a mystical experience is, for Deleuze, an existential real-life practice: it is an experiential and experimental art of perceiving the otherwise imperceptible.

Deleuze purports to show the as-yet-imperceptible by laying down a (visible) map of (invisible, yet intelligible) territory or, in other words, creating a mediatory link — Kelso's ~ that belongs to the family of transversal "non-localizable connections"(Deleuze [1994], p. 83) — between what is customarily considered to be the dual opposites of sensible and intelligible, matter and mind. This subtle, as if intuitive, transversal communication makes Deleuze's empirical method "patterned after Bergson's intuition" (Boundas [1996], p. 87). Intuition enables the reading and interpretation of implicit signs and symbols above and over the visible world of physical objects. As "the presentation of the unconscious, [and] not the representation of consciousness" (Deleuze [1994], p. 192), intuition leads to laying out what Deleuze called the plane of immanent consistency aiming "to bring into being that which does not yet exist" (Deleuze [1994], p. 147) in actuality, but subsists in its virtual potential form. A philosopher, as a creative thinker — an artist of their trade —, becomes capable of bridging the difference between the apparently dual opposites of the actual

and the virtual (ontologically) by virtue of the conscious~unconscious (epistemically) complementary pair connected by a transversal communication signified by "~".

We "are made up of lines" (Deleuze [1987], p. 124), we are dynamic relationships; lines move us, and the most strange line of becoming is the one that carries us across many thresholds towards a destination which appears unpredictable. This line is "not foreseeable, not pre-existent. This line is simple, abstract, and yet the most complex of all… the line of flight and of the greatest gradient… [T]his line has always been there, although it is the opposite of a destiny" (Deleuze [1987], p. 125), because the third term in the relation guarantees not the reproduction of the sameness, but the repetition, or iteration, of the difference. It is the "transversal communications between different lines [that] scramble the genealogical trees" (Deleuze and Guattari [1987], pp. 10-11) leading to the emergence of novelty. For Deleuze, "there is no other truth than the creation of the New: creativity, emergence" ([1989], pp. 146-147). In one of his books on the analysis of cinematic images, Deleuze (1989) equates mystical experience with an event of a sudden actualization of potentialities, *i.e.* awakening of perceptions, such as seeing and hearing, by raising them to a new power of enhanced perception, one which is future-oriented. Such "a vision and a voice… would have remained virtual" (Goddard [2001], p. 54), unless some specific, affective, conditions in the real experience that are necessary for the actualization of the virtual would have been established.

Affect, Desire, Eros, Love, Creation! Whatever its name, this is what accomplishes the Neo-Platonic double — *i.e.* ultimately, self-referential — movement of ascending and descending. Eros, the mystical son of Poros and Penia, was conceived in an act occurring in the middle and muddle of "groping experimentation… that… belong[s] to the order of dreams, of pathological processes, esoteric experiences, drunkenness, and excess" (Deleuze and Guattari [1994], p. 41). As a culmination of desire — affect/love — sparked between the two deities, Eros itself is a symbol of union. The desire, or Eros, de-constructs the neo-Platonic Oneness between the true, the good, and the beautiful by means of bringing it (One) down to earth into the multiplicity and diversity of real, flesh-and-blood, human experiences. Hence follows what Deleuze and Guattari (1987) present as a magical formula expressed in a form "One = Many", which posits *unity* in the plurality of experiences. The creation itself is not a single point of origin, but a continuing dialogue, an interaction or coordination as an ongoing transrelational sign-event. The symbolic Eros "does not take as its object persons or things, but the entire surroundings which it traverses" (Deleuze and Guattari [1987], p. 292) thus establishing transversal communication as a necessary condition for "the famous mystical principle

of *coincidentia oppositorum*, beyond the limit of all human understanding" (Kearney [2001], p. 104).

But, let us repeat, is it really so? Should such a conjunction of opposites remain at the level above and over human understanding, hence considered mystical? If human understanding overcomes the narrow rationalist knowledge of facts and allows itself to develop what Nicolescu called a transrelational attitude based on the logic of the included middle, then the conditions for the actualization of virtual potentialities — by means of what Deleuze specifies as the symbolic conjunction "and" — will have been created in experience *per se*! Therefore, there exists a definite, even if radical, *method* — transcendental empiricism — in the midst of what appears to be the *madness* of mysticism. What Deleuze called the ontological Outside (an unknown, yet potentially knowable, invisible fold of Being) is an overcoded virtual space that nevertheless "possesses a full reality by itself… it is on the basis of its reality that existence is produced" (Deleuze [1994], p. 211). However, "in order for the virtual to become actual, it must *create* its own terms of actualization. The difference between the virtual and the actual is what requires that the process of actualization be a creation… The actualization of the virtual… presents a dynamic multiplicity… the multiplicity of organization… Without the blueprint of order, the creative process of organization is always an art" (Hardt [1993], p. 18).

Such an artistic creative interpretation and reorganization is possible because of the meanings implicit in the unconscious that are over and above rational thought and can be actualized, or brought into consciousness by virtue of the "capture of code, surplus value of code" (Deleuze and Guattari [1987], p. 10) that ensures the actualization of potentialities. Tapping into such virtual, potential, reality means a possibility for it, in an almost Aristotelian spirit, of becoming-actual when our thinking "reconquers an immanent power of creation" (Deleuze and Guattari [1994], p. 140) in lived experience amidst real-life events. Respectively, the whole dualistic split between thought and world, self and other, ourselves and our environments — in general, between the inside and the outside — is rendered invalid due to the relational logic which is not "subordinate to the verb to be" (Deleuze [1987], p. 57), *i.e.* not reducible to the logic of identity (*cf.* Nicolescu). Such constructive and creative logic "energizes reason [and] provides a real possibility and the means for the opening of communication across boundaries long thought to be impenetrable" (Kauffman [1996], p. 293).

The dynamic understanding of meanings must be — by the logical necessity of the included middle as the natural *ratio* embedded in life processes — enriched and expanded with affect/desire/love, therefore

seemingly blending into what Aristotle called *Nous poetikos*. It is Eros that brings the affective dimension of creative art into the domain of science because of its functioning not in accord with the two-valued (true *vs.* false) logic, but as embodying the logic of the included middle represented by the noumenal difference between the opposite poles of a single structural whole, a network. The "~" of the transversal communication establishes a semiotic "bridge, a transversality" (Guattari [1995], p. 23) connecting what otherwise appear as dualistic, forever irreconcilable, opposites.

What was traditionally called the mystery of *coincidentia oppositorum* is grounded in Deleuze's totally realist ontology that understands cosmos in terms of *virtual reality* comprising multiple levels of existence. It is "the difference between the virtual and the actual [which] requires that the process of actualization be a creation" (Hardt [1993], p. 18), and it is this human creativity in practice as becoming capable of making a difference in the real world of action that might appear to carry a flavour of mysticism. It is an erotic affect, "immanent to a plane which it does not pre-exist" (Deleuze [1987], p. 89), that creates or lays down the plane of immanent consistency for the construction of concepts, hence complementing the conceptual thought with affective understanding. The function of affect or desire appears to be analogous to what Nietzsche called the will to power; according to Deleuze ([1987], p. 91), however, "there are other names for it. For example, 'grace'". Wherein the plane of immanence is being constructed, "the spiritual and the material [as] two distinct, yet indiscernible sides of the same fold" (Goddard [2001], p. 62) do meet. The plane of immanence therefore always presupposes an extra dimension, as if populated by "grace". Being supplementary — or transpersonal —, it can easily appear to us as mystical.

The plane of immanence is enfolded analogous to the Baroque art that expresses the harmonious multiplicity of the folds (Deleuze [1993]). According to the Baroque model, "knowledge is known only where it is folded" (Deleuze [1993], p. 49). The complex conceptualization of the experiential unfolding as the repetition of the different might seem to be a contradiction in terms if not for the epistemic role of the unconscious that exists over and above — *outside* — the ego-consciousness of the Cartesian subject. The critical philosophical framework is too narrow: Deleuze (1997) posits philosophy as an enterprise both critical and *clinical*, tending towards the deepest level of analysis akin to Carl Jung's archetypal psychology. The triadic logic leads to the process of intensifications or subtle reflexive amplifications. During each of the iterations, something different is being repeated, until a rational thought forms an assemblage with an affective non-thought that, accompanied by percept, "guides the creation of concepts" (Deleuze [1995], p. 148). Percept is part and parcel

of conceptual understanding, and philosophical thinking is equivalent to the art of the creation or invention of concepts. The creative process is accomplished by affect or desire akin to Platonic Eros. Each concept "should express an event rather than essence" (Deleuze [1995], p. 25) and exists in a triadic relationship with percept and affect: "you need all three to *get things moving*"(*ibidem*, p. 165; italics in original).

A play of affects may reach "a point of excess and unloosening" (Deleuze and Guattari [1987], p. 134). At this crucial turning point, there are two options: a subject must "either annihilate itself in a black hole or change planes. Destratify, open up to a new function, a diagrammatic function" (*ibidem*), *i.e.* align yourself with this very transversal that connects the human with the divine. Similar to the drapes in fabric, things themselves, as Deleuze says, are wrapped up in nature; as for ideas — they are often so enveloped or enfolded "in the soul that we can't always unfold or develop them" (Deleuze [1993], p. 49) based on subjective rationality as one's conscious will solely does unless experience itself is saturated with affective, almost numinous, conditions for their unfolding. Such a self-transcending breakthrough establishes the line of flight which "upsets being" (Deleuze [1995], p. 44), yet along this very line "things come to pass and becomings evolve" (*ibidem*, p. 45). One is not self-consciously passing through the line of flight; just the opposite, Deleuze insists that "something [is] passing through you" (*ibidem*, p. 141).

What appears to be a mystical experience of the conjunction of opposites is the potential human ability to raise "each faculty to the level of its transcendent exercise [and] to give birth to that second power which grasps that which can only be sensed" (Deleuze [1994], p. 165), thus establishing a bond of a profound complicity akin to the synchronistic bridge between matter and mind and connecting levels that seemingly belong to two disparate Platonic realms of sensible things and intelligible Ideas. A newly created meaning as encompassing the triad of percepts, affects, and concepts is ultimately self-referential. Being self-referential, the concept — at the moment of its creation — posits itself and its object simultaneously. The concept stops being a propositional statement: "It does not belong to a discursive system and does not have a reference. The concept shows itself" (Deleuze and Guattari [1994], p. 140) in experience when magically — or rather in accord with the new science of coordination dynamics — moving from the apparently inaccessible Platonic realm of intelligible Ideas to the visible, sensible world of real-life experience.

Sure enough, *phronesis* — or practical wisdom — is embodied in the ethical action performed by a wise, virtuous person and by necessity includes a special sensitivity and sensibility (*cf.* Slote [1997]; Varela [1999]); yet how such a sensibility operates has never been made clear in the

philosophical literature. Here are two key questions: How is an epistemic access to the Platonic Ideas of the True and the Good made possible? Whence any foundation for moral knowledge? It is Deleuze's self-referential triad of affects, percepts, and concepts grounded in his ontology of the virtual that enables a glimpse into the functioning of *phronesis* when, sure enough, "the concept shows itself" to the one who has the potential of becoming-wise *via* self-reflection. Wisdom, then, as the highest intellectual virtue, would be the actualized potentiality, in Aristotelian terms. But, most importantly, it is immanent to the plane that it itself constructs by virtue of an "unconscious psychic mechanism that engenders the perceived in consciousness" (Deleuze [1993], p. 95).

The actualization of potentialities, ontologically, is then akin, epistemically, to the unconscious-becoming-conscious, thereby traversing or bridging in a seemingly mystical manner that "fundamental distinction between subrepresentative, unconscious, and aconceptual ideas/intensities and the conscious conceptual representation of common sense" (Bogue [1989], p. 59) which thus function as a coordinated complementary pair. To elucidate, Deleuze refers to music, "where the principle of composition is not given in a directly perceptible, audible, relation with what it provides. It is therefore a plane of transcendence, a kind of design, in a mind of man or in the mind of God, even when it is accorded a maximum of immanence by plunging it into the depth of Nature, or of the Unconscious" (Deleuze [1987], p. 91).

The corollary is another inseparable immanent~transcendent triad constituting Cosmos itself: Self (human), Nature, God (divine) where each stands in a relation of a "reciprocal presupposition" (Deleuze and Guattari [1987], p. 109) to each other, *i.e.* functioning on the basis of both bottom-up and top-down "reciprocal causality" (Kelso and Engstrom [2006], p. 115). The rationalist causality that associates events on a direct cause-effect basis is complemented by the possibility of bringing these events together by means of creating a symbolic bridge establishing rapport and coordination between oneself and the world *via* the depth of spiritual life. Hence we can become capable of knowing self and God as One; as a holistic semiotic structure represented by a semiotic triangle in *Figure 4*:

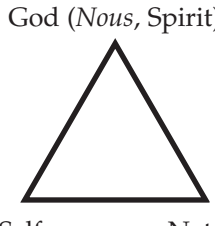

Figure 4

For Deleuze, it is Nature itself that is essentially "contingent, excessive, and mystical" (Deleuze [1994], p. 57). The notion of contingency is related to the complementarity of the virtual~actual pair. The virtual gives rise to a particular actuality; yet it may very well have given rise to other actualities. Contingency however is not the same as arbitrariness. The virtual can unfold into several "things", but it cannot unfold into just anything. Nature exceeds the observable world of physical facts and includes its own virtual dimension which, however, is never beyond experience and, hence, understanding. Any object of experience contains potentialities as virtual or implicit meanings, even if they are not yet actualized or made explicit. A symbolic mediation provides "intensity, resonance… harmony" (Deleuze [1995], p. 86), yet it appears imperceptible and, as such, borders on a direct mystical contact with the divine.

The contact in question is described by means of "non-localizable connections, actions at a distance, systems of replay, resonance and echoes… which transcend spatial locations and temporal successions" (Deleuze [1994], p. 83). Concepts are forever fuzzy and their truth-conditions are never completely determined: although "a concept… has the truth that falls to it as a function of the conditions of its creation" (Deleuze and Guattari [1994], p. 27), the very singularity of experiential conditions makes truth "a being-multiple" (Deleuze [1987], p. viii). As Deleuze says ([1988], p. 101), there exist forces constraining experience and the most important is a self-referential relation singled out as "an affect of self on self" when a force impinges on itself. We repeat that it is the problematic of self-reference that has "been making trouble for philosophers for centuries" (Kelso and Engstrom [2006], p. 253). In this respect, Deleuze's philosophy is naturalistic akin to an ancient science as a natural philosophy — and Deleuze and Guattari's emphasis on nonlinear enfolded dynamics of experience (*cf.* DeLanda [2002]) puts them at the very forefront of the contemporary cutting-edge science of coordination dynamics.

Being self-referential, the concept — at the moment of self-creation — posits itself and its object simultaneously, thus defying a dualistic split between subject and object, matter and mind, science and art, sacred and profane, human and divine. Concepts are invented or created as if reborn in experience, in practice. Self-reference, due to the included middle, means self-transcendence or, in Deleuze's words, becoming-other and changing in nature when expanding connections. Deleuze's transformational pragmatics takes place along the vanishing line of flight *at the very limit of human experience* — yet within intensified and amplified human understanding, not over and above it! It manifests at the moment when the potential meaning actualizes itself and becomes expressed by "the manner in which the existing being is filled with immanence" (Deleuze [1997],

p. 137) along the line of the mysterious conjunction with the transcendental. The occurrence of the transversal communication therefore always has a numinous, religious element, especially if we read re-*ligio* etymologically as linking backward to itself in the process of forming a feedback loop that enables a correspondence or conversation with the transpersonal, virtual, realm of Being. As Deleuze says, we "head for the horizon, on the plane of immanence, and we return with bloodshot eyes, yet they are the eyes of the mind" (Deleuze and Guattari [1994], p. 41).

This obvious circularity of self-reference is what makes "esoteric experiences" (Deleuze and Guattari [1994], p. 41) seem to us esoteric or mystical. Aristotle's loving Intellect (*Nous Poetikos*) is still subject to disputes whose historical or philosophical scope is beyond the scope of this paper (*cf.* Anton [2000]); what is important, however, is that it blends inner knowledge with an impersonal, cosmic and transcendent, entity as both "think" each other. As Kearney comments, "Creatures need a Creator and a Creator needs creatures" ([2001], p. 103). As such, the mystical, Gnostic, tradition should not be confused with the contemporary "New Age controversy [which] explains away" (*ibidem*, pp. 47-48) transcendence, but instead grounded in the fact that it is human action in our very practice that can "make the world a more just and loving place, or not to" (*ibidem*, p. 5). The said injunction ("or not to") is significant. The unity of theoretical knowledge and practical experience not only acquires a deeper ontological significance but, importantly, *phronesis* — our practical wisdom — becomes almost a guarantee, provided we learn how to recognize and enable the functioning of transversal communication in our real life; how to use the theoretical concept of the logic of the included middle in our practice; how to understand and interpret the "language" of signs that perfuse our experience.

The Language of Signs: Transversal Communication

Since time immemorial, humankind has searched for a universal language in its quest for the perfect means of communication that would transcend prevailing cultural, religious, and language barriers. A poetic tale (Coelho [1993]) explored such a language, once understood by everybody, yet now forgotten. The young hero of the tale who spends years in search of that universal language arrives at the understanding that it's all *written there*. The Bible speaks of a time when the whole Earth was of one language and of one speech, and all people indeed were one. Medieval symbolism considered the World as a book of God written in a *codex vivus*, which is to be deciphered. Bacon contrasted the apparent unreliability of human communication with the language based on perfect *real character*,

the use of which would have helped people to understand each other by means of shared meanings. Leibniz conceived of a *characteristica universalis* that would have built a common alphabet of human thought. Yet the continuation of Leibniz's dream in the contemporary research on artificial intelligence did not bring us closer to realizing his project even as the urgency of understanding "the other" is paramount for sustainability and the survival of our species in the current global climate permeated by diverse beliefs, disparate values and cultural conflicts.

Deleuze, citing Marcel Proust "who said that 'masterpieces are written in a kind of foreign language'" (Deleuze and Guattari [1987], p. 98), emphasizes the potential of such, as if foreign, language to be truly creative. For Deleuze, philosophers, writers and artists are, first and foremost, semioticians and symptomatologists: they read, interpret and create signs, which are "the symptoms of life" (Deleuze [1995], p. 143). There are extra-linguistic semiotic categories too, such as memories or images, which are apprehended in terms of neither objective nor subjective criteria, but learned in practice in terms of immanent problematic instances and their practical effects. A new language of expression that may take the hybrid form of legible images is exemplified in the creative or performative aspect of language that functions as a semiotic system, a language of signs. This paper presents such a language of signs as embodied in the semiotic system of Tarot's legible images (*cf.* Anonymous [2002]; Faivre [1994]; Semetsky [2001], [2006]) functioning as the symbolic typology of universal human experiences.

In contemporary culture, embodied non-dual (body~mind) practices are usually relegated to Eastern approaches such as, for example, Buddhist or transcendental meditation. The existing body of knowledge designated as Western esotericism or Hermeticism (*cf.* Faivre [1994]; Yates [1994]), comprising inner knowledge or Gnosis as pertaining to mystical traditions (*cf.* Schwartz [2004]), remains, however, under-represented. The late Vatican Cardinal Hans Urs von Balthasar related Tarot images to the metaphysics of the Hermetic tradition and Gnosticism. Such Gnostic knowledge that embodies the ancient "Know thyself" dictum, inscribed on the Temple of Apollo at Delphi, can become available to us *via* the symbolic language of Tarot images that "articulates" humanity's moral, intellectual, and spiritual "lessons", thus constituting collective human experiences across times, places, and cultures. Tarot establishes this much sought-after connection between "self" and "other" akin to the famous "I-Thou" relation in Martin Buber's metaphysics. As a metaphysical, yet practical, system (theory~praxis nexus), Tarot is oriented toward the discovery of meanings for the multiplicity of experiences that are symbolically represented in the form of images and pictures and against the background

of a deep metaphysical system that has its roots in Hermetic and Neoplatonic philosophies and Christian mysticism.

In his *Afterword* to the latest 2002 edition of the book *Meditations on the Tarot: A Journey into Christian Hermeticism*, which is considered to be written by Valentin Tomberg, a Russian Christian (yet published as Anonymous), von Balthasar referred to the images of the so-called Major Arcana in a Tarot deck as the expressions of the "all-embracing wisdom of the Catholic Mystery" ([2002], p. 659) while tracing its history back to the revival of Greek, Arabic, and Jewish philosophies during the Renaissance, followed by the "gathering and accommodation of Hermetic and Cabbalistic wisdom into Biblical and Christian thought" (*ibidem*, p. 661). Tarot images embody both a spiritual dimension of experience at the ontological level of Deleuze's virtual reality, and the unconscious, as yet unarticulated, potential meanings at the epistemic level. The interpretation of the implicit meanings makes them explicit and creates narrative structures serving the self-reflective function of our learning from such an embodied experience. Experiential learning is what leads to practical wisdom. In the Tarot deck, the potential for wisdom is embodied in the image of the High Priestess, the Major Arcanum numbered 2. She is a symbol for *Sophia* (Greek for wisdom) or *Shekinah* (in Jewish mythology), as a feminine principle complementary to the patriarchal figure of the Pope. Her function in the world is to unfold the scroll she holds in order to reveal to humankind the secrets of Gnostic knowledge lost in scientific (read: overly masculine) rationality. *Sophia* is a concept equally important for Hellenistic philosophy and religion, for Platonism and Gnosticism, as for Orthodox Christianity and Christian mysticism. In Egyptian tradition, her name is Isis, the goddess of the rainbow as a symbolic bridge between heaven and earth, who was also depicted as a wisdom figure in mythology. In the Hebrew Bible Wisdom/*Sophia* is personified in *Proverbs* (8, 22-31).

The High Priestess knows the secret code of the biblical lost speech that describes the true nature of things in a symbolic language similar to that used by Adam before the Fall. Deleuze affirmed that language, in its multiple forms, linguistic and extra-linguistic alike, is the only thing that can properly be said to have structure, "be it an esoteric or even a non-verbal language" (*apud* Stivale [1998], p. 259), such as pictorial, imaginary, or the language of dreams. Anything can possess a structure insofar as this "thing" maintains a *silent discourse*, such as the language of signs. As "the presentation of the unconscious" (Deleuze [1994], p. 192), it is the transversal connection established by actually laying down the plane of immanence, which "shows itself" in the Tarot layout, that engenders "the representation of consciousness" (Deleuze [1994], p. 192). The plane of immanence "does not immediately take effects with concepts… and its

layout resorts to measures that are not very respectable… or reasonable" (Deleuze and Guattari [1994], p. 41). While its layout is pre-rational and a-conceptual, it nonetheless ultimately leads to "the conquest of the unconscious" (Deleuze [1988], p. 29) when itself being constructed in the process of laying out and interpreting pictures as the unfolding patterns embodied in the Tarot layout. The real-life practice of Tarot readings enables us to see — as sensible patterns — that which otherwise would remain as if "outside" of experience, in the separate realm of the intelligible.

Deleuze's method of transcendental empiricism enables to "intuit" the character and nature of such an extra-ordinary, habitually considered mystical, experience. Intuition — or *noesis* as an operation of the *Nous* — represents the highest portion of human knowledge. Using the term "parallelism" with regard to the mind-body problem, Deleuze asserts that there must be a threshold that brings thought to the body. The same parallel relation exists between the virtual and the actual — both real — that requires a metaphorical threshold, or transversal link, for their connection. Transcendental empiricism affirms "the double in the doubling process" (Deleuze [1988], p. 98). "Doubling" here is taken in the sense of unfolding that presupposes the necessary existence of an extra dimension, without which the concept of fold is meaningless. This "outside" transpersonal dimension becomes internalized, enfolded in the mind: hence doubling as "the internalization of the outside… [becomes] redoubling of the other… [and] it is a self that lives me as the double of the other" (Deleuze [1988], p. 98). Expanding on Deleuzian conceptualizations, it is possible to actually *see* this internalization, which came about by redoubling, not in our mind as an abstract concept, but with our eyes as a concrete picture. Just so as to become able to see it, we have to re-redouble it, *i.e.* to different/ciate it once again; in a way *transcend*, albeit in the "primitive" mode of laying down the cards.

The term "transcend" acquires the meaning of, in fact, bringing down to earth, or grounding the concept by means of embodying it or giving it a form so as to project that which has become interior as a result of internalization. This is done by literally out-placing the potential or virtual "other in me" (Deleuze [1988], p. 98) on the transversal link created by the pattern of Tarot images so that a generic self~other complementary pair is actually being formed in real experience in accord with the by now familiar semiotic triangle as shown in *Figure 5* (see next page).

The Tarot layout is a sign, itself the included middle, that mediates between the world without and the world within; and it represents both in relation, notwithstanding that we ourselves as participants, and not detached observers, are continuously enacting and reenacting the world in question. By virtue of being transversal to both self and other, both

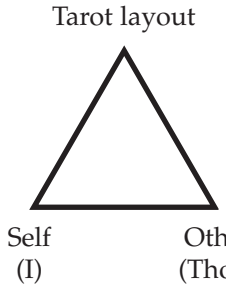

Figure 5

inside and outside, both I and Thou, it symbolically represents Being as Fold and "is installing [itself] transversally to the machinic levels [such as] material, cognitive, affective, and social… This abstract [virtual] machine [at the metaphysical level of description] will or will not give these levels [their actual] existence" (Guattari [1995], p. 35). The embodiment of the transcendental field allows it to merge with its own "object" which, despite always being immanent in perception, would remain disembodied or virtual and, as such, beyond actual recognition in the absence of the reading and interpretation. The Tarot system functions in the mode of dual-representation: from the (objective) viewpoint of the action of signs (called by Peirce *semiosis*) in nature, or sign-production, as well as from the viewpoint of (subjective) human experience in the here-and-now of the actual reading and interpretation.

The as yet unarticulated meanings, which exist only in the form of some unconscious implicit contents at the level of virtual reality, unfold in front of our eyes, following the spatio-temporal organization according to a type of spread that resembles a cinematic "syntax" organized by a sequence of images. Tarot images may be considered to represent *Memoria* posited by St. Augustine. A pagan turned Christian, he described in his *Confessions* "the fields and spacious places of memory (*campos et lata praetoria memoria*), where are the treasures (*thesauri*) of innumerable images" (*apud* Yates [1966], p. 46) Says Deleuze ([1993], p. 93): "I undo the folds… that pass through every one of my thresholds… 'the twenty-two folds' that surround me and separate me from the deep". The world is folded and, as such, "we can endure it, so that everything doesn't confront us at once… 'Children are born with twenty-two folds. These have to be unfolded. Then a man's life is complete'[1]." (Deleuze [1995], p. 112).

1. Deleuze's quotation on the twenty-two folds is from *The Space Within* by Henri Michaux, in *The New Directions Series,* printed in France by Henri Marchand & Co. Michaux's book was first published by Gallimard in Paris in 1944 under the title *L'Espace du Dedans* and then appeared in English as *Selected Writings: The Space Within* (translated, with an introduction by Richard Ellmann).

These twenty-two folds, non-incidentally, correspond to the number of the images representing the Major Arcana in a Tarot deck, each Arcanum being a symbolic representation of a meaningful enfolded pattern. Each consequent Arcanum stands in a relation of difference to the one preceding it. This means that likeness or analogy between the worlds above and below (between the human and the divine) as posited by the Hermetic maxim cannot be reduced to their absolute identity.

A reading, as a means of *transversal* communication, is an example of the indirect discourse when the triadic quality enabled by interpretation makes the Tarot system a genuine sign, *i.e.* a Peircean correlate of the sign-interpretant-object triad in *Figure 1* enfolded in the self-referential dynamics between "the semiotic machine, the referred object, and the enunciative subject" (Guattari, original French, in Bosteels [1998], p. 167). According to Peirce's semiotics, "genuine mediation is a character of a sign" (CP, 2.92) and visual signs combine together to form cartographies. Cartography, in semiotic terms, is described as a mode of graphic communication capable of transmitting information by means of a visual channel. The graphic information may be expressed in the form of a diagram, network, or map, or in the mixed format of a cartogram, *i.e.* a diagram superimposed on a map. As a cartogram, the Tarot spread can be read and interpreted, thus leading to the Deleuzian transformational pragmatics for the subject of experience. The transformational pragmatics consists in destratification, or opening up to a new, diagrammatic and creative, function when laying out the plane of immanence as a constituent part of "the cartographies of unconscious [that] would have become indispensable complements to the current systems of rationality" (Guattari, original French, in Bosteels [1998], p. 155). The signs enter "into the surface organization which ensures the resonance of two series" (Deleuze [1990], p. 104) due to "intensive and affective logic of the included middle" (*ibidem*, p. 151).

The series, while "located" at disparate levels of reality, converge on a paradoxical differentiator, which becomes "both word and object at once" (Deleuze [1990], p. 51) in accord with the triadic logic of relations and the science of complementary pairs. To repeat, "coordination dynamics bristles with apparent… paradoxes" (Kelso and Engstrom [2006], p. 193), an example of which is the intervention of the transversal line as the included middle between the supposedly dual opposites when it inserts itself "not so much… in their opposition as in their complementarity" (Deleuze [1987], p. 131). The *subject* of Tarot reading, who is always in the process of becoming-other, offers to herself — due to transversal, indirect, communication — the object of her own signs, or herself as an *object*, thus forming a complementary subject~object pair. As regards the psychology

of perception, "space-time ceases to be a pure given in order to become… the nexus of differential relations in the subject, and the object itself ceases to be an empirical given in order to become the product of these relations" (Deleuze [1993], p. 89) when the relations — or signs — are brought to consciousness, *i.e.* actualized. For Deleuze, "immanence is constructivism" ([1995], p. 48), *i.e.* the conquest of the unconscious.

At the ontological level, such self-reference, being either a complementary pair of virtual~actual or conscious~unconscious, indicates the Univocity of Being. In an almost alchemical vocabulary, Deleuze and Guattari describe the functioning of transversal communication as "a transformation of substances and a dissolution of forms, a passage to the limit or flight from contours in favor of fluid forces, flows, air, light, and matter, such that a body or a word does not end at a precise point. We witness the incorporeal power of that intense matter, the material power of that language" (Deleuze and Guattari [1987], p. 109). Deleuze stresses the a-personal nature of this specific expressive language by describing it as the paradoxical fourth person singular, *i.e.* collective, yet univocal. Let us again turn to St. Augustine: "Whoever… is able to understand a word, not only before it is uttered in sound, but also before the images of its sounds are considered in thought… is able now to see through this glass and in this enigma some likeness of that Word of whom it is said, 'In the beginning was the Word…' For of necessity…, there is born from the knowledge itself which the memory retains, a word that is altogether of the same kind with that knowledge from which it is born… And the true word then comes into being… [it] is a simple form, and simply equal to Him from whom it is, and with whom it is wonderfully co-eternal (*apud* Clarke [1990], pp. 26-28).

Such is the symbolic "Word" embedded in Tarot images. Hans Urs von Balthasar ([2002], p. 659) points to the "the veiled presentiments of the Logos" that may reveal itself to us. The transformation into the Word due to the action of signs in nature and culture alike is thereby an intelligent, noietic activity. In this respect, Tarot functions in the capacity of a meta-language akin to Leibniz's alphabet of thought or a symbolic lexicon used by the universal intelligence, the *Nous*. This lexicon expresses the Hermetic wisdom of the world, according to which the divine powers of the human intellect are implicit in the "man's mens" (Yates [1966], p. 147).

It is by virtue of this language of signs, symbols, and images that the Word expresses itself. It *shares* with us the implicated meanings when explicating them within each transversal communication; at the level of our experiences, these meanings, however, appear to be created anew. Hence Tarot images may also be conceived of as embodying, in the words of von Balthasar ([2002], p. 661), the "principles of the objective cosmos…

the sphere of the 'powers and mights', as they are called in the Bible". Yet, it is holistic human intelligence partaking in the conversation with the *Nous* that enables us to read, interpret, and even create anew the elusive signs embedded in experience. By means of "reading the signs [we are] decoding the secrets of intelligent alien life [both] within and without us" (Ansell Pearson [1997], p. 4), both inside and outside ourselves when unfolding the archetypal folds and becoming able to "*read*, find, [and] retrieve the structures" (Deleuze [1968], *apud* Stivale [1998], p. 270; the italics are Deleuze's) implicated in the deeper virtual level of reality, yet explicated at the level of our actual real-life experiences.

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Knowledge as Inner Word

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The ancient term *science* does not have a precise equivalence to our modern definition, although Western science may still be said to originate with the Greeks. There are several ancient terms that might embrace "science": *philosophía* (philosophy, or love of learning), *epistéme* (knowledge), *historía* (enquiry, research), *theoría* (speculation, contemplation), *perì phýseos historía* (natural science). *Scientia* meant, for many centuries, anything taught in schools (that is, all forms of human knowledge), thus retaining an older and more general usage; however, *science* and *scientist*, as defined from the mid-19th century onwards, have connotations of purpose and methods quite out of place when describing the entirely different enterprises of the ancient world (Healy [1999], pp. 100-101).

The ancient term was the product of a long development. The Greeks and the Romans defined five ages of mankind (*cf.* Hesiod, *Works and Days*) and it is significant that four were named after metals: gold, silver, bronze, and iron. In the course of the succeeding centuries, the role of the poet as educator and guardian of morals was gradually taken over by the natural scientist. The beginnings of rationalism saw the emergence of a number of philosophical explanations of the origins of the Universe. The myths in the works of Hesiod, of Homer, and their survivals in the Ionian cosmology of the 7th century BC are the formative materials out of which the Greeks made the transition from mythic to rational for the first time in human history. As such, the Greek myths have become more than another mythology: they are the beginnings of our culture, our arts, our sciences, and our political forms of thought. From that point on, the paths of natural science and religion apparently diverged.

In the 5th century BC, the Sophists took over higher education and claimed — as Hippias did, for instance — to impart all subjects (*hai téchnai*).

In the 4th century BC, Aristotle referred to the "branches of knowledge essential for a free man" (*hai eleuthériai epistémai*), *i.e.*, astronomy, geometry, arithmetic, music, and grammar. His *Meteorologica* treats some of these subjects, namely astronomy, geology, seismology, and meteorology. The work is typical of the stage when the natural sciences had not become fully differentiated from philosophy; none the less, they embraced a wide range of scientific knowledge.

Some distinct excerpts of ancient literature point to the fact that knowledge, seen as written word, has to be internalized (*i.e.*, swallowed) in order to become true knowledge, beyond words (either spoken or written). One of the most ancient pieces is *Ezekiel*, 3, 3[1] (the vision of the scroll, written on both sides, that tasted sweet as honey in the prophet's mouth). This passage probably influenced *Zechariah*, 5,1-4[2] (the vision of a scroll, in TM, or a sickle, in LXX).

A work of late Antiquity, that had a huge impact on the medieval studies — being used as a school text — was Martianus Capella's *De Nuptiis Philologiae et Mercurii*; the religious lore of this work is of considerable interest.

Martianus composed his one famous book, fundamental in the history of education, the history of rhetoric, and the history of science, at some time during the fifth century. This single curious encyclopedic work, *Satyricon*, or *De Nuptiis Philologiae et Mercurii et de septem Artibus liberalibus libri novem* (*On the Wedding of Philology and Mercury and of the Seven Liberal Arts, in Nine Books*), is an elaborate didactic allegory. The style is loaded with metaphors and bizarre expressions. The book was of stupendous importance in fixing the unchanging formulas of Academia from the Christianized Roman Empire of the 5th century until the newly-available Arabic texts and the works of Aristotle spread towards Western Europe in the 12th century. These formulas included a medieval love for allegory

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2. In the translation of Sir Lancelot C.L. Brenton (1851): "[2, 8] And thou, son of man, hear him that speaks to thee; be not thou provoking, as the provoking house: open thy mouth, and eat what I give thee. [2, 9] And I looked, and behold, a hand stretched out to me, and in it a volume of a book. [2, 10] And he unrolled it before me: and in it the front and the back were written upon: and there was written in it lamentation, and mournful song, and woe. [3, 1] And he said to me, Son of Man, eat this volume, and go and speak to the children of Israel. [3, 2] So he opened my mouth, and caused me to eat the volume. And he said to me, Son of Man, [3, 3] thy mouth shall eat, and thy belly shall be filled with this volume that is given to thee. So I ate it; and it was in my mouth as sweet as honey."
3. In the translation of Sir Lancelot C.L. Brenton (1851): "[5, 1] And I turned, and lifted up mine eyes, and looked and behold a flying sickle/scroll. [5, 2] And he said to me, What seest thou? And I said, I see a flying sickle/scroll, of the length of twenty cubits, and of the breadth of ten cubits."

(in particular personifications) as a means of presenting knowledge and an attachment to the seven Liberal Arts. The book continued to shape European education during the early medieval period and through the Carolingian Renaissance. Martianus himself lived in an age when the victory of Christianity over paganism was not yet complete. Longstanding rivalries between Christians and pagans and the more recent successes of Christianity had intensified the desire of the pagans to undertake, as a social responsibility, the preservation of classical culture. Christians, too, had a pagan schooling and appreciated the importance of the secular disciplines to a zealous practitioner who would glorify God through reading, writing, and teaching or preaching. The work was a complete encyclopedia of the liberal culture of the time, and was in high repute during the Middle Ages as a school text.

The title of Martianus' work refers to the allegorical union of the intellectually profitable pursuit (Mercury) of learning by way of the art of letters (Philology). Among the more than one hundred guests at the heavenly wedding of Mercury and Philology (most of the lesser deities or personifications), we meet some of the most illustrious of Greeks. Among the wedding gifts are seven maids who are to become Philologia's slaves: they are the seven Liberal Arts: Grammar, Dialectic, Rhetoric, Geometry, Arithmetic, Astronomy, and (musical) Harmony. Art herself gives an exposition of the principles of the science she governs.

The book was perhaps the most widely used schoolbook of the Middle Ages and one of the most popular books of Western Europe for nearly a thousand years. *De Nuptiis* was the foundation of the medieval trivium and quadrivium. Since it recapitulated the fundamentals of the Roman academic curriculum and transmitted them to the later generations of students, the book must be regarded as the key work in the history of education, rhetoric, and science during this period.

The classical Roman curriculum, which was to pass — largely through Martianus Capella's book — into the early medieval period, modified but scarcely revolutionized by Christianity, was limited to rhetoric and its accompanying arts, treating philosophy merely as a matter of dialectics, a focus which served equally in public or ecclesiastical education, which were increasingly becoming one and the same.

The work was edited by Franciscus Vitalis Bodianus and first printed in Vicenza, 1499; its comparatively late date in print, and the modest number of later editions are a marker of its slide in popularity, save as an elementary educational primer in the liberal arts. It has to be said that the loss of Martianus' book might have had a notably adverse effect upon the chances of a revival of learning in the later Middle Ages.

The allegorical setting, occupying the first two books, was a delight to medieval readers and largely accounts for the popularity of the work. The marriage of Mercury and Philology has been taken, both early and late, to symbolize the union of eloquence and learning, the arts of the trivium and quadrivium. The appropriateness of a marriage between eloquence and learning would have been apparent to any Roman down to the fall of the Empire. During the Middle Ages, rhetorical studies and classical literary models continued to engage the attention of the students because they constituted the only academic curriculum familiar to the Roman world.

An emblematic image is that of Philology (daughter of Phronesis or Wisdom) as an allegoric bride, forced to vomit up a number of books in order to attain immortality: from the mouth of the maiden books and great volumes and the works of many languages flowed; some were made of papyrus which had been smeared with cedar oil, other were woven of rolls of linen, many were of parchment, and a very few were written on linden bark. Philology is given a smooth, living sphere, that had the appearance of an egg inside, but its outside shone, being anointed with saffron; it seemed transparent with void, and a white liquid, and then something more solid stood in its centre; once she discovered its extreme sweetness, she drank it in a draught and she attained immortality.

Whereas the Christians attain salvation by faith, trust in God's mercy, and love manifested in their deeds, the characters that attain immortality in Martianus' system are (with the exception of Hercules) those whose wisdom, in matter of religious lore, agriculture, and technology, or the seven arts, has benefited mankind. Immortality in the eyes of Martianus is earned by fame won through service, not by love or innocence alone.

The representations of the seven liberal arts as separate genres was the most popular mode of representing the arts and sciences in the Middle Ages and the Renaissance. Some examples: the pulpit of the Pisa Cathedral, the baptismal font in Perugia, the relief panels on the Florence Cathedral Campanile, the frescoes in the Spanish Chapel of Santa Maria Novella in Florence, the bronze figures on the tomb of Robert of Anjou in Naples, the figures on the tomb of Sixtus IV in Saint Peter's, Botticelli's Tornabuoni fresco, the Pinturicchio frescoes in the Vatican, and the Attavante miniatures in the Venice codex; a miniature of a manuscript of the *Hortus deliciarum*, showing Philology surrounded by the seven liberal arts; the tapestry in the Quedlinburg cathedral containing narrative scenes from *The Marriage of Philology and Mercury*.

We conclude with a final image — presumably the most famous — of Philology; Botticelli's *Primavera* (1478) worked as a humanist allegory that has recently been reinterpreted: Philology is most likely to be the main

character of the painting, not Primavera. The image of Mercury is highly consistent with the groom in Martianus's work, the *Wedding of Philology and Mercury*. Several other characters in Botticelli's *Primavera* are inspired from the same writing: from left to right, Mercury (opposed to the others), the Three Graces in a nuptial celebration, dancing in harmony and shaping a ring; Philology as the main character; Rhetoric endowed with plenty of flowers and Poetry, with the poetic Genius that inspires her.

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Imperial gate — Annunciation Church (1636),
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The Symbol of the Imperial Gates in the Orthodox Church Sculpture

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In an attempt of foray in the world of forms that can decipher the lay way of knowing the natural and supernatural world, this essay wants to give a focalized image of the symbol of the imperial gates of the altars of orthodox churches.

The imperial gates, carved in lime or oak wood, by their vegetable nature represent the gates of the paradise on Earth. In the Gospel, the gates are identified with Jesus Himself, who says: "I am the gate, if somebody passes through Me, he will be saved".

The place of the gates appears as a transverse section through the seen and unseen heart of the Holy Cross.

The wooden upper knitting of the imperial gates follows, most of the time, the shape of a heart with its "peak" orientated towards the sky, as a cup put upside down, from which grace flows down onto creation. The top of the heart and its orientation towards the sky sustains the icon where the image of God is painted.

The imperial gates in their functionality between the altar and the rest of the church are opened and closed in a horizontal level describing the ritual "exits" and "entries".

Real or imaginary, the gates — spaces of crossing from a world to another — are an archetype symbol of humanity. The gate or the passing threshold marks, within the orthodox church, the limit between the sacred and the profane spaces.

In a dialogue between the imagination, the faith and the artists' science of composition, the human being is able to represent to himself the concept of divinity through the natural marks of the world he lives in. The need of the conscience to find the very reason of existence uses examples already provided by nature.

The moment we try to find the divine and our place in the world and we are aware of not mastering it, the only marks we have come from the artists' vision and science, as well as from the pure faith of the religious man. From this point of view, the image of the imperial gates represented in the orthodox church sculptures has to be seen as a methaphor of the meeting between the concrete world and the spiritual one.

Canonically, in the tradition of the Romanian Orthodox Church, the path to the transcendental realm takes the believers through three gates, three levels of access: the first is the entrance gate into the church, the second is the church portal and the third level, accessible only to the priest, is the altar gate.

We have to notice here that, from a layman's point of view, nature is mixed with the sacred due to its presence in the heart of the altar. This means that the meeting with the divinity is ubiquitous and the collective subconscious, lay or religious alike, manifests itself through artistic representations clearly anchored in everyday perception.

The ornaments and the symbolism of the carved forms translate the general archetypes of humanity. We can only take our bench-marks from the known nature. We represent ourselves the other nature, the intuitive one, through means which are accessible to the common sense.

Within the physical space, our conscience needs to mark this delimitation. The gate of passing from the physical to the metaphysical exists only in our mind and senses.

We decorate it with the symbols — bench-marks that we can associate with our material existence on Earth. We try to understand the metaphysical through physical bench-marks that can have values of symbols: the tree of life, the grape, the ear of wheaten etc.

For the religious man, nature is loaded with sacred being present all around us.

The ornamentation of the orthodox churches is full of life and nature. Because of this it has its own authenticity.

The translation of the "ageless" in a perceptive material form is made by the symbols which are mainly vegetable. A subconscious mind associates the permanent life with the luxurious vegetation. Therefore we can decipher the vegetable richness as an unlimited source of creation. The symbol of the "tree of life" can be deciphered as a metaphor of endlessness in time and space.

The vegetation, the nature carrying the seed of eternity is ubiquitous within the orthodox church. Connected with the topic presented here, at a closer look we see that all this vegetable richness of the wooden decoration is concentrated on the imperial gates, a magical space that marks the passage spot both physical and metaphysical.

Imperial gate — Holy Trinity Church (1718), Bogdan Vodă, Maramureș, Romania

I think it is necessary, within this context of preparing a possible dialogue among science, art, religion, and conscience, to establish what we understand and in which acceptations we use the notion of an object's form. Is it a datum of nature or of our consciousness? Or is it both? We talk here about the forms of nature, the forms of thinking, the forms of art, the forms of social organization etc. The word itself is used and perceived differently by the philosophers, the art historians, and by everyday language.

From the beginnings our conscious and subconscious needed marks and it found these marks according to the perceptional-visual data, such as the horizontality of the plain, the verticality of the tree and its ramifications, the roundness of the sun, the misteriousness of the moon, the restlessness of the sea, the movement of the stars, the blue of the sky, the red of fire etc.

All of these simple perceptions are generators of forms connected with our notion of the world and of our place in it; they are also generators of symbols that we use in order to establish the needed conceptual marks, in order to find ourselves within our own person and within the immensity of the universe.

The first marks of the civilizing man where the axial coordinates, as a first means of orientation in space: what was found on the horizontal could be measured, therefore researched and known. When man looked up, he realized that the vertical was beyond the control of the measuring used in the horizontal world. Maybe this was the moment when the consciousness woke up. Not being able to determine the distance to the stars, he understood that there is a God.

The moment artists, scientists, theologians, and philosophers discover the significance of this transcendental border, the gate becomes a sacred doorway through which the power of our mind and faith can pass.

The gate's physical form just transposes the virtual image loaded with symbols which direct the perception towards the archaic myths of humanity: day and night, the four seasons, vegetation, and the rhythm of life. Above all these there is only intuition.

Watching the ornaments carved on the orthodox rood screen we notice the joy of celebrating life beyond a determined time. The dominant vegetable element reveals, in fact, the feeling of having faith in perpetuity. The seed of life is seen through these vegetable forms that symbolize the resurrection and eternal life.

Which is the subconscious call giving this need of bringing nature, through all its shapes, to the very heart of the gate of passage to the land we call paradise? There are precisely these vegetable ornaments that give the characteristic feature of the orthodox churches' sculpture.

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Problems and Perspectives of the Science-and-Religion Dialogue in Russia

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Context

The science-and-religion dialogue in Russia has much in common with such a dialogue in the West; however, there are many essential peculiarities connected with the Russian religious tradition, culture, history etc. Some of them might be helpful for the dialogue, while others may create additional problems. Some peculiarities are connected with the Orthodox tradition and they are common with other Orthodox countries like Greece or Romania. Others are unique for Russia and connected with her recent political, social, and economic development.

Russia now stands at the frontier of choosing her strategy for a cultural development. It is one of the most important and painful issues. There are many different scenarios, many quarrels between their proponents and no experience of democratic discussion and development. Quite the contrary, there is a solid non-democratic experience and a traditional lack of tolerance in the Russian society. It is not the time now to decide which cultural strategy is the most perspective for the future of Russia (there is no agreement on this issue), it is the time to listen to one another, to set up a simple conversation, a dialogue for understanding. It is extremely important to develop actual interaction between the different parts of culture for the sake of preserving the culture itself. The dialogue between science, philosophy, and religion is most important in this situation.

The science-and-religion dialogue is especially important in choosing political and economic strategies. Most important, it was noted recently

in the Basic Social Concept of the Russian Orthodox Church[1]: "Unfortunately, there is still a danger of ideologized science for which the nations have paid too high price in the 20th century. This ideologization is especially dangerous in the area of social studies that are laid on the basis of state programmes and political projects… The Church supports the especially important dialogue with humanitarian scholars." Traditionally, in the whole Russian history, the choosing of political and economic strategies was based on the volitional decision of the élite or just a single person. Very unfortunately, there is no tradition to refer the actual cultural state of the society to, that could provide a basis for a balanced political development. Culture should be the basis for ideological projects, while in the Marxist tradition it was exactly the opposite.

The ideologization of religion is also very dangerous. Religious fundamentalism is rapidly growing — one can experience it from creationist tendencies which are very new for the Russian Orthodoxy. There was "a monkey trial" in St. Petersburg in 2007 when a secondary school girl tried to insist on her right to replace studying of the evolution theory with the creationist concept. And even though her claim has been rejected by the court, pro-creationist textbooks on biology for secondary schools have been published and introduced in many schools under patriarchal blessings. Clearly there is a very strong opposition to these new developments among the scientists and wider, in society. This opposition often goes to another extreme, denying any religious worldview, clericalism, and the involvement of the Church in secular education, politics, and society.[2] Religious fundamentalism has triggered atheistic fundamentalism; there is an aggressive fighting between them and their proponents do not hear each other.

In the dialogue between science and religion in Russia, social and humanitarian sciences play a very important role. What we lack is a holistic vision of science, philosophy, and religion. What are the place, role,

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1. This document, officially approved in 2000, is very important for the Russian Orthodox Church. It was developed as a "response" or parallel to the Social Doctrine of the Roman Catholic Church and was aimed at providing guidelines for relevant developments inside the Russian Orthodox Church and it its dialogue with the secular society and the state. There is a special chapter on "Secular science, culture, and education", about the dangers of "the development of science and technology under the influence of secular ideologies", which defenses and promotes the religious worldview so as "to restore the lost link of scientific knowledge with the religious spiritual and moral values". Special stress is given to the dialogue with the social and humanitarian sciences.
2. In the summer of 2007, ten leading members of the Russian Academy of Sciences wrote an open letter to the Russian President: "The Politics of the Russian Orthodox Church: Consolidation or Disintegration of the Country?" The Moscow Atheistic Society has launched a movement entiled "Say 'No' to Jesus".

and significance of religion and spirituality in our society? How can they be related to a wide spectrum of cultural and social issues of the contemporary secular world? Which is the place of religion in the system of state and private education in Russia? This raises questions of religious and theological education accessible for secular people and open to dialogue with sciences, secular culture and society, other religious traditions etc.

Russia needs to develop its intellectual-cultural milieu for promoting the science-and-religion dialogue. The milieu that would facilitate different forms of the dialogue and tolerate various views. Establishing and supporting reputable centres for the science-and-religion dialogue that foster relevant activities in different forms and at various levels and cooperate with the Western and Eastern centres and specialists in order to provoke and facilitate the dialogue at local levels and in specific cultural environments is a very efficient strategic investment. Very important here is tolerance towards other views (both strategic and tactical), willingness to cooperate and openness to the dialogue with other centres. It is necessary to note that, even though the Western experience is extremely important for us, stress should be laid on the development of the national traditions, otherwise alienation is unavoidable. At this stage, the local dialogue is even more important than the international one. It is equally important to concentrate on mainstream research and practical activities, avoiding too narrow and sometimes exotic programs that may look genuine to a foreigner, but lack any solid science or religious basis (or, indeed, both).

There is a definite lack of systematic theological education in Russia and hence there are very few qualified theologians involved in the science-and-religion dialogue. It is so despite the fact that there are many priests whose first education (in Soviet times) was in natural sciences or humanities. When organizing different academic and public events, it is always a challenge to attract attention and to actively involve some educated priests. The good thing is that the new generation of priests seems to be more open and more interested in the subject. We need to work actively with seminary students, young priests, and theology teachers. Probably the most efficient way now is to use summer theological institutes, special workshops, the publication of high-quality books and other material to develop distance-learning courses *via* email or the Internet.

The Russian school of physics was and partly still is very strong. Many leading physicists and other scientists were interested in religion even before the fall of the Soviet regime; hence, many of them became involved in the science-and-religion dialogue. Very unfortunately, many never had any formal theological education and their "research" in this field may be very naïve. However, some are more than active and really qualified participants in the science-and-religion dialogue. The younger

generation of scientists have had a much better access to the theological education — whether formal or self-applied. There are new theological departments at state universities (never before in Russian history!), independent theological colleges providing theological and religious education for the lay people. (There are now about fifty theological departments and chairs at the state and private universities and approximately the same number of religious studies departments. The quality of this education is not very high, but it is gradually improving.)

The third and probably the largest group of participants in the science-and-religion activities are the philosophers. Normally, they also do not have any formal theological education; however, they are influenced by the great tradition of Russian religious philosophy and culture, which helps in finding a common language with other participants. In many cases, philosophy is used as a "topos" (and language) of the dialogue between science and religion in Russia.[3] Here again the development of relevant educational, academic, and publishing programs is very efficient and perspective.

Russia has splendid achievements in sciences, philosophy, literature, and art. Its great culture influenced the contemporary world, but has been neglected at home for a long time. What we need now is the cultivation and popularization of our own traditions (just one example: many Russian philosophers exiled abroad have not yet been translated into Russian). The problem is that a continuous cultural process has been interrupted in the 20th century and it was a real tragedy for Russia. The Russian religious philosophy of the early 20th century (the "silver age of Russian culture") is quite popular now, but the level of its elaboration and research is not appropriate. In most cases, it is a simple question of reading and quoting with no serious analysis and applications for contemporary culture. Students and scholars have not read and argued with these authors for seventy years during the Communist regime and so the tradition had no continuation.

The Russian Orthodox tradition is potentially very fruitful for the development of the science-and-religion dialogue (one can see it from the Basic Social Concept of the Russian Orthodox Church). The problem is that there is practically no academic theology and no serious involvement in contemporary issues. The above-mentioned "silver age of Russian culture" resulted in the famous Russian Orthodox Church Council of 1917-1918. It could have become a "Vatican II" of the Russian Orthodox Church, but unfortunately did not have any serious influence on our society and

3. One of the leading hierarchs of the Russian Orthodox Church, Metropolitan Philaret of Minsk, has mentioned recently that "theology and philosophy are relatives".

culture due to the 1917 national catastrophe. Now the Russian Orthodoxy is virginally clean and there are very few bishops or clergy who might be actively involved in serious and challenging academic discussions. So it is extremely important to support any initiatives aiming to improve this situation.

Past and Current Activities in the Science-and-Religion Dialogue

St. Andrew's Biblical Theological Institute in Moscow became actively involved in the science-and-religion dialogue over ten years ago, when we started a book series entitled "Science and Theology". The first title was *The Faith of a Physicist* by John Polkinghorne. Translations of books by Ian Barbour, Nancey Murphy, George Ellis, John Brooke, Arthur Peacocke, Hans Küng, Jürgen Moltmann, Olivier Clément, Michael Heller, and many others followed, so that by now we have published 25 titles that have proven to be invaluable tools for developing science-and-religion activities and educational courses, including distant learning. These books are widely used in state and private universities and by all major Christian confessions. The authors are from different religious and cultural traditions. However, these are mostly translations. 25 titles certainly is a very small number for this large and rapidly developing field, so we will continue this vitally important programme. Extremely important is to encourage Russian authors to write their own books, so this should not be just a side-product of their main activities. We need to provide them with moral and financial support, so that they would not feel themselves on the margins of the main research and could really concentrate on this important and challenging task.

The publishing activities were initiated and largely supported by the John Templeton Foundation. However, cooperation with, and support from, different Churches, including the Catholic Church organizations and the Soros Foundation, greatly facilitated the success of this project especially in book distribution. We were able to reach most seminaries, university and some regional libraries and sent books as awards to theological graduates.

Educational activities include general and special courses on the science-and-religion dialogue for full-time students, distant learning courses and Summer Theological Institutes. The summer institutes have become one of our most successful and politically important projects. They attract students and specialists of all major confessions from all parts of Russia and other countries. Courses on science-and-religion are

always included in their programmes and, with the support of the John Templeton Foundation, we also organize annual specialized Summer Institutes on the Science-and-Religion Dialogue.

The public ceremony of the Templeton Prize Award to Ian Barbour in Moscow in May 1999 was an extremely important event and triggeerd many activities in the science-and-religion dialogue in Russia. Many scholars and public-opinion leaders saw that the dialogue is important in the West and it can be a valuable part of research and educational activities in Russia as well. Groups that had already worked in this field for many years were encouraged and new individuals and groups were involved. This also facilitated the success of several subsequent international conferences organized by St Andrew's Institute and other groups.

The next step was the support of several groups by the LSI-Metanexus Institute programme. The conferences, regular seminars, and some other related activities helped to provide some space for further dialogue and discussions among scholars. Two LSI supplemental awards made possible the organization of paper contests that attracted many new names, especially from the provinces of Russia and the FSU.

A great development was that of a large project supported by the Templeton Foundation, called "Development of Religion-and-Science Dialogue on the Academic, Educational, and Informational Level in Russia and the FSU", which included annual international conferences, summer institutes on science-and-religion, paper contests and many other activities. We, at St. Andrew's Institute, try to reach as many seminaries, theological departments, and colleges as we can and we work with them through different projects. We cooperate with the Theological Commission of the Moscow Patriarchate, that also develops science-and-religion programmes in cooperation with the Institute of Philosophy of the Russian Academy of Sciences.

International, interconfessional, and intercultural cooperation is extremely important for the development of the science-and-religion dialogue. I would say thay they are mutually important since the science-and-religion dialogue itself greatly facilitates the interconfessional and intercultural dialogue. It is important everywhere, but in Russia it is just vitally important. The next stage of the development could and should be international inter-orthodox and interconfessional cooperation. The collaboration with the ADSTR is especially important since Romania and Russia have similarities in their recent history and have much in common in their Orthodox heritage.

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New Evidence for Determining the Date of the Adoption of Christianity as State Religion in Georgia

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Introduction

It is now considered that Christianity was declared a state religion in Georgia in circa AD 326, during the reign of King Mirian and Queen Nana. In the Georgian Chronicle (Kaukhchishvili [1955]), it is stated that this event was connected with the adoption of Christianity by King Mirian. He was once hunting somewhere between Mtskheta (the ancient capital of Georgia) and Khashuri, near Mount Tkhoti, in a dense woodland. It rapidly got dark and the Sun disappeared from the sky.

Mirian began asking his traditional pagan gods, but to no avail. Then he addressed the god whom Nino from Cappadocia believed in (subsequently, she became Saint Nino, a woman whose name is inseparably linked with the spread of Christianity in Georgia) and a miracle occurred: the darkness suddenly disappeared and the Sun began shining in the sky again. Then Mirian turned to the East and thanked "Nino's god".

Contemporary Investigations

In the 1930s, the Georgian historian Ivane Javakhishvili appealed to astronomers to answer the question whether or not a total solar eclipse

had happened in Georgia during the fourth century. Based on the famous *Canon der Finsternisse* by Oppolzer (1887), in which the change in the length of the day with current time (the result of tidal friction) was taken into account incompletely, astronomers could not find any eclipse during the mentioned period. Thus, it seemed that the question was resolved.

However, after detailed tables and maps of solar and lunar eclipses have been published on the Web by Espenak (2003), we have found out that a total solar eclipse did occur in Georgia on 6 May 319 AD.

The Circumstances of the Solar Eclipse

By calculating the circumstances of the eclipse with the use of Bessel's improved elements, we have found that Mount Tkhoti was on the central line of the eclipse (Gigolashvili *et al.* [2007 a]; Kiladze *et al.* [2007]; Gigolashvili *et al.* [2007 b]). For the place where Mirian was hunting (λ = 44°.55; ϕ = +41°.99), the circumstances of the eclipse are as follows: the start of the partial eclipse was at $14^h58^m01^s$ Universal Time (UT); the second contact was at $15^h51^m57^s$ UT, and the third contact at $15^h53^m50^s$ UT; the maximum phase was 1.018. The moments of sunset are as follows: bottom edge — at $15^h59^m24^s$ UT; top edge — at $16^h02^m29^s$ UT.

The central line of the eclipse passed through the settlements of Tsageri, Ambrolauri, Tskhinvali, and Mtskheta. The northern boundary passed through the Caucasus Range (Elbrus, Upper Baksan, and Kazbek). The southern boundary passed through Lake Paliastomi, Abastumani, Aspindza, Dmanisi, and Akhtala. From the east, the strip of the complete eclipse was limited by a line from Gardabani to Sagarejo.

Hence, the eclipse happened in the evening, before sunset; the duration of the total phase was about two minutes. At the moment of the maximum phase, the height of the Sun above the horizon was only 0°.8. The sunset began 5.6 minutes later, after the end of the total phase (*i.e.*, after the third contact).

We have investigated every solar eclipse (total, partial, and annular) during the period AD 290 to AD 365. In *Table 1*, the list of solar eclipses with a phase of more than 0.8 for the period mentioned above is given for Mount Tkhoti. In the columns of *Table 1* are consistently given: the year, the month and the day of an eclipse, the moments of the first and second contacts, the maximum phase and the third and fourth contacts. In the last two columns are given the heights of the Sun above the horizon (in degrees) at the moment of the maximum phase of an eclipse and the maximum phase (in %).

Table 1

The list of solar eclipses with a phase of over 0.8 during the reign of King Mirian

Year (AD)	Month	Day	1st contact	2nd contact	Maximal phase	3rd contact	4th contact	Altitude	Phase (%)
306	July	27	$7^h17^m34^s$		$8^h39^m49^s$		$10^h15^m05^s$	41°.4	83.2
319	May	6	17 57 58	$18^h51^m54^s$	18 52 50	$18^h53^m47^s$		0°.9	101.7
346	June	6	6 18 52		7 16 42		8 19 44	29°.6	99.3
348	October	9	7 40 54		8 45 24		9 54 31	25°.7	87.6
355	May	28	5 55 51		6 53 35		7 56 47	24°.7	87.3

Other Evidence

According to *Kartlis Tskhovreba* (Kaukhchishvili [1955]), three crosses of cypress wood were made on 1 May. According to Ioane Zosime (Muskhelishvili [2003]), it was the third Sunday after Easter. One of these crosses was raised near the capital of Georgia, Mtskheta, on 8 May. However, the year is not mentioned in these sources.

From further investigation, it will be clarified that the event we studied occurred before the First Council of Nicaea (AD 325). Hence, the contemporary rules for the calculation of Easter had not yet been canonized. For this reason, the authors have calculated the dates of Easter by all possible methods.

To ascertain the exact date of this incident, the authors investigated the dates of all Easter days during the probable period of King Mirian's reign. Within this period, the years when Easter took place on 17 April have been chosen. Hence, the third Sunday after Easter fell on 1 May.

Table 2 presents the dates of Easter days in the appropriate years. In the first three columns are given the moments (year, month, day, hour, and minute) of the first full moon after a spring equinox, according to Espenak; in the following columns are given the dates of Easter days we have calculated by using different methods: by the ancient 19-year lunar cycle and the approximate formulas of Gauss and Meeus (Gunia [2006]; Klimishin [1981]; Kulikov [1991]). In the last column of the table are given Easter dates, selected by the authors with the use of the exact moments of full moon.

It is clear from *Table 2* that a 17-April Easter could only take place in the years AD 298, 309, and 320. In Table 1, only two eclipses (AD 306 and 319) are presented which could happen before the years when Easter took place on 17 April. However, the eclipse of AD 306 must be excluded for two reasons: it was a partial eclipse (with a maximum phase of 82%) and

Table 2

The dates of Easter days during the reign of King Mirian

Year	(Espenak) Date	Time	Lunar cycle	Gauss and Meeus	Selected dates
AD 298	13 April	23^h56^m	13 April	17 April	
AD 309	11 April	14 15	12 April	17 April	
AD 315	6 April	11 28	5 April	10 April	
AD 320	9 April	14 01	10 April	10 April	17 April
AD 326	4 April	4 47	4 April	3 April	10 April
AD 337	1 April	23 23	2 April	3 April	
AD 343	27 March	19 23	27 March	27 March	3 April
AD 348	31 March	13 13	1 April	3 April	
AD 354	25 March	10 22	25 March	27 March	
AD 365	23 March	20 14	24 March	27 March	

it happened early in the morning. But this incident happened to King Mirian in the evening (Kaukhchishvili [1955]).

Conclusions

In the authors' opinion, the eclipse seen by King Mirian happened on the evening of 6 May, AD 319. Later, in May of AD 320, cypress crosses were made and raised. Thus, we have answered the question put seventy years ago by the Georgian historian Ivane Javakhishvili about the occurrence of a total solar eclipse in Georgia at some time during the fourth century. The eclipse seen by King Mirian occurred in the evening of 6 May, AD 319. Later, in AD 320, cypress crosses were raised and Christianity became the state religion of Georgia.

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The Place of Biology in Cosmology*

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"Teleology is a lady without whom no biologist can live.
Yet he is ashamed to show himself with her in public."
E. VON BRUECKE, cited in W. Cannon ([1968], p. 108).

Introduction

What is the place of the humans in the cosmos? How we frame the question already reflects our ideas about the answer. To create transdisciplinary models, these implicit assumptions and orienting metaphors need to be examined. Cosmology can be defined as a subfield of astronomy that considers the nature and evolution of the universe. In this view, the origin and nature of matter and the forces impacting matter are the objects of study. Cosmology can also be defined as the study of cosmos, the universe as an orderly, harmonious system. In this view, the nature of underlying patterning is broader than that found in astronomy. Cosmology in its first sense is often taken to explain cosmology in its second one. In this paper, I will argue that cosmology as a subfield of astronomy is too limited a perspective to frame the discourse pertaining to cosmology in its broader sense. When we ask what the nature is of order in the universe, one thing that this question means is that we want to know our fundamental nature, and thus our place in this universe. To understand our characteristics as living beings and the important questions about order that need answering, we must look at Biology as being fundamental to our scientific understanding. Only then can we know what questions about cosmology as astronomy are relevant and important to address. That is,

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a scientific view of cosmology begins with looking at patterning in living systems. We need Biology for our facts and observations, hence core metaphors and assumptions about the nature of organisms and their environment. Only in this way can we know what the important features of the inanimate are as it relates to living things and the essential questions to ask.

Cosmology as a Subfield of Astronomy

According to cosmology in its first sense, from the origins of matter in a "big bang", successively more complicated atomic elements and compounds develop. Impersonal physical forces underlie these developments. Somehow, when matter achieves a sufficiently high level of chemical complexity in organic compounds, life and its typical characteristics emerge. Thus, to understand human origins and evolution, to be "scientific", Physics and Chemistry are primary. It is not simply that complex molecules are a part of the story; they are the key to the dynamic that explains life's origins and nature. However, this perspective contains no conceptual bridge across discontinuities between the dynamics of living and non-living things. How to bridge that discontinuity thus becomes a difficult, even insoluble problem.

This viewpoint carries underlying assumptions for our examination of the place of humans in the universe. First, big-bang cosmology assumes that the starting-point is crucial, the cause that sets everything in motion. Later developments follow in a cause-and-effect sequence from this beginning. We must understand the starting-point and, more generally, development in cause-and-effect linear time sequences, in order to understand what is happening in the present. If we only see later points in the sequence, we will remain in the dark, because these later points are understandable only in relationship to earlier causes. This contrasts, for example, with the understanding based on the nature of the patterning among parts in the present, a form of cosmology found, for example, in Chinese medicine. It also contrasts with an idea that origins are logical origins or a successive unfolding of meanings, as when an undifferentiated state transforms itself through a series of distinctions. Again, in Chinese medicine, the one becomes duality, which then becomes multiplicity. Further, creation was something that happened "back then", not in the present. This contrasts with the idea that creation occurs repeatedly in the present through a process of actualization, with the rules by which that actualization occurs being important to understanding the order.

Second, cosmology as astronomy tends to lend itself to a metatheory that Physics is primary and thus a view of evolution and, more broadly,

the life sciences that is reductionist and materialist. For example, the discovery of the physical structure of DNA has been hailed as telling us "the nature of life". Mapping the chemical structure of an individual's genome is supposed to tell us what is important about our health risks. Socio-biology embodies a radical materialism which assumes that promoting the propagation of one's DNA is a primary force in evolution. Describing the physical structure of neural nets is supposed to tell us about consciousness. In addition to a discontinuity between the dynamics of living and non-living systems, there is no conceptual bridge to the non-material. This contrasts, for example, with the idea that concepts not found in Physics are also primary and scientific, concepts like anticipation, purposiveness, or a felt relationship with the physical and social environment as part of the creation of meaning.

Biology as Metatheory

Biology offers many insights for the study of cosmology. The characteristics of living things are obviously different from those of non-living systems. Helena Curtis ([1975], pp. 27-31) suggested that "signs of life" include: living things are chemically complex and highly organized, take energy from their environment and change it from one form to another, are homeostatic, respond to stimuli, reproduce themselves, are adapted to their environment, and contain the information about all these functions within themselves. Other biologists have contributed additional experimental work and theoretical ideas about what the characteristics of life are. While there are many perspectives within Biology, I would suggest that J.S. Haldane, Ragnar Granit, and Walter Cannon are all examples of eminent biologists whose work contributed much to our understanding of the underlying organization of living beings. For example, Haldane (1917) examined the nature of interrelatedness between organism and environment. Granit (1977) examined the biological meaning of purposiveness. One aspect of Walter Cannon's (1963/1939) research was the dynamics of homeostasis. Homeostasis is a key and important idea in understanding the patterning of living systems. In this paper, I outline Cannon's work on homeostasis and the implications of this work for our understanding of cosmology.

Walter Bradford Cannon, M.D., was the chair of the Department of Physiology at Harvard Medical School from 1906 to 1942, and president of the American Physiological Society from 1914 to 1916. His experimental research on a range of topics was substantial, spanning the physiology of digestion, the nature of traumatic shock experienced by the wounded

soldiers during World War I, the role of the autonomous nervous system and the endocrine system in responses to threat, the nature of emotionality and of psychosomatic processes. He coined terms that have become part of our culture's common language, like the *fight/flight* response to danger and *homeostasis*. Cannon presented his ideas about homeostasis in the book *The Wisdom of the Body* (1963/1939), which forms the basis for this paper; unless otherwise noted, all information and quotes are from this book. His autobiography, *The Way of an Investigator* (Cannon [1961/1945]), was also drawn on.

Homeostasis

Homeostasis is the tendency of the body to maintain internal stability through the coordinated response of its parts to change. Many of our body systems must operate within a small range. For example, a diabetic has too much sugar in the bloodstream, but if we have too little sugar we experience first minor symptoms like fatigue and, finally, severe symptoms like coma. Such large variations in blood sugar, along with variations in oxygen and other important bodily components, are avoided in healthy functioning because active mechanisms keep levels within a normal range. For example, if blood sugar levels start going up then the hormone insulin, which reduces these levels, may be secreted; if blood sugar goes down, as when we are exercising, then the liver may release additional sugar.

Homeostasis is sometimes described in textbooks as a mechanical process, analogous to a thermostat in a furnace. A particular variable is monitored, changes in its value are noted by receptors, control centers like the brain send out messages to nullify change. However, Cannon is clear that his concept is one that pertains to living beings rather than mechanical systems:

> The constant conditions which are maintained in the body might be called equilibria. That word, however, has come to have fairly exact meaning as applied to relatively simple physico-chemical states, in closed systems, where known forces are balanced. The coordinated physiological processes which maintain most of the steady states in the organism are so complex and so peculiar to living beings — involving, as they may, the brain and nerves, the heart, lungs, kidneys and spleen, all working cooperatively — that I have suggested a special designation for these states, homeostasis.
>
> (Cannon [1963/1939], p. 24)

Building upon Claude Bernard's concept of the "milieu interior", Cannon emphasizes that what must remain stable is the immediate environment surrounding the cells in our bodies. For our bodies to survive,

the individual cells comprising them must survive. Individual cells are provided with nutrients and eliminate waste through their contact with the fluid that surrounds them. The composition of this interstitial fluid in turn depends upon its communication with the fluid in blood and lymph vessels. We require an astonishingly small variation in the amounts of oxygen, carbon dioxide, acids and bases etc. carried by the fluid matrix, *i.e.*, the fluid surrounding cells and within vessels, or else our individual cells will end up oxygen-deprived, desiccated, or suffer other problems. Thus, the key to homeostasis is maintaining constancy in the "fluid matrix" and the mechanisms we observe will ultimately maintain constancy here. For example, if we eat too little salt, our kidneys will excrete less; as a result, the percentage of salt in blood, lymph, and within cells can remain constant. Homeostatic mechanisms are active and purposive:

> In an open system, such as our bodies represent, compounded of unstable material and subjected continually to disturbing conditions, constancy is in itself evidence that agencies are acting, or ready to act, to maintain this constancy… If a state remains steady, it does so because any tendency towards change is automatically met by an increased effectiveness of the factor or factors that resist the change. (Cannon [1963/1939], p. 299)

> Homeostasis is not accidental, but a result of organized self-government. (*ibidem*, p. 300)

Yet the picture Cannon is painting is not one simply of constancy. Homeostasis involves the idea of maintaining a constant fluid matrix given ever-changing states, a balance in the present given dynamic change. The fluid matrix remains constant, but the body as a whole does not. It is not simply accidents or adversity that produce disequilibrium. People are always changing, their bodies active, their physical movements organized so as to achieve goals, their bodies responding to changes in internal states like emotions. If a person moves, for example, she/he uses up greater amounts of oxygen and sugar than they do when she/he is resting; the breathing rate, the release of sugar from storage in the liver etc. therefore need to change to maintain homeostasis.

Building on Cannon's language, we can say that the homeostatic mechanisms make activity, purpose, or a variety of states possible and are fundamentally integrated with movement and change rather than a simple return to a predefined equilibrium. The fluid matrix is like a pivot point around which all else revolves.

What is the nature of these homeostatic adjustments? We cannot make sense of them without referring to purposiveness. Only by knowing

the purpose can we make sense of the mechanisms and when they are brought into play:

> The view that there are organic adjustments which promote bodily welfare, and consequently are useful, involves the conception that these activities are directed, *i.e.*, that the parts operate teleologically for the good of the entire group of parts that constitute the organism. (Cannon [1961/1945], p. 108)

> When a person is exposed to a reduced amount of oxygen in the air… the red-blood corpuscles, which transport oxygen from the lungs to the shut-away tissues of the body, are increased in number… It has been shown experimentally that because of adaptive changes… lower animals can continue living in an atmosphere that contains less than 10 percent of oxygen, *i.e.*, less than half the concentration at sea level. In this connection it is pertinent to note that burning alcohol is smothered when the oxygen in the air falls from about 21 to 15 percent. (*ibidem*, p. 111)

Purposiveness helps to describe or explain how unrelated body systems, or different parts of the same body system, all work together to achieve an end. Homeostasis cannot be understood by simply isolating individual mechanisms and adding them up. It relies on a large number of mechanisms that may exist in structures of the body distant from each other or in different body systems acting cooperatively in an organized manner. These mechanisms may be simultaneously mobilized, or any one of a number of mechanisms may alternatively be mobilized.

In addition to purposiveness, the mechanisms comprising homeostatic adjustments have other characteristics. One is anticipation. Mechanisms and feedback loops do not simply respond to deviations or breakdowns. They are brought into play prior to changes occurring that would create, or even threaten, a breakdown in homeostasis. Sometimes, they occur simultaneously with the conditions for which they are needed, as when the same nervous system mechanism that triggers voluntary movement also initiates the changes in heart rate, thus blood flow, that an increase in activity will require. Sometimes, mechanisms respond to indications of change or minor changes/precursors. For example, we feel thirst given small amounts of water deprivation, long before danger of changes in the composition of blood. Sometimes, physiological changes may occur in anticipation of an action. For example, when a seated person decides to stand up, the intention to stand up results in a rise in blood pressure even before activity starts, so that when he/she does stand up, there is no drop.

A second characteristic of the homeostatic mechanisms is the interrelationship of psychology and physiology. As noted, intentions like the decision to stand up can initiate physiological changes. Drives like hunger are anticipatory. In addition, appetites, as when food is pleasurable because of its sight and smell, motivate eating before a deprivation large enough to produce hunger occurs.

A third characteristic of the homeostatic systems is that of a part acting for the benefit of the whole. Cannon, for example, discusses in detail the experience of thirst. Salivary glands moisten the mouth; when they do not secrete enough, this causes an unpleasant sensation called thirst. We can understand thirst in terms of local dynamics. Any condition that causes rapid evaporation of moisture in the mouth or smaller production of fluid by the glands will results in this dryness and the experience of thirst, as when someone sings a lot, or breathes dry air, or feels anxious. Any condition that restores moistness in the mouth will ameliorate the experience of thirst, as when someone swishes fluid in the mouth or sucks a lemon. However, if we focus too narrowly on these local dynamics, we will miss their significance to homeostasis. When there is too little fluid in the body, then fluid gets preferentially sent to crucial body parts like blood and away from non-essential parts like the salivary glands, which then become dry. Salivary glands thus signal bodily need by causing an unpleasant sensation. The experience of thirst occurs when there is too little fluid in the body, yet before the situation becomes critical; this is another example of the anticipatory quality of mechanisms. However, in addition, thirst is what Cannon calls a "sentinel, a local symptom that stands for/indicates a larger bodily imbalance. That is, an organismic state is experienced in thirst through a local indicator that communicates the state of the system; in alleviating thirst, the larger bodily imbalance is also addressed and balance is restored.

A fourth characteristic of the homeostatic mechanisms is redundancy and inefficiency. For example, when a person breathes, who is not moving, a great deal of air sits in the lungs without being either exhaled or absorbed into the body, and a lot of blood in the heart sits there and does not get pumped. This may seem like a poorly designed, inefficient system, but it is the means by which flexibility is possible. If the person suddenly moves and needs more oxygen and blood, this can occur immediately as these stores are available to be used. In addition, for Cannon safety rather than efficiency is important to bodily organization, to allow for error, damage to an organ, and other problems. For example, redundancy is found throughout the body — pairs of organs like lungs or kidneys when only one is needed, intestines that are much longer than needed for digestion, multiple mechanisms that serve the same purpose as when

saliva and the pancreas both release the same digestive enzyme. Conversely, in bodily organization one part often has multiple functions, as when the connective tissue is also storage tissue for water and salt.

Finally, Cannon's work suggests that the body is a holistic system and that intelligence inheres in the body as a whole. The organization of the body varies with the function of the overall body; for example, during muscular activity, arterioles and capillaries dilate in active muscle and constrict in the abdomen. Systems are interrelated; for example, constant blood acidity, crucial to the chemistry of individual cells, relies on control of carbon dioxide (which dissolves in blood as an acid) through respiration, but also relies on the control of salts in blood through excretion by the kidneys. Important as the brain and endocrine system are in organizing and coordinating bodily activities and functions, homeostatic mechanisms also inhere in local body systems, as when physical mechanics are important. For example, as muscles are being used, they push on blood vessels, which pumps blood along, which results in improved circulation to bring muscles the nutrients they need. As muscles are used, blood pressure rises, which results in a more rapid blood flow. However, rapid flow has a cost, since there is less time for the oxygen that the blood is carrying and that the muscles need to diffuse into cells from capillaries. However, active muscles produce heat and carbon dioxide which mechanically results in quicker oxygen diffusion.

Implications of homeostasis

The image of the body derived from Cannon's work is of a holistic system characterized by purposiveness, anticipation, the interrelationship of psychology and physiology, inefficiency and redundancy, a part representing the whole, and intelligence inhering in the body as a whole rather than localized in the brain and endocrine system. This image is a scientific image, based on experimental evidence and concepts derived from, or accounting for, experimental evidence.

This image differs from that derived from approaches to Biology from a materialist, reductionist viewpoint. For example, in socio-biology the propagation of the chemical DNA is at the heart of natural selection and the dynamics underlying evolution; for example, great importance is laid on how many women a man can impregnate rather than what it takes to successfully raise a child to reproductive age. A core image in socio-biology is that efficiency underlies biological organization, as in the assumption that there is a best trait that will be the object of natural selection (rather than that diversity, variety, or redundancy provides the best adaptation) or in the idea that adaptation is best understood as maximizing efficiency (as when asserting that men do not want to waste effort raising

genetic young not their own). Socio-biology also assumes that in natural selection individuals pursue individual gain and that this somehow adds up to a whole that works; the social and physical environment are only the context within which individual activity occurs rather than forming a meaningful larger whole of which the individual is a part. Competition, not cooperation is considered a genetic given.

Cannon's viewpoint organizes biological observations and ideas into a different set of core assumptions and metaphors. By highlighting different facts and organizing them in a different set of images, it provides us with a different orientation in which we notice different aspects of reality and make different kinds of bridges and connections. Bridges exist between the non-material and material, the psychological and the physical. For example, concepts like purposiveness explain observations and psychological motives are intertwined with physiological adaptation.

While he does not explicitly discuss spirituality, his concepts provide bridges to spiritual discourse. In scientific terms, we are characterized by activity, purposiveness, and meaning. These terms are also relevant to the spiritual discourse. The idea that inefficiency and error are part of the natural course of things that allow for redundancy and variety has many resonances, for example to human imperfection and the imperfection of the world. In general, a spiritual worldview that does not deny the space/time world but goes beyond it would be congruent with Cannon's images.

His ideas have many other interesting relationships to other systems. For example, Chinese medicine has a complicated system to describe the underlying patterning in the body. In health, bodily energies are balanced; in illness, energies are out of balance. This balance reflects the internal state of the body and the person's interrelationship with the social and physical environment. While for us, a symptom is a problem to be treated, in Chinese medicine a symptom is an indicator of an underlying bodily imbalance. Treatment consists of helping the body restore its ability to heal itself. All of these ideas resonate with Cannon: Homeostasis is a balance of bodily systems in which too much or too little creates problems; signs like thirst signal an underlying imbalance; the body actively self-corrects to restore balance, *e.g.* through behaviors like drinking water. Cannon states, with regard to medical treatment, that nature heals, while doctors assist self-regulating mechanisms and help make them more effective.

His ideas are also interesting when related to the chaos theory, which describes phenomena in the inanimate and biological realms. The cause-and-effect systems often studied by scientists characterize some but not the entire natural world. Other systems with other rules also exist, for example chaotic systems, which can be mathematically described.

Chaotic systems are deterministic, but not predictable. They are dynamic, in constant movement, and they generate aperiodicity, therefore variety. It has been suggested that this aperiodicity, on a biological level, results in greater adaptability, as systems which are not locked in to periodicity have greater flexibility in responding to change.

Finally, these orientating images provide us with a different lens with which to regard astronomy. With regard to the universe originating in a big bang, we can note that the universe is all of one piece. The same laws apply everywhere. The universe is moving as a whole. Everything affects everything else, as in the force of gravity. Physicists study forces and energies which are non-material all of the time. Our relationship to the stars, as when we look at the night sky, reflects in part an intrinsically felt relationship to our environment.

Conclusion

Living things are composed of matter and conform to the laws of Physics and Chemistry. Hence, these laws contribute one layer to our understanding of cosmology. However, biological systems have different characteristics from non-living systems. The idea that their characteristics are best understood as derived from, or explained by, the laws of Physics and Chemistry is an *a priori*, even scholastic, assumption, not a scientific fact. To understand cosmology, we must also look to Biology for basic scientific facts and premises about the nature of living things, and hence our fundamental nature. Homeostasis, coordinated physiological processes that maintain steady states through self-righting adjustments, is a basic biological principle for mammals. It can only be understood as a purposive dynamic. It is not simply a process that keeps organisms static and unchanging. The fluid matrix must remain constant in order for cells, and hence the organisms that they comprise, to stay alive. Homeostasis pertains to the ability to maintain this crucial constancy as behavior and the environment change, a constancy that makes activity and a variety of states possible. The fluid matrix is like a pivot point around which all else revolves. The image of the body derived from Cannon's work is of a holistic open system with balance among a large number of interacting parts, characterized by purposiveness, anticipation, cooperation, the interrelationship of psychology and physiology, inefficiency and redundancy, a part representing and acting for the good of the whole, and intelligence inhering in the body as a whole rather than localized in the brain and the endocrine system. Our relationship to cosmology starts here.

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The Unseen World and the Extended Mach Principle

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Introduction

According to the Extended Mach Principle, any attribute of a given system is the result of past and present interactions (exchange of energy and information) among systems of the same kind. This principle can also be applied to the mental and spiritual attributes of complex systems (man in particular). This extension requires a permanent connection between the beings of the tangible world and the beings (entities) of the unseen world (angels, the souls of the deceased etc.) and the mutual causal effects between the two worlds. This paper addresses such connections in detail.

Scientists and theologists believe that different methods are used in their specific areas of knowledge, *i.e.* scientific and mystical (spiritual) knowledge, and the principles on which such areas of knowledge rely are incompatible (Hawking [2004]; Mememlis [2005]).[1] Throughout this paper, we will try to demonstrate that there are methods and principles that apply to both areas of knowledge. The attributes of the fundamental principles that govern the material world (the world of systems/objects/entities/phenomena studied by science is called "the material world", although it also includes physical fields), *i.e.* the principle of causality, the principle of action and reaction, the extended Mach principle are found

1. This paper asserts the idea that religion in general, and particularly Christianity, establishes an immeasurable paradigm, in the sense given to the term by Thomas Kuhn, in comparison with the domain of scientific knowledge.

in various representations in the spiritual and moral worlds. We will outline the similarities among the processes that generate the attributes of simple material systems, the psychic restructuration processes (given this complex issue, we will only address the major attributes: consciousness, reason, and language), and the restructuration processes of man's spiritual attributes (love and compassion).

The principle of causality, the principle of action and reaction, and Mach's principle involve the existence of at least two systems (source/sender and receiver) that interact with each other and determine each other's attributes and also the existence of a third system (medium and carrier) that mediates the interaction and carries energy and information. The role of each of the three systems changes in a cyclical manner and any of them may be a source, a receiver, and a carrier depending on its model and complexity. According to scientific knowledge, the systems belong to the tangible world and are investigated by means of senses and/or instruments. Likewise, according to spiritual knowledge, there is an unseen world made up of systems that are no longer perceived with the sense organs of the material body, but by means of the organs belonging to the spiritual body (soul). There are connections, relations, and communication — *i.e.*, causal determinations — among the systems of the tangible world and those of the unseen world similar to those among the systems of the tangible world. In this case, the three connecting entities — the source, the receiver, the carrier — belong, in first investigation, to different worlds that influence one another. This mutual influence and the unique source (the same Creator) set the basis of a unitary system: the world.

Examples are given throughout this paper by reference mainly to the results of the research undertaken by Fathers Mitrofan (2003), Arsenie Boca (2003, 2004) and Dumitru Stăniloae (1993, 1997) of the unseen world and its meaning.

The Extended Mach Principle

According to a science-accepted paradigm, matter is organized into systems. The systems theory states that a system is a set of elements (sub-systems) that are mutually interacting inside the system (inter-relationships), as well as with elements from outside the system (intra-relationships) and is defined by dynamics, order, organizaton, synergy, and finality. The system dynamics, which is defined by the exchange of energy and information, is accomplished provided that structure (the order of sub-system arrangement in space — note the connection with space) and inner-processes sequence (*i.e.*, the organization in time of the processes —

note the connection with time) are maintained. Synergy, *i.e.*, the global, non-linear, cooperating, and/or competitive effect of elements to form a whole determines the specific properties of a class of systems, thus the whole quality is greater by comparison with the quality of the sum of its elements. Finality is the final status (scope status or objective) of a sequence of statuses. The material system is the part of the Universe that has real or imaginary boundaries and specific properties (Constantinescu [1986]; Neacșu [1982]; Simaciu [2001 a]; [2007]).

According to the latest research, the physical information, within a physical and mathematical model, is the complete description of a material system, but in a sense that is divorced from any particular language.

In thermodynamic systems, the entropy S is a measure of physical information. In statistical physics, the thermodynamic system is modelled as a set of microscopic systems. According to this theory, entropy is a measure of the order/disorder in the thermodynamic system. In physics, the systems' states and the processes they are involved in are defined by state functions and process functions. A state function is a function of the parameters of the system, which only depends upon the parameters' values at the endpoints of the path. For instance, in thermodynamics, the first law introduces a state function named internal energy, U, depending on the quantity of substance (molar quantity), temperature (thermodynamics specific parameter), and a parameter of a material named molar heat capacity at constant volume. In statistical physics, the internal energy is the kinetic energy of the microscopic elements in the thermodynamic system. The heat state varies in a system (at constant volume) if the system has a thermal interaction with the exterior (other thermodynamic systems) resulting in the exchange of energy as heat Q. Heat indicates how strong the thermal interaction is and, considering the causality principle, gives a measure of the cause. Heat is a process function. The first law defines the quantity relationship between the effect measure, the variation of internal energy ΔU, and the measure of the cause that is the quantity of heat being exchanged by the system ($\Delta U = Q$).

Likewise, physical information requires the distinction between the information inside the system — which is a measure of the internal order of the system — and the physical information exchanged by the system during interaction. The concept of physical information exchanged by a system is close — in terms of properties — to the concept of information from the information theory, as it also implies a source (sender), a receiver (addressee), and a transfer medium/channel. The physical information inside the system has the properties of stored information; hence, it should be otherwise defined. To make the distinction Brillouin (1958) introduces the concept of bound information or negentropy (*i.e.*, negative entropy),

to refer to the order inside the system, and potential/virtual negentropy, to define the physical information which, following physical interaction, turns into negentropy. With the same intent, Portelli (1992) introduces the concepts of potential order (the order that gives the system the ability to evolve from a state to another), conjunctural information (information sent from a receiver to a source), and the actual order (the system order increase when potential order meets conjunctural information). The sum of potential order and actual order is total order. These properties correspond to the potential-order, actual-order, and total-order generating functions. In a cyclic universe model (an eternity of big bang, expansion, contraction, big crunch), Portelli introduces a concept to maintain the function that generates the total order of the universe. Biochemists and biophysicians accepted this hypothesis and demonstrated that the physical information stored in the pattern of complex molecules is "communicated" *via* physical and chemical interactions to another system and produces specific alterations (*e.g.*, the process in which the information stored in the DNA molecule is updated following the structuring process of the specific organism — Roederer [2002]).

Scientists extended this hypothesis to all the physical systems, as the classes of physical systems differ by specific pattern. For simple system models, "communication" is symmetrical, as the two systems are both senders, and receivers at the same time. In quantum theory, any physical system is a processor/computer (that exchanges, stores, and processes information). The most compact processors are the black holes behaving like a system of series microprocessors (particles that have collapsed). Notwithstanding the submicroscopic structure of the collapsed particles, the maximum amount of physical information (order/negentropy — thermodynamic enthropy) stored in the black hole is proportional to its area surface (horizon area — Bekenstein [2003]). The universe is a system of microcomputers (protons, electrons etc.) that process the physical information in parallel (Lloyd & Ng [2004]; Lloyd [2002]).

In mechanics, mass is a measure of the mechanical inertia of a system. Inertia is the property of a system to resist any status change. In mechanical statics and dynamics, inertia is defined as the property of a mechanical system to maintain its state of rest or uniform straight motion, unless there is no mechanical interaction or if the resultant of forces (the measure of mechanical interaction) is null (Newton [1956]). In terms of gravitational interaction, mass is a measure of a system's capacity to gravitationally attract another system.

According to Mach's principle, the mechanical inertia of a body is not only the intrinsic attribute of that body, but is also due to the gravitational inertia of other bodies from the universe. The causal determination

of the inertia attribute was primarily brought up by Newton. According to him, inertia is an intrinsic attribute of the system. The hypothesis that this attribute of a system is aldo due to the gravitational interraction with other systems was first formulated by Mach (Kittel *et al.* [1981]; Misner, Thorne & Wheeler [1973]). This hypothesis is compatible with the theory of relativity. Sciama was the first who attempted to formally demonstrate this hypothesis (Sciama [1969]). Another way to address the mechanical inertia problem under Mach's principle was attempted by Haisch, Rueda, and Puthoff (1994), using results from Stochastic Physics. According to their theory, the electromagnetic radiation of all particles in the universe determines a local field of isotropic radiation at temperature $T = 0$ K. The mechanical inertia is the sum of the forces with which radiation acts on a particle in non-inertial (accelerated) motion. The electromagnetic radiation field depends locally on the universe states within a relativistic dynamic model (expanding universe) at any point in time and any point in space. Thus, locally, the field bears the physical information about the entire history of the universe and has holographic attributes (Simaciu [2001 a]).

A principle similar to the extended Mach principle can be identified in the bootstrap theories. In hadronic bootstrapping, the properties of each hadron (proton, neutron, pion etc.) result from the interaction with other hadrons, each with three distinct roles: system component (source and receiver), nuclear interaction mediator (medium and bearer of information and energy), and complex system (Nicolescu [2002], p. 80). The main attribute of bootstrap models is self-consistency.

It is to be noticed that the universe models proposed by scientific research do not contain man as a complex, living, and rational system. The identification of some connections between the microscopic and the macroscopic parameters of the universe, the stages of its evolution and the occurrence of the proper conditions for generating living intelligent matter have led to a postulate in cosmology, namely the anthropic principle (Dicke [1961]; Carter [1974]). The self-consistency of dynamic universe models connects them to the bootstrap models; this connection would be stronger if a bootsrap principle was formulated to include the processes specific to the living (Nicolescu [2002], p. 91).

It generally results that in self-consistent models system properties are intrinsic, as they result from the inner structure of former interactions, according to the genesis of the system, as well as extrinsic, as a result of the actual interaction of the system with other systems in the universe. Understanding that the generation of all the properties of a system is the result of internal and external interactions leads to the hypothesis that Mach's principle needs to be extended. Extending this principle to the other properties of a material system is contained in the Extended Mach

Principle (EMP). According to the extended principle, "any attribute of a system is generated as a result of present and past interactions with other systems in the universe" (Simaciu [2007]; Sachs [1982]; *The Mach Principle…* [2003]; Simaciu & Moșescu [1987]). In physics, the properties of fundamental particles such as mass, electric charge, nuclear charge, and spin are the result of interactions with other particles. The particle with its properties constitutes a stationary interference of the local interactions of all particles in a volume of which size depends on the interaction type.

The Extended Mach Principle still stands for superior forms of matter structures (Simaciu [2007]). The human psychic (where the human is the most complex structure known in the universe, according to science) is characterized by conscience, thinking, and articulate language. These characteristics are intrinsically determined by the specific genetic code that is structured in the history of living matter coming into being (past interactions); however, this determination is potential. The psychic structure in a child — potential man — is achieved through specific interactions (exchange of information) with the environment, especially with systems that already have a psychic structure — parents, teachers, friends, social group — and with the information stored in the artistic, scientific, and technical creation of humanity. Only present interactions determine the activation of potentiality. A major role in the psychic structuring process is learning an optimum communication system.[2] For humans, this communication system (except for communication with deaf-mutes) is the articulate language. Learning a language (the articulate language in general and the sign-language for deaf-mutes) allows the subsequent learning of specific languages of various areas of knowledge. Such languages allow the child to memorize a great amount of information and structure it as concept, judgment, and reasoning, hence the structuring of reasoning. The process includes interactions, connections, and communication with beings that already have a psychic structure.

According to the systems theory, cybernetics, and information theory, following the interaction with the outside world, the child develops a structure of behavior and action programs. If the child is accidentally brought up by other beings (animals), his/her psychic structure and behavior will be similar to the ones of the species he/she was in contact with. The child's isolation for many years results in the impossibility to convert him/her into a normal human being (psychologically speaking, as according to the principles of theology, the child's spirit will not be impaired) and the genetic determination in the loss of potential (no longer active). In his/her interaction with other species, the child learns the

2. *I.e.*, the ratio between the amount of information processed and the required energy should be high.

species' specific language, which, if effective, will allow the child to learn the biological survival methods specific to the respective species. The first test to experiment the hypothesis that the genetic structure is as important as living with the humans was carried out by R.A. Gardner and B.T. Gardner (1969; 1989) in their attempt to "humanize" a baby chimpanzee. The incapacity to articulate language (monkeys do not have a laryngo-pharyngeal system sufficiently developed to allow them to produce voiced sounds) was resolved by the deaf-mutes' sign language (the American Sign Language — AMS). Despite all efforts, the chimp only learned a few signs (at the age of five, Washoe would use 150 signs). Although he was brought up in a child's setting, the differences — in language amount and rudiments of thinking level — between a child and a chimp of the same age would become more visible with age. It results that the psychic structuring is both internally (genetically), and externally determined. Further experiments and developments were undertaken by studying other monkey species (Paterson, in 1978, studied gorillas), other languages (Premack [1971] used plastic chips; Savage-Rumbaugh [1986] used the computer to produce geometrical figures), or sign language with monkeys in the wilderness (Fouts [1994]).

The fact that a concept operating at a microscopic level is also found in complex structures proves again the unity of the substantial world. The indissoluble connection between man and the universe, also to be found among humans, is remarkably referred to by Father Dumitru Stăniloae. As he substantiates the central idea of his thesis titled "Jesus Christ, The Light of the World and Deifier of Humanity", Father Stăniloae considers the entire universe to be a light that nobody would be aware of, if the human consciousness did not exist. I become aware of the universe by means of my consciousness, but it needs other people's consciousnesses to ascertain and enrich knowledge. In a few phrases, Father Stăniloae sums up the entire process of consciousness coming into being through consciousness (*i.e.*, a form of EMP): "From the very beginning, a child becomes self-aware with the aid of the consciousnesses of those around him and throughout his life the individual becomes aware of the world and evolves through the people he interacts with orally or in writing and the remote people or people from the past" (Stăniloae [1993], p. 29).

In terms of spiritual awareness, the unity of the universe is completed by the existence of a spiritual world. Father Mitrofan demonstrates the unity of the universe by means of the laws governing it: "The life of the spiritual, moral, and material universe evolves in parallel according to an immutable law set out by the Creator" (Mitrofan [2003], II, p. 74). Communication between the two universes is possible because "the nature and purpose of being, the actions and laws are the same for both worlds" (*ibidem*, I, p. 73).

The Spiritual World

The spiritual-moral Kingdom

The spiritual-moral Kingdom — of Our Lord Jesus Christ — is the world of immortal spiritual-moral beings: the angels, the resting ones (the deceased, the dead), and the souls of men (those who live in the seen world, in substantial form). Man is a bridge between this kingdom and the substantial world through his double nature: substantial body and soul (spiritual body). Thus, the spiritual-moral realm is made up of the unseen world, but also of a representative of the seen dimension — man, who acts as a bridge between the two worlds. After the fall, man exists in the substantial (seen) world, as well as in the spiritual (unseen) world: we are, as Father Mitrofan puts it, "with our hearts in heaven or hell as from the earth" (Mitrofan [2003], II, p. 38).

The good angels and the living and resting men, who believe in Jesus Christ, form Christ's spiritual body, the seen and unseen Church (meaning Christ's ecclesiastic Body).

The spiritual-moral nature of the spiritual beings is in harmony with the spiritual nature of the Celestial Kingdom. The beings of the spiritual-moral Kingdom — though being in several states, different through their role and spiritual-moral complexity — and various places in space and time "exist in harmony and secret connection" (Mitrofan [2003], I, p. 40). This union relies on four basic truths:

— a God (the Creator and Redeemer) for all spiritual beings;
— the existence of a spiritual-moral Kingdom (as a society, it can only exist if there is continuous communication between the spiritual-moral members that live within a common law);
— the existence of the soul and its innate properties: (the basic property of the soul is love that transcends the death of the body);
— the words of the Holy Scriptures (God's word).

The Kingdom of God cannot be found in the substantial artefacts (devices/instruments): "God does not live somewhere beyond, but inside our hearts. The Kingdom of God is not several light-years away, but deep inside us… because it is a realm of a conscience that has made its peace with everything". This is why God rests in the holy man and suffers in the sinner (Boca [2004], pp. 176-178]. Therefore, the soul is the first to reach the Kingdom of Heaven, and only in certain circumstances, through divine manifestation — as in the case of Patriarch Enoch and prophet Ilijah —, can the substantial body reach it as well.

The separation of the worlds through the adamic downfall

Existence limited by the death of the body is a consequence of Adam's fall, after having disobeyed the commandment: "…for in the day that thou eatest thereof thou shalt surely die!" (*Genesis*[3], 2, 17).

Man's fall, through Adam and Eve, brought about the downfall of the entire creation, nature entering in a temporal existence oriented from past to future. The downfall raised a barrier between the seen world and the unseen one.

The downfall generated, through the darkening of man's senses, a chasm between the two worlds. The rift is only partial and temporal. Although separated, the two worlds form a sole system, because there is a proportion (rights and duties of the two realms) and a communication of both parts (mutual fulfillment of duties): "There is an inner bond, a mutual relationship between the fate of the living and that of the dead". Men's deeds bring present, past, and future together. Our deeds are the seeds that bear fruit or not, our earthly life being the "time of the harvest". The two worlds influence one another not only in a good way, but also in a bad one. The harm the dead have done during their earthly lives will increase in the physical world, affecting the spiritual world as well, *i.e.*, affecting the lost souls (the moral law of growth). "Only by defeating the evil will we be able to smother the curse's voice" and help the lost souls rest in peace (Mitrofan [2003], I, p. 55).

The physical world and the meaning of the substantial body

The physical world is the main concern of scientific research. Man's substantial body belongs to this world and many scientific domains such as medicine, biology, and anatomy deal with its study. Below we are going to analyse the purpose of this system from a Christian perspective.

Our substantial body helps us interact mostly with substantial systems. According to prophet David, only in our earthly life is repentance possible (Mitrofan [2003], I, p. 134). According to Christ's message, earthly life is like the day, as "night" will come and no sinner will be able to do good deeds — only saints will pray for all the souls (St. Dionisius the Areopagite).

The passage from the state in which man has a substantial body (it is worth mentioning that the body is substantial because after death the soul has a non-substantial body itself) to the state in which he has a non-substantial one leads to an existence in which the sinful soul of the dead person cannot do anything to redeem itself because it has no free

3. All biblical quotations are from *The Holy Bible*, English Standard Version, Oxford University Press, 2008.

will (Mitrofan [2003], II, p. 97). Therefore, the substantial body is a means (a tool) of changing its spiritual level willingly: "Our entire body is a system whose sensitivity is infinitely complex" (Stăniloae [1997], I, p. 261). "Through his body, man is seen as a factor which interrupts the connection between natural processes, creating spiritual-moral bonds willingly", therefore creating free bonds that "help him to pursue his aims" (*ibidem*, p. 262). The substantial body makes the principle of causality more flexible; similarly, this principle becomes more flexible in the case of processes dealing with complex systems that are able to forecast future phenomena (Simaciu [2007]; Marcus [1988]). At a certain point, although there are clearly defined causes of his behaviour — the pressure of his previous actions, thoughts, words — man can behave independently, without taking them into account. This is possible only by his own will or by forgetfulness. Thus, these clearly defined causes will fail to give rise to certain consequences. At the same time, the substantial body prevents us from being fully aware of our real spiritual potential (*Matthew*, 26, 41). The substantial body causes us to commit the three main sins: wrath, lust, and greed (Mitrofan [2003], II, p. 41).

The substantial body, decomposing in its constituents after its death, is brought to life again in a new, "pure" shape (an immortal, radiant shape similar to Jesus's body at the moment of His transfiguration on Mount Tabor and to His body after the Resurrection: "As the resurrected body will be all radiant, but not lacking an inner structure" — Stăniloae [1997], III, p. 275) and becomes one with the soul after Judgment Day. When the resurrected body and the soul become one, a new man will be born — a spiritual human being resembling Adam and Eve before their fall. "Each resurrected body is a unitary entity although, on the other hand, they do not entirely overlap like earthly bodies"; "On the other hand, bodies have to be in such a strong communion that every individual could relate more effectively to others and enjoy their lives, consciousness, and happiness" (*ibidem*, p. 273). All the people will be of the same age but will have different anatomical and psychic traits (Mitrofan [2003], II, p. 32). "Every individual's body and soul will be unique and they will be strongly connected to one another" (Stăniloae [1997], III, p. 274).

The purpose of earthly life

The purpose of each individual's existence is to "redeem themselves by helping their fellow human beings to redeem themselves" (Mitrofan [2003], I, p. 173). The human being is endowed with "the ability to create, which angels lack, but also with the ability to turn the physical world into a spiritual one" (Stăniloae [1997], I, p. 293).

The human being is immortal. As opposed to God, whose eternal existence has no beginning and no end, man's existence has a beginning, *i.e.*, the very moment he is conceived in his mother's womb (Mitrofan [2003], I, p. 167). Each individual's existence consists of three stages:

— the first stage begins when the individual is conceived and ends when he/she is born; all this time, he is unconsciously preparing to face the physical world, taking control of his physical body (the connection between the spiritual body and the substantial one is created);

— the second stage begins when the substantial body is born and ends when it dies; all this time, man is consciously preparing for the "great sleep": the separation of the spiritual body from the substantial one; this stage was conceived by God as a period of self-redemption and of helping others — be they dead or alive — to redeem themselves through prayers;

— the third stage begins when the soul leaves the physical body and passes into the spiritual world; unlike the previous stages, this one does not have an end.

Commenting upon *The Hymns of God's Love* that belong to St. Simon the New Theologist, father Dumitru Stăniloae talks about the purpose of earthly life: "The Holy Spirit that God endowed us with is the Kingdom of Heaven, received as a grain of mustard in the garden of our heart, and this grain will turn into a big tree reaching for the sky. He who does not receive this grain *here* cannot receive it in the life after death. Only here and now can we make good deeds. The future is for crowning." (Stăniloae [1993], p. 235].

Earthly life exists in time due to the rapid changes our bodies, minds, and souls are subject to.

The unseen world

The unseen (spiritual) world is the world of angels and of the resting souls. This world lies in "heavens" and is divided into at least three different worlds: heaven (Abraham's descent, Heavenly Jerusalem, the Kingdom of Heaven [*Matthew*, 8, 11], the Kingdom of God [*Luke*, 13, 20, 29], our Heavenly Father's dwelling place [*John*, 14, 2; *Matthew*, 19, 2; *Luke*, 12, 33; *Jews*, 4, 10] etc.), *i.e.* the world of angels and of redeemed souls (the souls of the saints who have passed away); hell, or the world of fallen angels and of lost souls, and Gehenna. Father Mitrofan lists twelve names of the places in hell and in Gehenna: the fire oven, the outermost darkness, the land of darkness, the fountain of depth, the fire of Gehenna etc. (Mitrofan [2003], II, pp. 31, 32). These places are themselves structured according to the seven deadly sins. There are seven levels (states) of heaven

and seven levels (states) of hell (*ibidem*, I, p. 66; the third book of Ezra, and Saint Ambrosius of Milan). Until Christ's descent into hell, this was the place where the souls of the righteous rested as well; after His descent, they were taken to heaven.

It is not the Orthodox Church's concern to find out the place where heaven lies, but it believes that heaven is a *heavenly* dwelling (Mitrofan [2003], II, p. 107). Heaven is a place "whose nature is in harmony with the hidden, holy nature of the soul, inaccessible to our limited ways… and one can reach it helped by the Holy Spirit… especially if their faith is strong. Once they reach it, they will get into the state of Adam and Eve before their fall" (*ibidem*, p. 110).

The angels

The revelation shows that angels were the first ones to be created by God (the first ones that God created were the archangels)… Their number is infinite and their dwelling is the "third heaven" (*2 Corinthians*, 12, 4). Their activity consists in "incessantly praising God… worshipping and serving Him by bending to His will" (Mitrofan [2003], I, p. 71). Angels are immaterial, personal, limited beings. "Some fathers (priests) and Byzantine authors (Saint Basil the Great and Mihail Psellos) even talk about a very slight figure of angels" (Stăniloae [1997], I, p. 296), endowed with spirit, will and power.

Spiritual (immaterial) beings have a language of their own. It is this type of communication that Saint Paul refers to: "If I could speak the language of humans and angels…" (*1 Corinthians*, 13, 1), and Father Mitrofan states that "in order to understand the language of spiritual beings in the unseen world, we should keep in mind that talking means sharing one's thoughts, wishes, and feelings with one's fellows. We are able to do this by means of visual and auditory signs, *i.e.*, letters and sounds. These are necessary as long as the soul is dwelling in the body. In the lives of the saints, we will come across many examples of their ability to read their fellows' minds… If some redeemed souls are able to do this during their earthly life, what could prevent the souls of the righteous from seeing and reading minds…" (Mitrofan [2003], II, p. 142). According to Father Mitrofan, angels work on the human body and soul, either spiritually (through the spirit), or through our senses (*ibidem*, I, p. 72). Angels, as "created beings, have… a certain intrinsic ability to observe and influence the physical (material) world" (Stăniloae [1997], I, p. 296).

Good angels are assigned the task to supervise God's whole creation and guard humans (*Psalm 90*, 11, 12), without restricting their freedom. According to John the Apostle, the number of good angels is two thirds out of the total number of angels (Mitrofan [2003], I, p. 73).

As regards the fallen angels/demons/evil spirits, their main traits are pride, ambition, and vileness (Mitrofan [2003], I, pp. 73, 74, 132). Since man was created, they have been working on his soul's and body's death. By setting traps on humans, they fight against virtue and man has to make an effort to do good deeds: "…the Kingdom of Heaven will be conquered through strenuous effort and the ones who are willing to make this effort will reach it" (*Matthew*, 11, 12). Evil spirits can possess both humans and animals, being capable to pass through the matter of the physical world. As Christ says, they can only find their "peace" in "humans' hearts, the dwelling of all evil thoughts". Therefore, according to the Extended Mach Principle, there is a strong relationship between the fallen beings in the physical world and demons, a relationship which will lead to the human beings' annihilation by the latter. According to Father Arsenie, the seven deadly sins pave the way for the evil spirits to possess men's souls (men call upon evil spirits by pronouncing their name incessantly or as a punishment for not doing good deeds — Saint Paul allowed Satan to possess three people as a punishment for their sins). Men can be delivered from the evil spirits by fasting and praying under the priest's guidance; by confessing to the priest; by making the sign of the cross; by humility; by calling the names of Christ ("Oh Lord, Jesus Christ, Son of God, have mercy upon me, a sinner!") and the Virgin Mary and also by calling their guardian angels in their prayers (Boca [2003], pp. 169-171). The relationship between man and the fallen angels leads to man's death; that is why God Himself named the demons "killers of men". The demons' deliberate fall caused their spirit and will to take a wrong direction (angels have free will as well!). They cannot do harm without God's permission, not even to animals (they ask Jesus' permission to go into the herd of swine — *Matthew*, 8, 32). In order to deceive us, demons may show themselves as our parents, siblings, resting friends, and may even "embody virtues" (Mitrofan [2003], I, p. 77). They can even deceive spiritually evolved human beings by appearing as angels of light. Generally, they cannot predict the future, that is the reason why they deceive the ones who are not spiritually developed. Their "dwelling" is the air surrounding the earth: "A common dwelling — this is what brings man and demon together" (*ibidem*, I, p. 78). Following Adam's fall, God "strengthened" our senses to protect us against demons and their traps (*ibidem*).

The souls

The soul is man's immortal part. It was given to us by God Himself: "…and the Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul" (*Genesis*, 2, 7). The adamic fall has not affected this quality of the soul, because

the latter has its own spiritual body whose nature differs from that of the substantial one. It is this spiritual body that father Mitrofan refers to when he says that "through its substance, through the breath of life, the soul can exist as an individual being having the ability to create" (Mitrofan [2003], II, p. 13); he considers that the individuality of the soul (the soul's existence as a person after the death of the substantial body) makes it a system in itself, a system different from the others. Even after the physical body's death, the spiritual body deals with the entire affective, intellectual, and volitional processes, *i.e.*, the programmes structured during earthly life, if we were to use computer-science terms. We can be alive judging by our physical body, but dead on the inside when our conscience ignores it, *i.e.*, our conscience responds to the programmes we acquire during our earthly lives and ignores the programmes given by God. Father Mitrofan distinguishes between spirit and soul when stating that "man's spirit embraces all his being — both his body, and soul, therefore it is strongly connected to both of them" (*ibidem*, I, p. 68). This distinction leads to a pattern where the spiritual body acts as a matrix both for the physical body, and for the soul.

When we reach the state in which we have no substantial body, we are fully aware of our spiritual state, but are no longer able to change it by our own will. Once we reach this state, we have a place in the unseen world, depending on our spiritual level. Our spiritual growth, therefore our changing the place in the unseen world, can be only attained by a strong interaction with the ones who are praying for us (*i.e.*, by external intervention!) in the physical or spiritual world (the resting saints' prayers). St. John Chrysostomos strongly believed in the power of the ways in which we can change the state of the resting ones (prayers, good deeds): "I vouch for the effectiveness of these means" (Mitrofan [2003], I, p. 148).

As opposite to earthly life, life after death is eternal because we are no longer able to change our states willingly, but through external intervention (the prayers of the ones alive as well as divine grace). Life in the redeemed body is eternal due to the close communion with God.

The souls of the resting ones are of three types: the perfect/redeemed souls of the chosen ones/of the righteous (of the dead saints who "dwell" in heaven), the imperfect/sinful souls (they dwell in hell) and the lost (they dwell in the Gehenna). Perfect and imperfect souls communicate with the other members of the moral-spiritual family. Lost souls do not participate in this type of communication.

Souls are characterized by an inner and an exterior work. The inner work of the soul consists in his relationships with God (his Creator) and with himself. According to the Church Fathers, „the understanding part of the soul", the mind can recognize God directly, intuitively" (Stăniloae

[2007], I, p. 262). Through death, communication between the spirit and the Creator is absolute: "Death is the passage to a high life, not only for the simple release of the spirit from the body, but also for the fact that it is the entrance to a deep and full communication with Christ (*ibidem*, III, p. 162). The outer action of the soul consists in its relationships with all the beings and things from the seen and unseen worlds. This action "is led according to the same law which connects all the spiritual-moral beings with the Creator and between them. This law of immortality is the eternal love" (Mitrofan [2003], II, p. 66). During the existence on earth, the soul connected with its material body helps the senses in their relationships with the exterior. Their limited qualities lead to a reality diminished and deformed and to an incomplete prevision of the future states: "For we know in part, and we prophesy in part" (*1 Corinthians*, 13, 9); "For now we see through a glass, darkly…" (*ibidem*, 13, 12). The same senses — seeing, hearing, smelling, touching, tasting — are owned by the soul after its separation from the material body as well, but, because there are no more material senses, they express themselves better, according to the spiritual level they have reached in the moment of death. Souls without bodies know better the life of the living than they knew it when they had one and they were alive (Mitrofan [2003], II, p. 66). For the souls from hell, senses are diminished so that, for exemple, they cannot see each other (their selfishness on Earth during their life, the concentration of their actions on the satisfaction of their own pleasures and interests and so the lack of communication with the others lead to a decrease of the senses even during their existence in a material body), but they can "see" (it is a seeing intermediated by the evolved souls' prayers and compassion, those from Eden (*Luke*, 16, 19-31).

The senses can be ordered according to the place where they act. The process of acquisition from the subject (the being who knows) of the information through senses implies the existence, for each sense and its corresponding organ, of a carrying agent and a propagation environment. The carrying agent of information is a material one (streams of substance and fields). For the seeing, the carrying agent is the electromagnetic wave (in man's case, the perceptible spectrum), so the propagation speed is maximum (the light speed in the respective environment, or 300,000,000 m/s) and the interaction radius is very high and equal to the attenuation distance of that radius in the respective environment. For the hearing, the carrying agent is the mechanic wave (for a man, the spectrum part perceptible by the ear — the acoustic wave). The radius of interaction is limited to the dimensions of the substantial environment and to the distance of attenuation of the sound under the perceptible limit. In this case, the

speed is lower and the propagation speed in the environment (in the air, for example, the speed of sound is around 330 m/s). For the smelling, the carrying agent is the flux of molecules which evaporate from the object and propagate in the carrying environment (a fluid: air, water etc.). The speed of propagation is the speed of diffusion, when the fluid has no currents, or the speed of the current). The radius of interaction is much lesser than in the case of seeing or hearing. In the case of touching or tasting, the radius is limited to the occupied volume of the tactile sensors and the taste buds. The higher the interaction radius is, the bigger the number of human beings with whom the subject interacts simultaneously, so the quantity of purchased information. Man receives through seeing 90% of the exterior information.

Imortal qualities of the soul are love (*1 Corinthians*, 13, 8) and compassion. The dead love the living ones and take part in their destinies (Mitrofan [2003], I, p. 56). The soul, through its faculties, is the reason of the inner relationship and the close union between the members of the Christian Church, between living and dead people, between the unseen world and the material one (that can be seen — *ibidem*, I, p. 59).

The union is generated by faith: "Faith rises the union, the community of thought". Faith connects man with God and with all moral beings. Divine love is a true and mutual love. "A new commandment I give unto you, That ye love one another; as I have loved you, that ye also love one another" (*John*, 13, 34). "The faith creates so close a connection between men, that we should form a unique soul and heart as our ancestors did" (Mitrofan [2003], I, p. 59). Faith connects not only the living people but also our souls of the dead: "Prayer and faith have the power to approach us from the dead so much, that we can even feel their breaths around us" (*ibidem*, I, p. 63). Father Mitrofan sees the communication as a result of the mutual accomplishments of duties (*ibidem*, I, p. 61). He thinks that faith is the only instrument of communication with the spiritual-moral world: "Faith is the eye which sees beyond the material world, the unseen can be seen too, future is like the present". (*ibidem*, I, p. 44). Faith takes man from a temporal existence and brings him to an atemporal one. True faith gives hope and expectance to the body with God's help and with the help of other spiritual-moral beings. Hope, as a characteristic of the soul, remains after the separation of the body.

The soul has a memory which is preserved after the disembodiment. Memory helps the body to know itself and to judge. After the death of the body, the memory becomes so clear that we are going to remember all our thoughts, words, and actions. The attenuation of the memory when the soul is still inside the body has a role of protection, so that man

does not disappoint himself. As it evolves spiritually, it remembers all the mistakes he has done and he tries to rectify them, so that the passage to the unseen world be done with a pure soul and without the pressure exercised by the prick of conscience of the imperfect souls of the dead towards those we have wronged or towards the bad spirits.

Another characteristic of the soul, which manifests after death, is wishing. The strongest wish of the dead person is that the perfect souls and the living persons pray for it, as it is the only possible way of redemption in its condition (without a material body — Mitrofan [2003], II, p. 83). For the perfect souls, living with God and seeing God all the time satisfy their wishes, assuring them a state of pace and happiness where the inner and outer senses can be accomplished.

The future state of the soul is determined by the actual life, but also by the divine graciousness. The conformity between the future and the actual life is shown by the Savior when he says: "God's Kingdom is inside you" (Mitrofan [2003], I, p. 65).

The prayer

The seen expression (which can be felt) of the union consists in the living human beings' actions for the dead persons, but also in the prayers of the dead who have reached completion (the saints) for the livings persons and for the imperfect souls of the dead. "The eternal love constitutes the basis of the prayer, generally, and of the dead people particularly" (Mitrofan [2003], I, p. 115).

The prayer is the reason of living for every existence. As Christians asking for something, we have as a motive the authorization, the permission of praying given from God himself: "Ask — but also the faith of obtaining — and it shall be given you " (*Matthew*, 7, 7 and *Luke*, 11, 9). The prayer works when it is spelled with tears and repentence: deep faith in God, virtuous life, fervor, and humiliation. The grace without hard work does not bring about our salvation either for ourselves, or for the dead.

Our prayers for the dead people have effect just when "they had a certain virtue which made them worthy of our prayers" (Mitrofan [2003], I, p. 218).

Christ has not given any indications about the prayers for the dead people (Mitrofan [2003], I, p. 183).

All the Saint Fathers, cantors and writers of the Church, confess unanimously that "the most important way of purification from sins for the souls who arrive in Hell is the sacrifice during the Holy Liturgy" (Mitrofan [2003], I, p. 190). St. Ephrem the Syrian demands of his apprentices to achieve the Liturgy for him during 40 days after his death (*ibidem*, I, p. 152).

Characteristics of the Extended Mach Principle encountered in the spiritual world

Accomplishing moral-spiritual duties and finding the truth implies a relationship, a communication with all beings. The sociable character is an essential quality of the souls, given by creation: "And the Lord God said: It is not good that the man should be alone" (*Genesis*, 2, 18); "Behold, how good and how pleasant it is for brethren to dwell together in unity!" (*Psalm 133*, 1 — (Mitrofan [2003], II, p. 63).

As inanimate systems are characterized by *synergy*, animate systems are characterized by *sympathy*: "Joy, repulsion, or any other situation of the soul has an interest — that is sympathy" (Mitrofan [2003], II, p. 75). Communication and the harmonious relationships between souls imply sympathy and generate unity (a structure of a high complexity): "…for the spiritual-moral beings, sympathy is an essential consent, since everything is part of Christ's Church…" (*ibidem*, II, p. 75).

According to the Extended Mach Principle, man's creation as a spiritual being implies not only the intrinsic given gift, "genetic" — the fact that the Creator gave him a soul —, but also the extrinsic aspect — man becomes spiritual (he actualizes himself — in fact, according to what we are going to demonstrate, he recovers himself), he loves God and all His creation, only in relationship with the moral-spiritual beings.

The moral-spiritual beings have as a main characteristic the capacity of loving. Love is the deep conscious communication and the common action of some persons (Stăniloae [1993]). The prototype of perfect love is established between the Entities of the Holy Trinity. The Father as a Person/Entity communicates totally with the Son through His own will and through the Holy Spirit. The Son as Person/Entity communicates totally with the Father through His own will and through the Holy Spirit ("because the Holy Spirit joins the Father with the Son" (*ibidem*, p. 234). The result is that in the Holy Spirit there is total communication between the Father and the Son and between the Son and the Father. Because in the Holy Spirit there exist both Father and Son, in the Holy Spirit there also exists the will of communication of both Father, and Son, hence the Holy Spirit's will is that of the previous two who have invested Him with the status of Person. According to Mach's generalized principle, the three Persons' properties result from this communication as being deeply atemporal (that is, this communication has no start and no end and that is why the properties are simultaneously intrinsic and extrinsic). Eternal love through the Holy Spirit was prolonged by the Son in His assumed humanity as well (*ibidem*).

Before the angels' fall and before Adam's fall, all the persons were created through the Holy Spirit, so they were endowed with a deep love.

Man's fall, and the angels' fall, too, is part of God's plan, because the Father only asked from man to give Him his free love in exchange for His great love. Having the free agency of offering his free love to the Creator or being selfish ("believing that he can increase his own boundlessness" (Stăniloae [1993], p. 57]), man made a wrong choice because he was tempted and inspired by the fallen angels.

The fundamental property of the perfect being (the moral-spiritual being) — immortality and the capacity of loving — are recovered by man, after the fall, only by a relationship, a communication with God and with the others beings of the Spiritual-Moral Kingdom. Direct communication was interrupted by Adam's fall and all that remained was indirect communication because: "The Members of the Spiritual-Moral Kingdom cannot be divided to the point of not longer knowing each other" (Mitrofan [2003], I, p. 79). Factitive relations, among part and whole, discovered by science in the models of the substantial world, can be underlined in the spiritual-moral world, too: "The state of the whole is reflected on each of its parts and also the change in the situation of the parts exercises a great or a small influence on the whole. The state of the whole's parts influencing each other produces harmony and comprehension in the Universe. This harmony can be called sympathy…" (*ibidem*, II, p. 74). In other place, Father Mitrofan says: "…God's word itself sustains the undeniable truth of the Orthodox Church, which says that in the future the life the righteous will be together with God, and the sinners will live with the sinners, away from God" (*ibidem*, II, p. 141).

Conclusions

This paper has tried to underline within the Spiritual World (that is, the Spiritual-Moral Kingdom) those characteristics of Mach's generalized principle: the existence of a specific property of the analyzed systems, the existence of an energy and information change between the systems of the same category — and obviously, the definition of a transmitting system and of a receiving one which, according to the action-and-reaction principle, can be changed —, and the existence of an environment and support energy and information changed.

In the case of the world, the systems are moral-spiritual human beings who have as a characteristic property the capacity of love. Before the fall, all the spiritual-moral beings were in the Holy Spirit and for this reason they had the capacity of full love ("Charity suffereth long, and is kind; charity envieth not; charity vaunteth not itself, is not puffed up; doth not behave itself unseemly, seeketh not her own, is not easily provoked,

thinketh no evil; rejoiceth not in iniquity, but rejoiceth in the truth; beareth all things, believeth all things, hopeth all things, endureth all things. Charity never faileth" (*1 Corinthians*, 13).

After the fall, man lost this capacity. It can be recovered by man just by reestablishing the communication with the spiritual-moral human beings and the interruption of the communication with the loveless human beings (the fallen angels and the unredeemable souls). Faith plays a very important role in this recovery process. Faith in a love prototype (that is, the Holy Trinity and/or Jesus Crist, in Christianism), faith in a spiritual-moral world which is formed of a material world and a spiritual one, the faith that, after the death of the material body, a human being continues his/her life in an unseen world. Communication between the human beings of the two worlds is achieved by a specific language. For the moral-spiritual human beings, this language is possible by means of the *Holy Spirit* (descending upon the Apostle during Pentecost; each Apostle was praying in his mother-tongue, but he was understood by the others, even though they had not spoken the same language).

For an atheist man of science, who accepts a movement of the substance governed by principles and laws, the undertaking of this paper tries to be an indirect demonstration of the fact that the world does not reduce itself to the objects in it and to that of the phenomena reachable by senses and instruments; for the Christian intellectual, we hope that is a new argument which should increase his faith.

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The Significance of Unity and Diversity for the Disciplines of Mathematics and Physics*

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Closely related to a long-standing over-estimation of human rationality, the scholarly disciplines of Mathematics and Physics have always been appreciated as the best examples of rationality at work and as pure instances of "exact" scientific thinking. Of course, the embarrassing fact is that in spite of the reign of "objective" and "neutral" reason, not even these two "exact" sciences have managed to side-step serious differences of opinion, manifested in opposing schools of thought.

We begin by making some remarks about Mathematics and then continue with a brief analysis of the foundations of modern Physics.

A Few Perspectives on the History of Mathematics

During the development of Mathematics, this discipline appears twice to have completed the same circle. In ancient Greece, the Pythagoreans were convinced that *everything is number*, *i.e.* they believed that fractions (rational numbers) are capable of expressing the "essence" of reality. However, in his dealing with a regular pentagram, Hippasos of Metapont discovered (450 B.C.) that the ratio of certain line segments is *incommensurable* (*cf.* K. von Fritz [1965], pp. 271 ff., especially pp. 295-297),

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marking the discovery of irrational numbers. What these were supposed to be within what they considered the *form-giving* (delimiting and ordering) function of number, the Pythagoreans were thus confronted with an un-bounded and infinite series, indicating something formless and unlimited. To escape from the "fate" of irrational numbers, they translated all their arithmetical problems into *spatial* terms (any spatial figure has a *definite* and limited form). This possibility of handling irrational numbers (with their implied unlimited and infinite series of numbers) in a geometrical way, caused a fundamental geometrization of Greek mathematics. Not only is this an outcome directed by the basic tension between *matter* and *form*, since it also means a shift in the focus of explanation. Instead of sticking to the arithmetical mode of explanation — everything is number — the spatial point of view entered the scene. This new orientation lasted until the modern era where we slowly see, since Descartes (1596-1650), Mathematics increasingly moved back to an arithmetizing orientation. Sometimes, the developments in Greek mathematics are depicted as the first foundational crisis of this discipline. The second crisis was generated by the combination of the idea of infinity and the technical mathematical concept of a limit (17th-18th centuries).

Soon, the new arithmeticism of the 19th century found a powerful alley in the development of the modern *set theory*. In the line from Bolzano (1781-1848), Cauchy (1789-1857), Weierstrass (1815-1897), and Dedekind (1831-1916) up to Georg Cantor (1845-1918), this theory offered the hope of supplying Mathematics with a firm and secure foundation. Between 1874 and 1899, Cantor developed the mathematical set theory in such a way that mathematicians soon considered it to be the ultimate foundation of Mathematics.

The Crisis of Set Theory

Yet once more this new foundation experienced a severe blow. In 1900, Bertrand Russell (1872-1970) and Ernst Zermelo (1871-1953) independently discovered that the everyday concept of a set — as being constituted by clearly distinct elements bound together into a whole — is inconsistent. Just consider the set C, which has as its elements those sets A that do not contain themselves as elements. Now contemplate two options; the one supposing that C is an element of C, and the other that C is not an element of C. It should be kept in mind that the *condition* for a set to be an element of C is that it cannot contain itself as an element. The upshot is perplexing:

(i) If C is an element of C, it must conform to this condition, *i.e.* that it does not contain itself as an element — if C is an element of C, then C is not an element of C;
(ii) If C is not an element of C, then it meets the condition for being an element of C: if C is not an element of C, then C is an element of C;
(iii) Therefore, C is an element of C *if* and *only if* it is not an element of C!

The apparently innocent combination of *multiplicity* and *wholeness* therefore caused havoc within the discipline of Mathematics, giving rise to conflicting schools of thought within this special science.

Diverging Schools of Thought in Mathematics

While the logicism of Russell held that Mathematics is actually logic, the intuitionist school and that of axiomatic formalism accepted a pre-logical or extra-logical subject-matter. Intuitionism reacted both to logicism and formalism and in particular to what Russell and Zermelo discovered — and, in so doing, it generated a whole new Mathematics:

> The intuitionists have created a whole new Mathematics, including a theory of the continuum and a set theory. This Mathematics employs concepts and makes distinctions not found in the classical Mathematics. (Kleene [1952], p. 52)

This explicit and unqualified trust in "mathematical reason" apparently did not take notice of Morris Kline's assessment, three decades ago:

> The developments in the foundations of Mathematics since 1900 are bewildering, and the present state of Mathematics is anomalous and deplorable. The light of truth no longer illuminates the road to follow. In place of the unique, universally admired and universally accepted body of Mathematics whose proofs, though sometimes requiring emendation, were regarded as the acme of sound reasoning, we now have conflicting approaches to Mathematics. Beyond the logicist, intuitionist, and formalist bases, the approach through set theory alone gives many options. Some divergent and even conflicting positions are possible even within the other schools. Thus the constructivist movement within the intuitionist philosophy has many splinter groups. Within formalism there are choices to be made about what principles of meta-Mathematics may be employed. Non-standard analysis, though not a doctrine of any one school, permits an alternative approach to analysis which may also lead to

> conflicting views. At the very least, what was considered to be illogical and to be banished is now accepted by some schools as logically sound. (Kline [1980], pp. 275-276)

Perhaps the most astounding observation comes from Stegmüller:

> The special character of intuitionistic Mathematics is expressed in a series of theorems that contradict the classical results. For instance, while in classical Mathematics only a small part of the real functions are uniformly continuous, in intuitionistic Mathematics the principle holds that any function that is definable at all is uniformly continuous". (Stegmüller [1970], p. 331)

The Third Foundational Crisis of Mathematics

In 1900, the French mathematician Poincaré made the proud claim that Mathematics has reached absolute rigour. In a standard work on the foundations of set theory, however, we read: "Ironically enough, at the very same time that Poincaré made his proud claim, it had already turned out that the theory of the infinite systems of integers — nothing else but part of set theory — was very far from having obtained absolute security of foundations. More than the mere appearance of antinomies in the basis of set theory, and thereby of analysis, it is the fact that the various attempts to overcome these antinomies… revealed a far-going and surprising divergence of opinions and conceptions on the most fundamental mathematical notions, such as set and number themselves, which induces us to speak of the third foundational crisis that Mathematics is still undergoing" (Fraenkel *et al.* [1973], p. 14).

Zermelo introduced his axiomatization of set theory in order to avoid the derivation of "problematic" sets and Hilbert dedicated the greater part of his later mathematical life to develop a proof of the consistency of Mathematics. But when Gödel demonstrated that in principle it is not possible to achieve this goal, Hilbert had to revert to intuitionistic methods in his proof theory ("meta-Mathematics"). After Hilbert died in 1943, his student, Hermann Weyl, who switched to an intuitionistic orientation, wrote: "It must have been hard on Hilbert, the axiomatist, to acknowledge that the insight of consistency is rather to be attained by intuitive reasoning which is based on evidence and not on axioms" (Weyl [1970], 269).

In this context, the history of Gottlob Frege is perhaps the most striking. In 1884, he published a work on the foundations of Arithmetic. After his first volume on the basic laws of Arithmetic appeared in 1893,

Russell's discovery (in 1900) of the antinomous character of Cantor's set theory for some time delayed the publication of the second volume in 1903 — where he had to concede in the first sentence of the appendix that one of the corner stones of his approach had been shaken.

Close to the end of his life, in 1924/25, Frege not only reverted to a geometrical source of knowledge, but also explicitly rejected his initial logicist position. In a sense, he completed the circle — analogous to what happened in Greek Mathematics after the discovery of irrational numbers. In the case of Greek Mathematics, this discovery prompted the geometrization of their Mathematics and, in the case of Frege, the discovery of the untenability of his *Grundlagen* also inspired him to hold that Mathematics as a whole actually is Geometry:

> So an *a priori* mode of cognition must be involved here. But this cognition does not have to flow from purely logical principles, as I originally assumed. There is the further possibility that it has a geometrical source… The more I have thought the matter over, the more convinced I have become that Arithmetic and Geometry have developed on the same basis — a geometrical one in fact —, so that Mathematics in its entirety is really geometry." (Frege [1979], p. 277)

The Three Options of the History of Mathematics

The history of Mathematics clearly opted for at least *three* different possibilities:

(i) attempt exclusively to use the quantitative aspect of reality as mode of explaining the whole of Mathematics — Pythagoreanism, modern set theory (Cantor, Weierstrass), and axiomatic set theory (axiomatic formalism — Zermelo, Fraenkel, Von Neumann and Ackermann);
(ii) explore the logical mode as point of entry — the logicism of Frege, Dedekind and Russell); and
(iii) the intermediate period during which the geometrical nature of Mathematics was asserted, once again taken up by Frege close to the end of his life.

An Alternative Approach: Accept the Uniqueness of Number and Space and Explore Their Mutual Coherence

In opposition to all forms of reductionism, evinced in the multiplicity of "ismic" positions found within philosophy and the various scholarly

disciplines, the positive contribution of the philsophical heritage handed to us in the thought of Dooyeweerd and Vollenhoven is given in their emphasis on a non-reductionist ontology.

Looking at the history of Mathematics and the dominance of an arithmeticist axiomatic formalism within contemporary Mathematics, the obvious observation to be made in terms of a non-reductionist ontology is the following one.

Acknowledge the uniqueness and irreducibility of every aspect inevitably involved in practicing Mathematics without attempting to reduce any one of the aspects involved to any other aspect. Dooyeweerd shows that whenever this anti-reductionist approach is not followed, theoretical thought inescapably gets entangled in theoretical antinomies. His claim is, in addition, that the logical principle of non-contradiction finds its foundation in the more-than-logical (cosmological) principle of the excluded antinomy (*principium exclusae antinomiae* — see Dooyeweerd, [1997], vol. II, pp. 37 ff.). A Christian attitude within the domain of scholarship, while observing the *principium exclusae antinomiae*, will attempt to avoid every instance of one-sided deification of anything within creation. The biblical perspective that God is Creator and that everything within creation is dependent upon the sustaining power of God, opens the way to the life-encompassing consequences of the redemptive work of Christ, for in Him we are in principle liberated from the sinful inclination to search within creation for a substitute for God. We are in principle liberated from this inclination in order to be able — albeit within this dispensation always in a provisional and fallible way — to respect the creational diversity with the required intellectual honesty for what it is — creaturely reality in its dependence upon God.

Therefore, while respecting the uniqueness and diversity of various aspects within created reality, it should be realized that no single aspect could ever be understood in isolation from all the other aspects. Clearly, if a serious attempt is made to side-step the conflicting *ismic* trends that operate throughout the history of Mathematics, the most obvious hypothesis is contained in conjecturing the following thesis:

> Accept the uniqueness and irreducibility of the various aspects of created reality, including the aspects of quantity, space, movement, the physical, the logical-analytical, and the lingual (or: sign) modes, while at the same time embarking upon a penetrating, non-reductionist analysis of the inter-modal connections between all aspects.

Of course this proposal is crucially dependent upon a more articulated account of the theory of modal aspects as such. At the same time, the incredibly rich legacy of special scientific knowledge within the domain

of Mathematics ought to be integrated into such an alternative approach. Yet this does not entail that such a Christian approach will have to deal with a *different reality* — simply because such an understanding already fundamentally misunderstands the biblical perspective. The latter actually is the only life-orientation operative within world history emphasizing the *unity* and the *goodness* of creation in its entirety — by realizing that the directional antithesis between what is good and bad (redemption and sin) may never be identified with the structure of God's creation.

Christians and non-Christians are not living in different worlds and they are not doing different things — but they indeed do the same things differently! They share with all human beings the ability to think, to discern and argue. But given the supra-theoretical biblical starting-point of Christian scholarly reflection within the disciplines, Christians are called to take serious the demand not the absolutize anything within creation.

Although axiomatic set theory proceeds under the flag of being fully arithmetistic, it does not realize that its entire analysis of the "continuum" — interpreted as an analysis of the real numbers — inherently depends on "borrowing" something crucial from our spatial intuition, namely the awareness of "at once" (simultaneity) and the feature of being a *totality* (a whole with its parts). Zermelo-Fraenkel set theory accepts the primitive binary predicate designated as the membership relation. This move only apparently conceals any connection with our spatial intuition, for the moment in which we set out to investigate what is at stake, it is clear that the undefined status of the term *set* (or, alternatively, the "membership relation") borrows the two above-mentioned key-features from the spatial mode, namely *simultaneity* and the *whole-parts relation*.

Therefore mathematical set theory in fact ought to be seen as a spatially deepened theory of number. In this context it is noteworthy that Hao Wang informs us that Gödel speaks of sets as being "quasi-spatial" and then adds the remark that he is not sure whether Gödel would have said the "same thing of numbers" (Wang [1988], p. 202)!

Particularly in confrontation with the actual dominant claim that Mathematics has been arithmetized completely, these insights should be embedded within the context of an inter-modal understanding of the meaning of number and space. Without explaining this point in a technical way, the inherent circularity entailed in this whole position could be highlighted on the basis of the distinction between what should be designated as the *successive infinite* (traditionally known as the *potential infinite*) and the *at once infinite* (traditionally: *the actual infinite*). The introduction of these phrases took into account the rich legacy of philosophical and mathematical reflections on the nature of infinity. By "locating" the interconnections between these two kinds of infinity relative to the respective

meanings of number and space, the aforementioned attempted arithmetization of Mathematics stands and falls with the acceptance of non-denumerable sets — and it can be shown that the only basis upon which the latter could be introduced is by employing the idea of the *at once infinite*. But in order to employ the at once infinite one has to account for the theoretical deepening and opening up (disclosure) of the primitive numerical intuition of *succession* in its anticipation to the spatial meaning of *simultaneity* (at once) underlying the (regulative) hypothesis of viewing successively infinite sequences as if all their elements are present at once. Therefore, implicitly or explicitly, the use of the at once infinite has to make an appeal to the meaning of space — *i.e.* to the spatial (time-order) of at once (*simultaneity*), entailing the feature of *totality* which is irreducible to *succession*. Consequently, spatial continuity could be reduced to number if and only if its irreducibility is assumed (in the inevitable acceptance of the at once infinite).

Although Paul Bernays, the co-worker of the foremost mathematician of the 20th century, David Hilbert, and the author of a distinct variant of modern axiomatic set theory, did not develop the necessary theoretical distinctions advanced in this account of the (inter-modal) meaning of the at once infinite (actual infinity), he does have a clear understanding of the futility of arithmeticistic claims. He writes:

> It should be conceded that the classical foundation of the theory of real numbers by Cantor and Dedekind does not constitute a complete arithmetization… The arithmetizing monism in Mathematics is an arbitrary thesis. The claim that the field of investigation of Mathematics purely emerges from the representation of number is not at all shown. Much rather, it is presumably the case that concepts such as a continuous curve and an area, and in particular the concepts used in topology, are not reducible to notions of number (*Zahlvorstellungen*).[1]

1. "Die hier gewonnenen Ergebnisse wird man auch dann würdigen, wenn man nicht der Meinung ist, dass die üblichen Methoden der klassischen Analysis durch andere ersetzt werden sollen. Zuzugeben ist, dass die klassische Begründung der Theorie der reellen Zahlen durch Cantor und Dedekind keine restlose Arithmetisierung bildet. Jedoch, es ist sehr zweifelhaft, ob eine restlose Arithmetisierung der Idee des Kontinuums voll gerecht werden kann. Die Idee des Kontinuums ist, jedenfalls ursprünglich, eine geometrische Idee. Der arithmetisierende Monismus in der Mathematik ist eine willkürliche These. Dass die mathematische Gegenständlichkeit lediglich aus der Zahlenvorstellung erwächst, ist keineswegs erwiesen. Vielmehr Iassen sich vermutlich Begriffe wie diejenigen der stetigen Kurve und der Fläche, die ja insbesondere in der Topologie zur Entfaltung kommen, nicht auf die Zahlvorstellungen zurückführen" (Bernays [1976], pp. 187-188).

Physics

An understanding of modern Physics is crucially dependent upon a clear distinction between the four most basic aspects of reality, namely number, space, movement, and the physical aspect. The uniqueness and coherence of these fundamental aspects of reality are indispensible in an assessment of the implications of a non-reductionist ontology for the foundation of the discipline of Physics.

Faith in Reason

Interestingly, the dominant philosophical orientation amongst the special sciences during the first half of the 20th century was to restrict science to the "positive facts" assumed to be the sole guide to "objective scientific truth". "Sense data" were supposed to be the only source of reliable knowledge, and this position supported the postulate of the *neutrality* of human rational endeavours. The latter conviction (!) erroneously labeled any ultimate commitment (conviction) operative within the domain of rationality as a *disturbing factor* that should be *eliminated* from science.

However, without an implicit *trust* or *faith* in reason this postulate itself cannot be maintained. All human beings are endowed with the capacity to think and to argue rationally, but they do this from one or another *diverging direction-giving orientations*. Consequently, despite the fact that positivism acknowledged that there are universal structural conditions for theory-making, it never allowed that deep, extra-scientific convictions could be among them. This overlooks the point made by Stegmüller to the effect that there is no single domain in which a self-guarantee of human thinking exists — one already has to *believe* in something in order to *justify* something else (Stegmüller [1970], p. 314).

An analysis of the *structure* of scientific activities therefore does not aim at *securing* a domain of the *good* by protecting it from the evil influence of direction-giving ultimate commitments, for any such analysis can only advance by implicitly proceeding from a particular life-orientation.

There are not simply "scientific" people *liberated* from any and all supra-rational convictions and "non-scientific" people blurred by the "evil" of adhering to some or other *conviction*. Whatever the life-orientation of thinkers may be, they all equally share in the dimension of *rationality* (or: logicality) and all of them are inevitably in the *grip* of a more-than-rational *ultimate commitment*.[2]

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2. A penetrating analysis is given by Clouser in terms of the hidden role of religious belief in theories (see Clouser [2005]).

The Concept of Matter

We have seen that the Pythagoreans held the view that everything is number, but after the discovery of irrational numbers they reverted to a spatial angle of approach. In respect of the nature of material things the most important consequence of this switch is that the Greek-Medieval legacy only acknowledges *concrete material extension*. Extension characterizes the nature of material things.

In line with the Aristotelian tradition, it was believed that celestial bodies obey laws that are different from those that hold for entities on Earth. In addition it was believed that the movement of anything required a *cause*. The problem of motion increasingly acquired a more prominent position, although it did not mean that the powerful influence of the classical space Metaphysics immediately lost its hold. The power of this spatial orientation is indeed still evident in the thought of Descartes (1596-1650) and even Immanuel Kant (1724-1804). In their understanding of nature, both philosophers continued to assign a decisive role to *spatial extension*. For Descartes, *extension* serves as the essential characteristic of material bodies — *res extensa*, for he writes: "That the nature of body consists not in weight, hardness, colour, and the like, but in extension alone" (Descartes [1965], p. 200 — Part I, IV). Kant's characterization of material bodies is also oriented to space. When our understanding leaves aside everything accompanying their representation, such as substance, force, divisibility etc., and likewise also separates that which belongs to sensation, such as impenetrability, hardness, color etc., then from this empirical intuition something else is left, namely extension and shape.[3]

It should not surprise us therefore that Descartes straightaway applied the feature of (mathematical) continuity to material things and even to atoms which, since Greek antiquity, were supposed to be the last *indivisible* material particles. He holds that there cannot be atoms or material particles that are inherently non-divisible: "We likewise discover that there cannot exist any atoms or parts of matter that are of their own nature indivisible" (Descartes [1965], p. 209; Part I, XX).

In this context, he even introduces the idea of God in order to make acceptable the infinite divisibility of matter. He argues that although God can make a particle small enough, that no creature can divide it, this does

3. "So, wenn ich von der Vorstellung eines Körpers das, was der Verstand davon denkt, als Substanz, Kraft, Teil-barkeit usw., imgleichen, was davon zur Empfindung gehört, als Undurchdringlichkeit, Härte, Farbe usw. absondere, so bleibt mir aus dieser empirischen Anschauung noch etwas übrig, nämlich Ausdehnung und Gestalt" (Kant [1781/1787-B], p. 35).

not set any limits to the Divine capacity to divide. Therefore it should be assumed that matter is indeed infinitely divisible: "Wherefore, absolutely speaking, the smallest extended particle is always divisible, since it is such of its very nature".

Galileo: Motion as a Principle of Explanation

The truly modern era in Physics begins with Galileo, who formulated his law of inertia. Galileo formulated this law with the aid of a *thought experiment*. Suppose a body moves on a friction-free path extended into infinity, then this movement will simply continue endlessly. Opposed to the traditional Aristotelian-Scholastic conception according to which the movement of a body is dependent upon a *causing force*, the law of inertia implies that motion is something *given* and that therefore, instead of trying to deduce or explain it, one should accept it as a mode of explanation in its own right. Motion is original and unique and, indeed, embodies a distinct *mode of explanation* different from those used by the Pythagoreans (number) and the Eleatic school of Parmenides (space). If motion does not need a causing force, then at most it is possible to speak of a *change* of motion (*acceleration* or *deceleration*) — and this does need a *physical force*. The well-known German physicist Carl Friedrich von Weizsäcker remarks:

> Since the law of inertia has shown that no force is required for a change of place the most natural thing to do is to accept that that force causes a change of speed, or, as Newton says, the magnitude of motion (*Bewegungsgrösse*). (Von Weizsäcker [2002], p. 172)

The idea of a uniform (rectilinear) motion on the one hand expands the inherent limitations attached to number and space as modes of explanation, and, on the other, it opens the way to consider another problem that already captured Greek thought. This problem concerns the relation between *persistence* (think about the nature of inertia) and *dynamics* (consider the change of motion requiring a physical force).

The important insight of Plato is that change can only be established on the basis of constancy (persistence) — *i.e.* without an enduring subject there is nothing to "hold on to", nothing to which the alleged changes can be attributed. Of course this insight does not force us to join the speculative account which Plato gave for it in his metaphysical theory of static, super-sensory ideal forms — it is true that his solution did form a lasting attraction for many scholars. Even Frege said that amidst the on-going flow of events something lasting, something with eternal durability must

exist, for otherwise the knowability of the world would be canceled and everything would collapse in confusion.[4]

The proper elaboration of Plato's insight, namely that change presupposes constancy, is found in Galileo's formulation of the law of inertia and in Einstein's theory of relativity. The core idea of Einstein's theory is the constancy of the velocity of light in a vacuum. Although he often merely speaks of "the principle of the constancy of the speed of light"[5], he naturally intends "the principle of the vacuum-velocity" ("das Prinzip der Vakuumlichtgeschwindigkeit" — see Einstein [1982], pp. 30-31; and also Einstein [1959], p. 54). It follows thence that Einstein primarily aimed at a theory of *constancy* — whatever moves, moves relative to this element of constancy. It was merely a concession to the historicistic *Zeitgeist* in the early 20th century that he gave prominence to the term *relativity* — all and every movement is relative to the constant *c*. It also implies, by taking into consideration the interconnection between the kinematic and physical aspects, that a more precise formulation of the first main law of thermodynamics (the law of energy-conservation) ought to be designated as the law of *energy constancy* (an analogy of the foundational kinematic aspect on the law-side of the physical aspect of energy-operation).

However, a certain ambiguity is still to be found in the thought of Descartes and his followers, for in spite of the fact that they viewed *extension* as the essential property of matter, they also simultaneously pursued the kinematical ideal to explain everything that exists and happens exclusively in terms of movement (*cf.* Maier [1949], p. 143).[6] It is generally known that Thomas Hobbes took the full step to the exploration of movement as a principle of explanation in his intended rational reconstruction of reality. According to the newly established natural science ideal, he first demolished reality to a heap of chaos in order to build up afterwards, step by step, a new rationally ordered cosmos, guided by the key concept "moving body". His acquaintance with the mechanics of Galileo enabled him to exceed the limits of space as a mode of explanation. Galileo himself embodies the long history of our understanding of matter up to this phase of its development because he explicitly explores the three modes of explanation thus far highlighted in our discussion. He accounts for arithmetical properties (countability), geometrical properties (form, size,

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4. "Wenn in dem beständigen Flusse aller Dinge nichts Festes, Ewiges beharrte, würde die Erkennbarkeit der Welt aufhören und alles in Verwirrung stürtzen" (Frege [1884], p. VII — *Einleitung*).

5. "Das Prinzip der Konstanz der Lichtgeschwindigkeit" — *cf.* Einstein [1982], p. 32.

6. Maier remarks that "Descartes und seine Schule" indeed pursued a "rein phoronomisches Ideal" and attempted to explain "alles Sein und Geschehen in der Welt lediglich aus Bewegungen".

position, and contact) and kinematic features (motion).[7] Leibniz continues this legacy in his belief that physical events can be explained mechanistically in terms of magnitude, figure, and motion.[8]

As soon as the kinematic mode of explanation is acknowledged in its own right, the necessity to find a cause for motion disappears. The classical opposition between *being at rest* and *moving* is therefore untenable, because from a kinematic perspective "rest" is a state of movement (*cf.* Stafleu [1987], p. 58). Unique and irreducible modes of explanation are not *opposites* — for they are mutually cohering and irreducible.[9]

The last prominent physicist who consistently adhered to the mechanistic approach was Heinrich Hertz. Soon after Hertz's death in 1894, the work in which he attempted to restrict the discipline of Physics to the concepts mass, space, and time, reflecting the three most basic modes of explanation of reality, namely the modes of number, space, and movement, appeared: "The Principles of Mechanics developed in a New Context". This caused him (and Russell) to view the concept of *force* as something intrinsically antinomous.

Acknowledging the Physical as a Distinct Mode of Explanation

As soon as the physical aspect of reality surfaced, it opened up the way for 20th century Physics to explore it as a distinct mode of explanation and to arrive at an even more nuanced understanding of reality. For example, in his *protophysics*, Paul Lorenzen distinguishes *four* units of measurement reflecting the first four modes of explanation: mass, length, duration, and charge (Lorenzen [1976], pp. 1 ff.).

A decade after he discovered the *Wirkungsquantum*, Max Planck explicitly addressed the intrinsic untenability of the mechanical understanding of reality:

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7. "G. Galilei zählt als primäre Qualitäten der Materie arithmetische (Zählbarkeit), geometrische (Gestalt, Grösse, Lage, Berührung) und kinematische Eigenschaften (Beweglichkeit) auf" (Hucklenbroich [1980], p. 291).

8. On October 9th, 1687, Leibniz wrote in a letter that we "must always explain nature mathematically and mechanically" (Leibniz [1976], p. 38). In a footnote, the Editor of Leibniz's work wrote that Leibniz's approval of the corpuscular philosophy of Boyle ought to be understood as "any philosophy which explains physical events mechanistically or in terms of magnitude, figure, and motion" (*ibidem*, p. 349, note 14).

9. For that reason also, number and space ought not to be seen as opposites as asserted by Lakoff and Núñez ([2000], p. 324) owing to their inability to appreciate the unique and mutually coherent nature of these aspects.

> The conception of nature that rendered the most significant service to Physics up till the present is undoubtedly the mechanical. If we consider that this standpoint proceeds from the assumption that all qualitative differences are ultimately explicable by motions, then we may well define the mechanistic conception as the conviction that all physical processes could be *reduced completely to the motions* [the italics are mine — DFMS] of unchangeable, similar mass-points or mass-elements.[10]

Writing on the foundations of physics, David Hilbert refers to the mechanistic ideal of unity in Physics, but immediately adds the remark that we now finally have to free ourselves from this untenable ideal (*cf.* Hilbert [1970], p. 258).[11]

Einstein is equally explicit in his negative attitude towards "the mechanistic framework of classical physics" (*cf.* Einstein [1985], p. 146).

Eventually, the distinction between the kinematic and physical aspects of reality thus became common knowledge. According to Janich, the scope of an exact distinction between *phoronomic* (subsequently called *kinematic*) and *dynamic* arguments could be explained in terms of an example. Modern Physics has to employ a dynamic interpretation of the statement that a body can alter its speed only continuously. Given certain conditions, a body can never accelerate in a discontinuous way, that is to say, it cannot change its speed through an infinitely large acceleration, because that will require an infinite force.[12]

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10. "Diejenige Naturanschauung, die bisher der Physik die wichtigsten Dienste geleistet hat, ist unstreitig die mechanische. Bedenken wir, dass dieselbe darauf ausgeht, alle qualitativen Unterschiede in letzter Linie zu erklären durch Bewegungen, so dürfen wir die mechanische Naturanschauung wohl definieren als die Ansicht, dass alle physikalischen Vorgänge sich vollständig auf Bewegungen von unveränderlichen, gleichartigen Massenpunkten oder Massenelementen zurückführen lassen" (Planck [1973], p. 53).

11. It is therefore strange that the contemporary physical scientist from Cambridge, Stephen Hawking, still writes: "The eventual goal of science is to provide a single theory that describes the whole universe" (Hawking [1988], p. 10).

12. "Die Tragweite einer strengen Unterscheidung phoronomischer (im folgenden kinematisch genannt) und dynamischer Argumente möchte ich an einem Beispiel erlautern, das… aus der Protophysik stammt. Die Aussage "ein Körper kann seine Geschwindigkeit nur stetig ändern" kann von der modernen Physik nur dynamisch verstanden werden. Geschwindigkeitänderungen sind Beschleunigung, d.h. als Zweite Ableitung des Weges nach der Zeit definiert. Zeit wird von der Physik als ein Parameter behandelt, an dessen Erzeugung durch eine Parametermaschine ("Uhr") de facto bestimmte Homogenitätserwartungen geknüpft sind… Bezogen auf den Gang einer angeblich so ausgewählten Parametermaschine kann ein Körper seine Geschwindigkeit deshalb nicht unstetig, d.h. mit unendlich grosse Beschleunigung änderen, weil dazu eine unendlich grosse Kraft erforderlich wäre" (Janich [1975], pp. 68-69).

The idea of an attracting force, initially conceived of in connection with magnetism, eventually brought Isaac Newton to the insight that magnetism is a force that cannot be explained through motion, although in its own right, foundational to the physical aspect, motion is a mode of explanation. Stafleu points out that the rejection of the Aristotelian distinction between the Physics of celestial bodies and the Physics of things on Earth paved the way, in the footsteps of Galileo and Descartes, to realize that the same physical laws apply to both domains, *i.e.* that physical laws display modal universality (*i.e.* they hold universally) (Stafleu [1987], p. 73). He also remarks that Newton (just as Kepler) already appreciated *force* positively, indeed, as a principle of explanation that is distinct from motion as an original principle of explanation (*ibidem*, p. 76). Stafleu summarizes this process through which the physical aspect emerged as an equally original mode of explanation as follows:

> In Newtonian mechanics, a force is considered a relation between two bodies, irreducible to other relations like quantity of matter, spatial distance, or relative motion. Though an actual force may partly depend on mass or spatial distance, as is the case with gravitational force, or on relative motion, as is the case with friction, a force is conceptually different from numerical, spatial or kinematic relations. (Stafleu [1987], p. 79)

Since the introduction of the atom theory of Niels Bohr in 1913, and actually already since the discovery of radioactivity in 1896 and the discovery of the energy quantum *h*, modern Physics realized that matter is indeed characterized by physical energy operation. It is therefore understandable that 20th century Physics eventually had to come to a general acknowledgement of the decisive significance of *energy operation* for the nature and understanding of the physical world, as it is strikingly captured in Einstein's famous formula: $E = mc^2$.

It was also realized that physical processes are *irreversible*. In itself this observation also justifies the distinction between the kinematic and the physical aspects of reality. Both Planck and Einstein knew that from a purely kinematic perspective all processes are *reversible*. Einstein refers to Boltzmann who realized that thermodynamic processes are irreversible.[13] Already in 1824 Carnot discovered irreversible processes. Since 1850, Clausius and Thompson independently developed the second main law of thermodynamics, known as the law of non-decreasing entropy. This

13. "Er hat damit das Wesen der im Sinne der Thermodynamik 'nicht umkehrbaren' Vorgänge erkannt. Vom molekular-mechanischen Gesichtspunkte aus gesehen sind dagegen alle Vorgänge umkehrbar" (Einstein [1959], p. 42).

law accounts for the fundamental irreversibility of natural processes within any *closed system*. The term *entropy* itself was introduced by Clausius only in 1865. In 1852, Thomson explained that according to this law all available energy strives towards uniform dissipation (*cf.* Apolin [1964], p. 440 and Steffens [1979], pp. 140 ff.). Planck remarks that "the irreversibility of natural processes" confronted "the mechanical conception of nature" with "insurmountable problems" (Planck [1973], p. 55).

It is only on the basis of an insight into the foundational position of the kinematic aspect in respect of the physical aspect that an appropriate designation of the first law of thermodynamics is made possible. Although we are used to employ the familiar designation of it as the law of *energy conservation*, there is an element of ambiguity attached to the term *conservation* — as if energy is "held on to". When, on the law-side, the retrocipation from the physical aspect to the kinematic aspect is captured by the phrase *energy constancy*, this ambiguity disappears and then we have at hand a concise and precise formulation of this law.

We may now consider the claim of positivism, namely that sensory perception is the ultimate source of scientific knowledge.

The Impasse of Positivism

Let us explore this issue in some more detail. In order to highlight the limitations of the senses in the acquisition of knowledge, we only have to consider the aforementioned sketch of the history of the concept of matter. We have referred to the fact that the Pythagoreans adhered to one statement above all else: everything is number. After the discovery of irrational numbers, we saw that Greek Mathematics as a whole was transformed into a spatial mode (the geometrization after the initial arithmetization). As a consequence, material entities were no longer described purely in arithmetical terms. The aspect of space now provided the necessary terms required to characterize material entities. This spatial angle of approach remained in force until the rise of modern Philosophy, since philosophers like Descartes and Kant still saw the "essence" of material things in their *extension*. Particularly through the work of Galileo and Newton, the main tendency of classical Physics eventually underwent a shift in perspective by attempting to describe all physical phenomena exclusively in terms of (kinematic) *motion*.

Since the introduction of the atom theory of Niels Bohr in 1913, and actually already since the discovery of radioactivity in 1896 and the discovery of the energy quantum *h*, modern Physics realized that matter is indeed characterized by physical energy-operation.

From this brief historical analysis it is clear that different aspects served to characterize matter — starting with the perspective of number and proceeding to the aspect of space, the kinematic aspect and eventually the physical aspect of reality. The implication of this is that the positivistic appeal to *sense data* is problematic, because the theoretical "tools" employed in the *description* of what is observed always utilize *terms* that are not susceptible to "empirical observation" themselves.

The moment we proceed from what has been *observed* to a *description* of what has been observed, the positivist criterion collapses, because the terms employed in such a description derive from aspects that are not open to sensory perception. Can these modal aspects be observed in a sensory way? Can they be weighed, touched, measured, or smelled? The answer must be negative, for they are not *things*, but aspects of things (or rather aspects within which concretely existing things *function*). The first step positivism had to take in order to digest "sense data" theoretically has already eliminated the restriction of reliable knowledge to sense data!

The renowned physicist Max Planck, who eventually became sharply critical of Mach's positivism, distinguished between the real outside world, the world of the senses and the (theoretical) world of the science of physics, which he equates with the *physikalisches Weltbild* (the physical world picture — Planck [1973], p. 208). The abstractions that belong to the *Weltbild* are not sensorily perceptible — they embrace, according to him, the known law-conformities and concepts such as space, time, and causality (*cf.* Vogel [1961], p. 149).

Matter and the First Four Modes of Explanation

When Stegmüller explains the problems attached to an understanding of the nature of matter, the first four aspects of reality suddenly acquire a new significance.

In the first place, he distinguishes two global basic conceptions regarding the nature of matter, and he points out that currently these conceptions once again, as previously, occupy a prominent place in the discussions. He calls these two basic conceptions the *atomistic conception* and the *continuity conception*.[14]

14. "Selbst die beiden grossen Grundkonzepte über die Natur der Materie stehen heute nach wie vor zur Diskussion, wenn auch mannigfaltig verschleiert hinter Bergen von Formeln. Diese beiden Grundkonzepte kann man als die *atomistische Auffassung* und als die *Kontinuumsauffassung* der Materie bezeichnen" (Stegmüller [1987], p. 91).

Laugwitz also points out that insofar as Physics subjects itself to auxiliary means from Mathematics, it cannot escape from the polarity between continuity and discreteness.[15]

Suddenly, the question concerning the infinite divisibility of matter once again occupies a central position, thus highlighting anew the important distinction between *physical space* and *mathematical space*. It is clear that this distinction between "atomism" and "continuity" is based upon number and space as the two most basic modes of explanation of reality. But this is not yet the end of the dependence upon unique modes of explanation. For, according to Stegmüller, these two conceptions were designed in order to bring to a solution the following two problems (Stegmüller [1987], p. 91):

(i) The apparent *indestructibility* of matter, and
(ii) The apparent or real limitless transformability of matter.

When these two problems are assessed in relation to one another, it is immediately clear that they depend upon the third and fourth ontic modes of explanation given in reality, namely on the meaning of kinematic persistence ("immutability") and physical changefulness ("transformability").[16]

As soon as we do this, the key points of our historical survey of physics are again brought into playing a decisive conditioning role in our theoretical reflections. The "thing-ness" of material entities once and for all transcends the limited nature of the unique angles of approach (modes of existence and modes of explanation) that served our understanding of matter. Things function at once within all these modes and yet, in spite of this aspectual many-sidedness, things are never exhausted by any one of these modal aspects. And it seems that the *mystery* surrounding material entities derives from this multi-aspectual but-at-once more-than-merely aspectual nature of such entities.

It is precisely this more-than-merely-aspectual-nature of material things that sheds a negative light on any *monistic* attempt to develop a "theory of everything". Greene, for example, wants a framework that will combine all insights into a seamless whole, into a "single theory that, in principle" is capable of describing all phenomena (Greene [2003], p. viii).

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15. "Die Physik, insofern sie sich mathematischer Hilfsmittel bedient oder sich gar der Mathematik unterwirft, kann an der Polarität von Kontinuierlichem und Diskretem nicht vorbei" (Laugwitz [1986], p. 9).

16. The physicist Rollwagen holds the view that the "dualism" of wave and particle introduced a new dimension, namely the "possibility of the ... mutual transformation of elementary energy-structures" (Rollwagen, 1962:10).

He indeed presents the "super string theory" as the "Unified Theory of Everything" (Greene [2003], p. 15; *cf.* also pp. 364-370, 385-386). However, he does not realize that although he has a *purely physical theory* in mind, the *meaning* of the physical aspect of reality inherently points beyond itself to its inter-modal coherence with other aspects, first of all with those aspects that are foundational to the physical aspect (namely the aspects of number, space, and movement). Even the way in which he phrases his goal cannot escape from terms that have their original seat within some of these aspects. Just consider his reference to a "seamless whole" and his use of the quantitative meaning of number while referring to a "single theory". The idea of "everything" also makes an appeal to the quantitative meaning of the *one* and the *many*. Likewise, the idea of a "seamless whole" reflects the core meaning of space (*i.e. continuous extension*) which underlies our awareness of *wholeness* and of *coherence* ("seamless").

The unity of physical (material) entities can never be found in one privileged or elevated mode of explanation. Only a non-reductionistic ontology can liberate us from this untenable "unity-ideal". Material entities exceed the confines of every modal aspect in which they function — thus underscoring the crucial role of acknowledging *unity and diversity* also within the domain of the discipline of physics.

Accepting the unity and diversity within creation presupposes both the acknowledgement of God as Creator and the insight that nothing within creation can be elevated to serve as a substitute for God. Reifying or divinizing any aspect always lead to theoretical antinomies. Only when a non-reductionist ontology is employed is it in principle possible to do justice to the unity and diversity within creation.

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Theories of Mind and Post-Reductionist Philosophy of Science*

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Over the past half-century, the analytic philosophy of mind has seen debates between several camps that have become the "mainstream" alternatives for a theory of mind: reductive and non-reductive physicalism, eliminativism, and dualism. Almost all parties to these debates have shared the assumption that some form of inter-theoretic reduction is the norm in the natural sciences. Where they have parted company is over the questions of (i) whether key features of the mind (consciousness, intentionality, normativity) can be reductively explained in non-mental terms, and (ii) if they cannot, what this portends. An influential set of publications from the late 1970s to mid-1990s argued that there are *explanatory gaps* between mind and brain of a sort not found in other domains (Chalmers [1996]; Jackson [1982]; Levine [1983]; Nagel [1974]). Reductionists assume that these gaps are merely a symptom of the current incomplete state of our sciences, particularly the comparative youth of the cognitive sciences (Carruthers [2004]; Churchland [1985]; Dennett [1991]; Melnyk [2003]; Oppenheim & Putnam [1958]; Tye [2000]). Dualists hold that the gaps are evidence of the existence of mental substances or mental properties that do not supervene on the physical (Chalmers [1996]; Robinson [2004]). Eliminativists have seen such gaps as evidence that the mentalistic vocabulary reflects theoretical posits of a failed "folk psychology" that should be eliminated from science and ontology (Churchland

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[1981]; Ramsey *et al.* [1991]; Stich [1983]). And non-reductive physicalists have claimed that the mental supervenes upon the physical, even though it cannot be reductively explained in physical or neural terms, whether because ascription of mentalistic terms involves rational interpretation (Davidson [1970]) or because of some limitation of our understanding (McGinn [1991]).

During this same period, philosophers of *science* have had second thoughts about the kind of inter-theoretic reduction that was a mainstay of logical empiricist philosophy of science from Carnap (1929) to Ernest Nagel (1961). While the reductionist programme was a kind of orthodoxy in the philosophy of science half a century ago, philosophers of science today tend to believe that true reductions are in fact relatively rare, and that reducibility does not serve as a normative constraint on the special sciences. This paper argues that post-reductionist philosophy of science poses significant challenges to all of the "mainstream" theories of mind, and explores a cognitivist answer to the question of why there might be an abiding plurality of scientific theories.

Reductionisms

The words *reduction* and *reductionism* have been used in a number of ways in the philosophy of mind. Only some of these are directly relevant to the current discussion. One of the most familiar uses of the word in the philosophy of mind makes *reductionism* a synonym for "type-type identity theory" — the view that each mental type stands in a one-to-one relation with a corresponding physical type (Place [1956]). This view, popular in the 1950s and 1960s, is now almost universally rejected by the philosophers of mind.[1] Here, no new arguments are really called for, as the current orthodoxy has it that this view has been decisively defeated by the functionalist case that mental state types are typified by functionally-defined systems that are multiply realizable (Fodor [1974]).

Type identity theory claimed both an "upward" and a "downward" relationship between mental and physical types. Given a mental type, one can infer "downwards" to physical type, and vice-versa. However, for purposes of *explanation*, it is clear that only the "upward" relations matter.

1. The exception are those who are willing to extend the notion of "physical type" to include wildly disjunctive types, so that all of the realizing systems of, say, pain in physically different organisms are lumped together with a liberal peppering of conjunction signs. This view may be useful for logic and metaphysics, but insofar as we are concerned with the explanatory value of inter-theoretic reductions, it is perfectly useless.

The core of reductionism can be preserved in a way that allows multiple realization so long as fixing the physical or neural type allows inference upward to a unique mental type as well. As a result, neither scientists, nor indeed all philosophers, have been inclined to give up on some sort of "reductionism" — *i.e.*, one that is weaker than type identity — even if they acknowledge the possibility of multiple realization for functional kinds.

Scientists, in particular, are often considerably more profligate in their bestowal of the label "reduction" than are philosophers. Indeed, one can find the term applied not only to very partial part-whole explanations (*e.g.*, serotonin reuptake explains depression), and indeed to very different forms of explanation such as what Kitcher (1981) calls "unifications". Such a broad usage is probably not sufficiently precise as to be a proper subject of philosophical investigation (though see Bickle [1998]) and is certainly too weak to underwrite claims of metaphysical supervenience.

The core of the traditional philosophical notion of reduction would seem to consist in its being a form of explanation that has several distinctive characteristics. First, it is explanation of a system in terms of its parts: chemical reactions in terms of the properties of the atoms, for example. Second, it is explanation in which, once one has an adequate theory of the lower-level system in hand, one can demonstrate that all of the salient features of the higher-level system are a necessary consequence of these. It is one type of what I have elsewhere (Horst [1996]) called a "conceptually adequate explanation", and an explanation *without remainder*. More recently, I have labeled this notion of reduction "broad reduction" (Horst [2007]). Such a notion of reduction preserves two important characteristics of historical treatments of reduction: a close connection with notions of derivation in mathematics and logic, and an immediate connection to metaphysical necessity: in brief, if one has a reduction in this sense, one also has metaphysical necessity for free, since if A is derivable from B, $B \rightarrow A$ is true in every possible world.

The Demise of Reductionism in Late Twentieth Century Philosophy of Science

While everyone would agree that reductions are a particularly strong and useful form of explanation to have when one can get them, it is really a second-order empirical question whether and where they are in fact to be found. Other philosophers who attempted to extend Nagel's project of axiomatic reconstruction began to discover that mechanics turned out to be a special case, and almost unique in being susceptible to this form of reconstruction.

Toulmin, for example, writes ([1974], p. 610):

> In mechanics — and in mechanics alone — the intellectual content of an entire physical science could apparently be expounded as a single mathematical calculus. Here was a complete natural science free of logical gaps and incoherences… The temptation to hold theoretical mechanics up as a mirror to other branches of science, and to demand that other sciences be construed on the same model and achieve the same logical coherence, seemed irresistible. Yet the very formal perfection of theoretical ought surely to have ruled it out as the "type example" of a natural science, and prevented us from extrapolating conclusions about the "logical structure" of mechanics, so as to apply to natural sciences generally. Rather, we need to recognize how *exceptional* a science mechanics really is.

Patrick Suppes, who had himself undertaken the project of axiomatizing a number of areas of science, likewise came to the conclusion that, while such reconstructions were possible in some areas of the sciences, they were by no means the rule (*cf.* Suppes [1974], p. 66).

Meanwhile, the historicist philosophers of science began to make an important turn away from the normative, aprioristic project of the "logic of science" and towards the hands-on investigation of how science is practiced "in the wild". Salmon (1984; 1971) and others showed decisively that some important methods of scientific explanation were not syllogistic. And various writers through the 1980s and 1990s noted that even when explanations could be reconstructed as syllogisms, these reconstructions came after the explanatory success had come through non-derivational forms (Churchland [1986]; Schaffner [1967]; [1974]), and the reconstruction misdescribed the theories "in the wild" (Craver [2002]; Nersessian [1992]). And examination of what really takes place at the borders between theories revealed a much richer set of options, which were explanatorily useful and productive even when they fell short of reduction (Bechtel & Richardson [1993]; Darden & Maull [1977]).

Perhaps most damningly, case studies of *purported* inter-theoretic relationships have seemed to lead to the conclusion that true reductions are actually rather rare, and even the four or five much-touted examples do not deliver as advertised.

As Silberstein puts it in the *Blackwell Guide to Philosophy of Science* ([2002], p. 94):

> Focus on actual scientific practice suggests that either there really are not many cases of successful epistemological (inter-theoretic) reduction, or that most philosophical accounts of reduction bear little relevance to the way reduction in science actually works. Most

working scientists would probably opt for the latter claim. Often discussed cases of failed or incomplete intertheoretic reduction in the literature include:

(1) the reduction of thermodynamics to statistical mechanics (Primas [1998]; [1991]; Sklar [1999]);
(2) the reduction of thermodynamics/statistical mechanics to quantum mechanics (Hellman [1999])
(3) the reduction of chemistry to quantum mechanics (Cartwright [1997]; Primas [1983])
(4) the reduction of classical mechanics to quantum mechanics (such as the worry that quantum mechanics cannot recover classical chaos — Belot and Earman [1997]).

Additional critique has arisen from the philosophy of biology, denying the reducibility of evolutionary biology either to molecular genetics (Levins [1968]; Lewontin [1983]) or to classical genetics (Kitcher [1984]).

This is, of course, only a cursory overview of several broad trends within the philosophy of science. It is impossible in the course of an article like this to provide much more detail on the arguments for each position, much less to adjudicate questions on which there are remaining controversies.[2] In the context of this article, this exposition is largely preparatory to consideration of questions in the philosophy of psychology and the philosophy of mind. To put it briefly, *if* one accepts these anti-reductionist results in the philosophy of science, what implications would this have for how one does the philosophy of mind? And in particular, to what extent would some familiar problematics be transformed or undone?

The Post-Reductionist Philosophy of Science and the Philosophy of Mind

The post-reductionist philosophy of science presents problems for all of the theories of the nature of mind that tend to be presented as the mainline options: reductive physicalism, eliminativism, dualism, and non-reductive physicalism. The problems for reductive physicalism and eliminativism are relatively clear, and one might readily suppose that the demise of reductionism should favor dualist and/or non-reductive physicalist views. However, I will argue that they, too, are faced with significant challenges.

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2. I would commend the *Blackwell Guide to Philosophy of Science* chapter on *Reduction, Emergence, and Explanation* (Silberstein [2002]) as a starting place for those interested in reading further on these topics.

Reductive physicalism

At least one implication seems quite straightforward: the post-reductionist philosophy of science is bad news for reductive physicalism. It was bad enough for the reductive physicalist that there seem to be explanatory gaps with respect to intentionality, consciousness, and normativity. But so long as those gaps were confined to psychology, the appearance of such gaps could be offset by the sense that that appearance might be — indeed, *must* be — mistaken, given what we know about the natural world. If nature is generally united by reductive relations, it seems reasonable — though by no means necessary — to conjecture that such relations will eventually be found for the mind as well. But if there are "explanatory gaps all the way down", no such assurance is justified. Indeed, if explanatory gaps, in the forms of failures of reducibility, are the rule rather than the exception in even the natural sciences, expecting psycho-physical reductions would mean expecting *closer* relationships between brain and mind than are found between physics and chemistry. Such a hope might pan out, but its adherents are betting against long odds. With the general demise of hopes for inter-theoretic reductions, the reductive physicalist is left with nothing more than a standpoint of faith.

Eliminativism

The post-reductionist philosophy of science also spells trouble for eliminativism. Arguments for eliminativism tend to trade on the assumption that there is a forced choice between inter-theoretic reduction and elimination. If the theoretical posits of a special science cannot be mapped smoothly onto the categories and laws of a reducing science, there are grounds to doubt their scientific and ontological credentials. If the explanatory gaps pose a principled reason that consciousness, qualia and the normativity of mental states cannot be reduced, the eliminativist would therefore see this as evidence that there is something wrong with them as theoretical posits.

This argument may seem plausible or not if one assumes that the *only* explanatory gaps or failures of reducibility are the ones encountered with respect to the mind. But the discovery that reductions are in fact rare implies that, if one is to follow the eliminativist canons, it is not only mental phenomena that must be eliminated, but many of the phenomena of biology, chemistry, and even non-fundamental physics as well. There are few philosophers willing to bite the bullet and say that all that really exists are the entities of fundamental physics (Van Inwagen [1993]); most philosophers and scientists would deem the elimination of categories of biology and chemistry too high a price to pay for an *a priori* philosophical commitment to reducibility as a criterion for scientific and ontological legitimacy (*cf.* Baker [1995]; Stich & Laurence [1994]).

Dualism

At first sight, then, the post-reductionist philosophy of science looks like good news for friends of the explanatory gap. It undermines much of the unease that might be felt about a unique gap in the case of the mental, which has been for many an important defeater for their intuitions that there is such a gap. But, on the other hand, if it is "gaps all the way down", the psychological gap ceases to be such a uniquely interesting and sexy problem as well. And, in particular, it puts the dualist in an awkward position. For one important argument for dualism is based on the gap, plus what I have elsewhere called the "Negative Explanation-to-Metaphysics Connection Principle" (for short, Negative EMC). This is the idea that a principled explanatory gap entails a metaphysical gap as well in the form of a failure of supervenience.

Negative epistemology-to-metaphysics connection (Negative EMC): The irreducibility of A to B entails that A does not supervene upon B.

Dualists have used such a principle, combined with the explanatory gaps, to argue that mental phenomena must involve either non-physical substances (substance dualism), or non-physical properties (property dualism). But if it is gaps all the way down, Negative EMC does not entail dualism, but a radical ontological *pluralism*. (One may call it a "Dupréved" pluralism, in honor of the ontological pluralist John Dupré.) And radical such a pluralism would seem to be: if abiding and principled gaps imply failures of supervenience, and chemistry and biology are not reducible to physics, then they do not supervene upon physics either. (And likewise, *mutatis mutandis*, for statistical mechanics/thermodynamics etc.) That is, if one follows the customary dualist reasoning, widespread failures of reducibility would imply that biology and chemistry involve either non-material substances, or at least non-material properties that do not supervene upon the physical phenomena. This is a result that few will find easy to swallow without further justification.

The dualist is thus faced with a kind of dilemma. He can, on the one hand, stop counting to two by giving up Negative EMC, thus blocking the argument to a more radical sort of pluralism. But he does so at the cost of depriving himself of the usual sorts of arguments for dualism. On the other hand, he can hold on to Negative EMC, but at the cost of counting to three and beyond, and adopting metaphysical pluralism rather than dualism.

There is, however, also an intuition that many experience here that, while there are explanatory gaps outside of psychology, the psychological gaps are in some way special, and that they are special in a way that carries different metaphysical consequences than the physics-chemistry gap.

If this is so, it may be possible to avoid radical ontological pluralism even if we accept theory pluralism in the philosophy of science. This is an issue that arguably faces all ways of addressing the problem.

Non-reductive physicalism and mysterianism

There is nothing about mysterianism or non-reductionism that prevents its advocates from holding that it is true all the way down. Theory pluralism may provide a *challenge* to materialism and a monistic metaphysics, but it is not clear that it presents a *refutation*; and indeed the non-reductive physicalist might try to turn theory pluralism to his advantage. If, say, chemistry is not reducible to physics, yet we are sure that it supervenes upon physics, this gives us good reason to assume that supervenience is compatible with the inavailability of reductions. And if it is consistent in one case, it should be consistent in all cases, including that of psychophysical supervenience. One might even be inclined to say that non-reductive physicalism is in a *better* evidential position if one embraces theory pluralism than if one views the mind as uniquely unreducible.

There is something a bit illusory about this inclination, though. It can be seen by noting that the strength of the position depends on the direction from which one arrives at it. Historically, the popularity of materialism came hand-in-hand with the popularity of reductionism. Indeed, what were taken to be reductive successes in the sciences were precisely what led people like Hobbes and Laplace to be materialists. Where there are reductions, supervenience comes at no extra charge. And if reductions are shown to be unavailable, it is natural for the physicalist to look to *non*-reductive physicalism as the most conservative fallback position. But suppose we start the other way: we start with irreducibility or mysterianism and then ask, *What is the best metaphysical interpretation of irreducible correlations?* Now there seems to be little reason, other than some sort of philosophical taste (*e.g.*, for desert landscapes), to prefer the view that an A-B correlation is grounded in a metaphysical necessity (that $B \rightarrow A$ in all possible worlds), over the view that it is merely a lawlike and/or causal connection. The *non-reductive* side of non-reductive materialism may be based on strong evidence; but the *materialist* side is more like a standpoint of faith. There is nothing wrong with standpoints of faith, but this deprives materialists of the rhetorical high ground aligning their position with both reason and evidence and their opponents against it. Without reduction, materialism loses such grounding as it might have had in scientific explanation.

New Problems and a Turn to Pluralism

The failure of the project of inter-theoretic reduction as conceived by the logical empiricists thus presents challenges for all mainstream views in the philosophy of mind. It also presents us with several new problems. First, assuming that we are indeed faced with a principled and abiding *explanatory* pluralism in the sciences, how should we best account for this? Should we look for an explanation in metaphysical terms — say, that there are genuinely novel entities or properties found in the special sciences, that do not supervene upon those of fundamental physics? Or should we seek an epistemological explanation, such as a generalized form of the mysterian suggestion that explanatory gaps are a consequence of features of the cognitive architecture of the human mind?

Second, what should we make of the intuition, shared by many, that while there might be many insuperable explanatory gaps, the gaps between mind and matter (or mind and brain) are different from the rest? If this intuition is correct, does it give the dualist a way to re-formulate familiar arguments for his position? Or is there an alternative explanation that does equal or better justice to the intuition?

Third, what should we make of the intuition (again, widely shared) that, while we might need to accept the conclusion that biological and chemical phenomena are not all reducible to physics, we must resist any metaphysical conclusion that involves their not supervening upon physical facts? Is this intuition supportable? And, indeed, how should we go about assessing the trustworthiness of such metaphysical intuitions?

In the remaining sections, I shall assess the prospects of two types of pluralism. The first is what we might regard as a realist pluralism, found in Dupré's "promiscuous pluralism" (Dupré [2001]; [1993]) and in certain proponents of "emergentism" (Broad [1925]; Clayton [2004]; O'Connor [1994]; Polanyi [1958]). In a nutshell, this is the view that the sciences are disunified because reality is itself disunified, and contains an irreducible plurality of natural kinds. The second is a less familiar view, which I shall call Cognitive Pluralism.

Realist Pluralism and Metaphysical Emergence

The realist pluralist takes irreducibility of an object or property to be a mark of its being fundamental. On such a view, a radical theory pluralism on the epistemic side entails a radically pluralistic inventory on the ontological side. (It might be possible to distinguish the thesis that

irreducibility implies fundamentalness from the negative EMC, but only at the cost of divorcing ontology from scientific realism.) In some places in *The Disorder of Things*, John Dupré seems to take such a view, which he christens "promiscuous pluralism" (Dupré [1993]). Some proponents of views styled "emergentist" also take such a line.

Each of these characterizations, however, is in need of some caveats. While Dupré sometimes writes as though theory pluralism in the sciences reflects a pre-existing ontological pluralism, at other times he takes a more pragmatist tone, suggesting that the plurality of categories in the sciences may be a result of our cognitive architecture and pragmatic interests. In this second mode, Dupré's pluralism seems more akin to the Cognitive Pluralism I shall develop in the next section, as it does not assume that the world divides itself into a long list of natural kinds in a fashion independent of our theories and practices.

The word *emergence* is used in a bewildering number of ways. I will follow Silberstein (2009) in distinguishing between *explanatory emergence* and *metaphysical emergence*. Explanatory emergentism is simply the view that some of the phenomena of the special sciences cannot be reductively explained. Metaphysical emergentism is the view that there are entities and/or properties found in complex systems that are "novel" in the sense that they do not supervene upon the physical facts. The proponents of "emergence" are often insufficiently clear just which type of claim they advance. If one embraces explanatory, but not metaphysical emergence, this amounts to a mysterian form of non-reductive physicalism. And so the form of emergentism that represents an alternative to the mainline views is one that embraces metaphysical emergence as an account of why there is explanatory emergence. Metaphysical emergentists may argue for their view on the basis of some version of Negative EMC, or they may do so on other grounds, such as that it is deemed necessary to allow room for free will and mental causation (Clayton [2004]).

To the extent that one is wedded to realism and Negative EMC, this might be an attractive position. However, its metaphysical costs are both great and apparent. On the one hand, it is extremely ontologically profligate. Instead of one basic ontological kind, or even a handful, it ends up committed to hundreds or even more. Indeed, it probably ends up being even more profligate than Aristotelian metaphysics, which posited one substance kind for each species. On the other hand, at least some of its denials of supervenience seem quite counter-intuitive. Short of evidence that some particular chemical property is *under*-determined by physical properties, we are generally wont to assume that fixing the physical properties for a possible world thereby fixes the chemical properties as well. This intuition might be defeasible in the face of possible empirical

or philosophical argumentation, but it dies hard. There is an unstable triad of views here, in short:

1) the Negative EMC Principle;
2) theory pluralism in the philosophy of science;
3) the intuition that the phenomena of natural sciences are metaphysically determined by the complete set of physical facts and laws cast at the level of the simplest physical objects.

The realist pluralist rejects 3, but it is by no means clear that this is the least costly move to make.

Cognitive Pluralism and Theory Pluralism

What alternative explanations of abiding theory pluralism might we consider? In the philosophy of science, at least, there are a variety of positions that might provide alternative and very sensible takes on theory pluralism: pragmatism, cognitivism, idealism, social constructionism. All of these approaches are sometimes contrasted with "realism", and might be contrasted by their advocates with "naïve realism", in that they reject the assumption that "inventory ontology" — taking the inventory of what our best understandings of the world are committed to — is metaphysical bedrock. Whereas monism and dualism give different answers to questions of ontological inventory, these "nonrealisms" question the assumption that the world just divides itself up in a unique, canonical and mind-independent way into natural kinds. The "non-realist" positions differ with both materialists, and dualists, not on questions of inventory, but on questions of "critical ontology": the question of what it is to be a thing. (Naïve) realists answer this by saying that the inventory ontology already gets at metaphysical bedrock. Non-realists answer the question by cashing out objecthood in terms of something else, such as cognition or practices.

Non-realist positions might treat theory pluralism as a symptom or artifact of the kind of cognitive, practical, or social activities that go on in modeling aspects of the world. That is, the explanation may be found not in facts about how the world is, but in facts about human cognitive architecture. After all, the feasibility of the idea that everything we know can be unified into a single system is dependent not only upon how the world is, but also upon facts about our minds. And once one casts the problem this way, it seems actually rather presumptuous to assume that either God, or evolution would build human minds so that they were able to understand everything in a fashion that is at once consistent and comprehensive. But in order to render the view plausible, it is necessary first to explain it in more detail.

The account given by Cognitive Pluralism of the plurality of scientific theories may be summarized in the following way. First, Cognitive Pluralism posits that it is a basic design principle of our cognitive architecture that we understand the world through the creation of special-purpose models of particular content domains. Different scientific domains would be examples of these, but the variety of common-sense ways we think about and relate to objects and persons are equally good examples. Scientific understanding is a specialized application of our minds, and an especially careful, rigorous, and regimented one; but it reflects the basic principle that we understand things through constructing mental models of them.

Second, such mental models afford explanatory insight by isolating a few systematic invariants at a time, and finding the characteristic relations between them. This involves *idealization* away from other factors that may be at work in real-world situations. A theory of gravity, for example, brackets other forces like aerodynamics and electromagnetism. As a result, each model, in and of itself, captures only a partial and perspectival story about the world. Our minds are not capable to understand the world in its enormous complexity at once. We gain epistemic traction only by putting on various "epistemic lenses" that highlight different features of the world.

Third, each model must be some particular determinate kind of model. One way of saying this is to say that each model must employ some particular determinate representational system. To represent space, one must adopt a Euclidean or a Lorentzian metric for spatial geometry. The choice of a representational system is constrained by the practical demands of the features to be modeled, and also by the set of representational systems made available by our cognitive architecture. A model is "apt" to the extent that it provides a good-enough framework to capture the phenomena of that domain.

Fourth, features of the representational systems employed for particular content domains may pose barriers to their integration. On the one hand, some representational systems are formally incommensurable with one another. (There is no consistent axiomatization of geometry, for example, that is both Euclidean and non-Euclidean.) On the other hand, the representational system that is used in a given domain may distort the phenomena in ways known or unknown — for example, by treating bodies as point-masses or collisions as ideally elastic. Such "distorting idealizations" may be innocent in the context in which they are employed, but problematic when one goes beyond that context, or tries to combine the principles of that model with those of other models with contrary idealizations. (For example, the assumption of elasticity of fluid particles

is innocent when one is modeling simple low-energy interactions, but other models are needed when turbulence is involved.)

Given these four assumptions, we are faced with interesting empirical questions about (i) whether the models that serve us so well in real sciences can be integrated into a super-model or even made consistent with one another, and (ii) whether minds like ours are capable of attaining an understanding of the world that has all of the explanatory power of our existing models while also being unified. It is possible that we can get broad explanatory power only by employing a number of separate models, idealized in different ways to accord with different practical constraints of particular content domains, and that such profligate modeling will have the consequence that, while it allows us to deal with many problems individually, it prevents us from unifying the separate models that afford this collective explanatory power.

Cognitive Pluralism is thus far a theory of cognitive architecture that provides a candidate explanation for abiding theory pluralism. It is compatible with a number of metaphysical positions, including non-reductive materialism and dualism, but also with idealism, pragmatism, and social constructionism. Its alternative would seem to be that of assuming that science as we know it is in need of wholesale revision before it can provide the kind of understanding needed to meet *a priori* conditions for reduction and unification. It may turn out that we will hit upon a truly revolutionary way of re-casting science that will meet such conditions, but it seems wrong-headed to hold science hostage to *a priori* philosophical conditions rather than let the best sciences we have set constraints upon our epistemology and metaphysics.

Cognitive Pluralism as Metaphysics

Cognitive Pluralism can, however, also be made into a metaphysical thesis. Its metaphysics is much more contentious, but I deem it to be worthy of exploration. The cognitivist side of Cognitive Pluralism has much in common with Transcendental Idealism and Pragmatism, in that it rejects the naïve realist assumption that the world divides itself into objects and kinds in a single, canonical mind- and interest-dependent way. Properties, kinds, and even object-hood are not pre-existing divisions in the world awaiting discovery, but more like the watermark of our cognitive architecture upon the canvas of phenomena.

Thus far, Cognitive Pluralism bears much in common with Kantian idealism. Where Cognitive Pluralism may part company from Kant is in a rejection of the assumption that our understanding presents us with

a single, categorically unified world of phenomena, as opposed to a repertoire of apt models through which we can triangulate reality. I say it *may* differ from Kant on this point because there is some reason to think that Kant himself was somewhat of a pluralist. (For example, the Third Critique suggests that biology operates on completely different principles from physics, and the First Critique paints "the world" as an illusory Idea of Reason.)

There has been relatively little discussion of cognitivist/idealist or pragmatist views in recent philosophy of mind (important exceptions include Baker [1995]; Putnam [1995]). To be sure, cognitivist positions have been explored with regards to topics in epistemology, but rarely applied to issues in metaphysics of mind. Do they have anything to contribute to our two nagging questions about the new problematic: (i) Can we explain (or explain away) the intuition that there is something special about the *psychological* gaps? (ii) What should we say about whether explanatory gaps imply failures of supervenience as well?

Why is this gap different from every other gap?

The cognitivist strain of the brand of pluralism I am recommending does have special resources for addressing the first question. Transcendental idealists like Kant and Husserl have already pointed out that there are special problems in trying to talk about subjective experience as though it were itself a thing in the world, related to other things in the world. On the one hand, a description of subjectivity seems to require a peculiar representational form, in which self/thought/object are related in a single intentional state, *not* as three objects in an objective relation, but rather as three moments of a single experience. Husserl additionally points out that to take either a thought, or the transcendental subject and treat it as a thing is necessarily to distort it as it appears in lived experience. If this is correct, then there are problems in trying to create a mind-body theory (or, better, an experience-body theory) that do not arise when relating two objects or systems of objects.

Theory pluralism, cognitivism, and modal metaphysics

On the questions of supervenience and modal metaphysics, cognitive pluralists and other nonrealists are likely to sound a strongly cautionary note about the entire enterprise. Some of the issues arise specifically from particular theoretical perspectives (*e.g.*, cognitivist, pragmatist); but others, I think, can be motivated as more general problems for uniting modal metaphysics with theory pluralism, regardless of its metaphysical interpretation.

The notion of metaphysical supervenience is one that the cognitive pluralist ought to regard with some suspicion. In particular, he ought to be concerned about standard formulations of supervenience within a modal metaphysics cashed out in terms of a possible worlds semantics (PWS). Consider how one gets at the notion of a possible world. One starts with a set of all propositions or a set of all states of affairs. A world is then conceived of as being, or defined by, a mapping from this set onto truth values. A *possible* world is one in which there are no inconsistencies generated by such a mapping.

Cognitivism and possible worlds semantics

Now ought a cognitive pluralist to be happy with such a project? Well, perhaps at the level of it being one more conceptual tool that can do some limited amount of useful work. But if it is supposed to give insight into the deep structure of metaphysical reality, things look a bit suspicious. On the one hand, it is suspicious from a *cognitivist* standpoint. To start off speaking of "the set of all properties" ("all propositions", "all states of affairs") would seem to be exactly the kind of naïve realist move that the cognitive pluralist, *qua* cognitivist (or similarly idealist, pragmatist, social construcivist) takes issue with, as it assumes that there is some unique, canonical, mind-independent way that reality divides itself up into properties, propositions or states of affairs. The cognitivist may agree that there are enterprises in which one has to think like a naïve realist.[3] But the juncture at which one decidedly must avoid this impulse is when one is trying to do fundamental metaphysics. The point could also be made, *mutatis mutandis*, from other nonrealist perspectives: pragmatist, idealist, social constructivist. In order to pose questions of metaphysical supervenience from these standpoints, there is some prior work to be done in showing that they can in fact be *well*-posed without making (naively) realist assumptions.

Pluralism and possible worlds semantics

The cognitive pluralist also has a problem with PWS *qua* pluralist. And arguably *these* problems result not from a particular standpoint in critical metaphysics, but from a mere commitment to theory pluralism in the philosophy of science. For PWS seems to assume that the various things we can represent through local models can be united into a single master system. PWS need not imply *reductive* unification — propositions

3. Notably, in order to assess the fidelity or aptness of a representational system, one must compare it to an independent description of the world that is treated as canonical. The epistemologist may well know that this description, too, is idealized, but *for purposes of the task of fidelity-assessment* treats it as though it described how the world is in itself.

can be consistent with one another without being reducible to a common denominator. But idealized models can sometimes generate contradictory predictions, as in certain cases involving General Relativity and Quantum Mechanics. The cognitive pluralist rejects the view that such a circumstance implies that at least one of the models is false or (globally) inapt. Indeed, each may deserve honorifics like "true" or "apt" as much as anything deserves them. And yet they can generate contradictions, due to the ways in which they are idealized and partial. If you want a kind of "truth" that entails consistency too, you need to work with unidealized theories. Maybe God can get at this sort of Truth; but, the cognitive pluralist hypothesizes, the human mind cannot. But if two theories T1 and T2 are true of a world W, yet generate contrary predictions in some cases in W, then either W is not a *possible* world as that notion is generally understood (as that requires consistency), or else true theories do not imply their predictions. (Indeed, one could even derive the conclusion that the *actual* world is not a "possible world" in the sense required by PWS.) This problem, unlike the objection from cognitivism, would seem to be one that arises purely from theory pluralism, independent of its metaphysical interpretation.

What moral should one draw from this? I think the deep issue here is that scientific laws cannot be smoothly grafted onto the kind of semantic model represented by PWS, and may not be easily integrated with modal metaphysics at all. From the cognitive pluralist standpoint, this does not imply that either enterprise (scientific modeling or modal metaphysics) is individually problematic, as he holds that in general disparate models may not be integratable with one another. But it does seem to present problems for enterprises that require us to mix them together. And speculating on whether the truths of one science supervene upon those of another would seem to be just such an enterprise. Here, theory pluralism in the philosophy of science seems at least to raise issues for the scope of modal metaphysics, and perhaps to present real problems for it. These problems are not specific to the metaphysics of *mind*, but do call into question the very terminology in which at least some problems in the metaphysics of mind are cast (*i.e.*, problems involving metaphysical supervenience or metaphysical necessity, especially when these are combined with claims about scientific laws).

Conclusion

The philosophy of mind would seem to be at a crossroads. Familiar problemmatics have tended to be predicated upon the assumptions (i) that there are widespread reductions in the natural sciences, (ii) that

there are close relations between explanation and metaphysics, (iii) that it is safe to treat these problems from the standpoint of a naively realistic inventory ontology without recourse to critical ontology. The first assumption seems to have turned out to be empirically false as a second-order claim about the relationships between theories and models in different scientific domains. This, in turn, challenges the evidential status of all of the familiar positions. Reductive physicalism is damaged, perhaps past resuscitation. Without reductions, materialism is left without the primary means of arguing that inter-domain correlations are symptoms of metaphysical supervenience rather than some weaker relation, and hence even non-reductive materialism is set back. But the dualist alternative also loses argumentative ground as it must either yield arguments based on the Negative EMC (in which case it too is ill-motivated) or else admit that there are failures of supervenience outside of psychology (in which case it ceases to be dualism and becomes a more radical pluralism). Moreover, the explanatory gap in psychology seems no longer to be a unique phenomenon; and if it is not unique, one might raise the question of whether it is as interesting or important as we might have supposed as well. There is, to be sure, an intuition to the effect that there is something *different* about the psychological gaps, but this intuition needs to be fleshed out in greater detail before it can be put to philosophical use.

The main suggestion of this article is therefore that post-reductionist philosophy of science forces us to rethink some mainline problems and positions in the philosophy of mind. To this I have added an outline of what I take to be a promising way of proceeding: by re-examining the philosophy of mind from the cognitive pluralist standpoint, which holds theory pluralism to be a product of how the mind conceives of the world, and to explore the cognitivist turn in metaphysics as an alternative to naively realistic inventory ontology.

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A Relational Process-Oriented View of Physical Reality as a Foundation of the Conscious Mind*

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What is the nature of the conscious mind? Could we have ethics, aesthetics, morals, and religion without a conscious mind? The true understanding of the nature of the human mind lies at the core of any attempt to provide a satisfying account of the higher levels of human life. On the other hand, the understanding of the conscious mind entails the understanding of its relation with the physical world whether it is a relation or some kind of identity. The conscious mind represents the vault stone between the domain of physical reality and the domain of humanities at large.

A long-established tradition assumed that the physical world is different from the world of our mental experience. Such tradition, historically initiated by Galileo Galilei, posits an apparently unsolvable problem, since either the conscious mind ought to arise out of a purely physical ontological domain, or the conscious mind has an independent and autonomous existence. The latter option was embraced by Descartes while the former one had been at the center of the contemporary attempt to naturalize phenomenal experience reducing it to neural activity. So far, such attempt has not produced any convincing result, despite the huge amount of resources employed.

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Instead of trying to reduce the conscious mind to a mindless physical reality, I will pursue here a different strategy. I will criticize the traditional notion of physical reality as a quality-less, relation-less, atomistic ontological domain. I will present a non reductionistic ontological framework that aims at providing a neutral foundation both for the mental, and the physical aspects of reality.

According to Brentano, the hallmark of the mental is the capability of referring to something else. At the same time, most mental states have a certain quality. On the other hand, it is often assumed unquestioningly that the physical world is both not relational, and devoid of qualities. These assumptions lead to incompatible conclusions. Too many unsuccessful attempts have been made in order to reduce either the relational (mental) to the non-relational (physical), or the qualitative (mental) to the non-qualitative (physical). I suggest that the physical is indeed relational and that its relational nature upholds the qualitative aspects of reality. I will outline a process-oriented ontology, labeled process externalism, capable of endorsing a relational view of the physical world. If both the physical, and the mental world are relational, a non-reductionistic stance can be taken in consideration.

Is the physical world relational? Does the physical world contain qualities? The most common answer to both questions is negative. A widespread tradition defends a non-relational physical and quality-free world. Consider the world description offered by a textbook of Physics. No mention of qualities is necessary. Qualities have been exiled to the psychological domain. Our knowledge of the physical world, albeit derived from first-person experienced qualities, is allegedly independent of qualities.

Yet we experience qualities. Qualities are an empirical fact. Even hard-core neuroscientists like Cristoph Koch have acknowledged it: "The provisional approach I take […] is to consider first-person experiences as brute facts of life and seek to explain them" (Koch [2004], p. 7). But since objective knowledge of the world is independent of qualities, the world is supposed to be devoid of qualities. Qualities are supposed to emerge out of the subject — whatever the subject is.

At the same time, it has been observed that our mental states are relational. They refer either to other mental states, or to the world — a fact often labeled as intentionality or aboutness (Searle [1983]). I think of *X*. I see *Y*. I hear *Z*. Although it is still rather unclear whether mental states are always relational, it is fair to say that relations play a fundamental role in the mind. As it happened in the case of qualities, relations too were removed from the physical world.

The picture is made more difficult by the unclear relation between the qualitative and the relational aspect of the mind. Some authors argued

that phenomenal states can be reduced either to their representational, or to their intentional content (for instance, Tye [1990]). Symmetrically, it has been argued that thoughts have a specific qualitative content (Strawson [1994]; Chalmers [1996]; Strawson [2003]). On the other hand, many scholars maintain either that there are purely qualitative phenomenal contents (qualia) or that there are purely intentional, *viz*. relational, mental contents or both (Block [1980]; Shoemaker [1990]; Block [1995]; Chalmers [1996]).

And yet, is the physical world really non-relational and quality-free?

I will argue that we should not necessarily answer positively to this question. This paper is mainly an attempt to argue that the physical world is relational. Furthermore, I will argue that being relational and being qualitative is one and the same. If this were tenable, the traditional gap between subjective and objective aspects could be closed. The suggested process ontology endorses a monistic view of reality, whereas a neutral level of processes can be described either under the objective quantitative perspective, or under the subjective qualitative perspective — that is, I will advocate here a kind of neutral monism grounded on processes not so dissimilar in aim to William James' doctrine of pure experience. Although panpsychism has often been misrepresented and *a priori* rejected, many authors have recently reconsidered it (Chalmers [1996]; Skrbina [2005]; Strawson [2006]).

In section 1, I will sketch out a series of problems that do not seem amenable of a solution once we accept Physics. In section 2, I will address in more details the drawbacks of a non-relational world and I try to show how such a world disagrees with empirical data. In section 3, I will suggest that the physical world (as we experience it) is made of objects which are complex relational wholes. In this respect, objects are processes taking place in time — or, at least, this is what I will argue for. In section 4, I will outline some more details about the kind of process ontology that can be used to deal with the physical world and with the mental world and I will try to get some conclusions.

What Does not Fit in the Description of the Physical World?

In the traditional picture of the world, mostly derived from Galileo's implicit ontology, there are many issues that consistently lead to paradoxes and unacceptable conclusions. I would like to mention a few of the most conspicuous: the issue of *representation*, the nature of *quality*, the belief in the existence of a *magic code*, the problem of *unity*, and that of the *present*. Although apparently distant, such issues share the same common root,

namely the fact that we experience a relational and qualitative world, while Galileo opted for an absolute and un-relational world.

Let me sketch a cartoon view of the scientific fundamental ontology. The world is made of simples (whatever they are: quarks, strings, or something else) which exist autonomously and which drain completely the causal efficacies of all macroscopic level of reality. Furthermore, anything ought to be reduced to them. Such simples interact at microscopic levels and it is hold true that if we were able to know everything there is to know about them, we would know everything worth knowing about reality at large.

What is held true from a spatial and atomistic point of view, is also true from a temporal point of view. The present is a Euclidean temporal point running along the arrow of time. Such point is autonomous with respect to the past, which is no longer, and the future, which is not yet. Although it is the result of the past, it does not require in any way the past existence of the past. In principle, the universe could have been created, as it is, only an instant ago. Such a picture is clean and has many merits. However, it disposes arbitrarily of the world as we experience it. It runs afoul empirical evidence and it dictates the rules of what we can accept as empirical data. It is worthwhile to briefly examine each of these issues.

Representation

The issue of representation has several branches in many different areas ranging from cognitive science to artificial intelligence, from neuroscience to philosophy of the mind. In its traditional form, it suggests that there is some kind of representational relation between two separate entities. This is, of course, a circular and deeply unsatisfactory definition. Unfortunately, other more sophisticated attempts were as much unclear. Commenting on such a gloomy situation, several authors expressed their skepticism as to the possibility of clarifying the nature of representation. John Searle pointed out that "the notion of representation is the most difficult of all", while Jerry Fodor stated that it is impossible to understand how anything could stand for anything else (Searle [1983]; Fodor [1981]). This situation has not improved yet. Basically the problem of representation arises from the fact that something (a sign, a representation) ought to stand for something else (the represented). As long as we use the term in an everyday uncritical fashion, we can always say that a symbol represents something else.

However, as soon as we need to naturalize representations in order to understand how they emerge out of the physical world, things get a lot messier. Since representations seem to be at the root of the subject, we cannot resort to subjects in order to define consciousness.

And since semantics, intentionality, and meaning are all notions parasitical on the existence of subjects, we cannot resort to them either. We are thus left with two equally unsatisfactory strategies: either representations are copies of other entities, or representations have some kind of relation with other entities.

The former option is unsatisfactory for several reasons. I will mention only a few. First, the relation of similarity is logically different from the relation of representation (for instance, one is symmetrical, while the other is a-symmetrical). Second, there is not any evidence of this kind of representations in our brain. Third, even if and when we have examples of representations by similarity, as it is the case with photographs and statues, it can be argued that they are not really similar to their objects, but that they depend on some kind of linguistic convention between their beholders. For instance, for blind subjects, a colored picture in perspective does not resemble its object in any way.

The second option is equally problematic. If we assume that a representation instantiates some kind of relation with the represented entity, we have to suggest what such relation is. In physical terms, there are no plausible candidates. All suggested relations depends on the existence of subjects.

What then? Neuroscience and cognitive sciences use working definitions for representation. A representation of a cat is the neural structure that allows a subject to interact with cats. In this sense, a representation is a functional or causal entity. Unfortunately, it is a pragmatic approach that leaves unanswered the question about the nature of representations.

How is it possible then that a subject experience the outside world by means of my mental representations? There is no answer as yet.

Quality

We experience the world as made of qualities, from the smell of cheese to the nuance of colors in a sunset. Such qualities have no place in the domain of Physics. Ever since Galileo, qualities have been exiled to the mental domain. Yet, when the mental domain is allegedly reduced to what the brain does, where do qualities go? Philosophers have even introduced the term qualia in order to refer to pure qualities as if they were something detached from the physical world. The usual escape is to suggest that qualia emerge out of certain activities of the brain. However, this seems rather problematic because of the following rationale.

Let us assume that in the brain there are certain neural activities that represent certain entities in the outside world. Whenever I have the activity y in my brain, I experience x. Of course, I must assume that I have an experience which is different from the properties Y of y as such, because,

in that case, I would experience a bloody gray jelly substance, which is not. On the contrary, I experience, let us say, the bright yellow of a flower. So, by means of *y* I have an experience of *x* with its property *X* (let the flower be *x* and the yellow be the property *X*). This is a nothing short of a mystery.

In principle, *y* could take place somewhere else without being involved in any perceptual or cognitive process — for instance, in the case of the swamp man. More practically, there is no reason why the same neural activity could not be carefully crafted in a lab without being part of a subject. In such a case, would *y* have any properties beyond *Y*? Of course not. But then, why should *y* become a representation of *x*? How could *y* assume any new property?

By definition, *Y* corresponds to all *y*'s properties when *y* takes place without being part of a cognitive process. They are properties which can be objectively ascertained when *y* is examined. However, when *y* takes place as an aspect of a cognitive process, the subject experiences something altogether different from *Y* — namely *X*. Why?

There are two possible options: either *y* has acquired a new property which it did not possess earlier, or, from the very beginning, *y* had some mysterious hidden property that can be revealed only in conjunction with a cognitive process.

The former option is absurd, since *y* has not changed in the least. It is always the same. The latter option seems very hard to maintain and for various reasons which I will briefly mention. *y* has been selected by a cognitive process because of its functional and causal properties. If *y* had any hidden qualitative aspects, they could not have played a causal role and thus there would be no way to assign to a given percept a particular qualitative aspect. Furthermore, *y* should somehow represent *x*, therefore *y* should acquire the property *X*. However, there is no guarantee that the hidden property *Y'* is in any way related to *X*.

These rationales show that even the hypothesis of hidden qualitative aspects of reality (for instance, David Chalmers' property dualism) or qualia is inconsistent, since there is no way of linking such alleged qualia to the object they should represent and to the phenomena from which they should emerge.

Summing up, if we accept the classic substantial ontology in which everything is physically autonomous, we cannot account for the simple fact of everyday life — namely that we have an experience of our world.

The magic code

The magic code is another way to fall into the same trap outlined in the previous two paragraphs. It looks more promising since it is clothed

in a jargon that sounds more scientific. The usual way to cast the magic spell is to pronounce a claim more or less like this one: "Of course, the neural activity neither shares any properties with the represented object, nor possesses any mysterious qualitative aspect. All that is needed is to decipher the code the brain uses to represents various states in the world." And the spell is usually further flanked by appealing to computer science where, so it is assumed, there are codes capable of representing almost everything. Unfortunately, this is an over-optimistic picture.

First of all, computer science representations are either placeholders or tags parasitical on the human subjects' semantic capabilities. Without human subjects, bits and pixels would be just electronic levels in a computer memory. A computer code is a code because it is part of a chain which has real physical events at its ends. For instance, an audio file codes audio waves because it is conventionally used to transmit audio waves. In principle, the same bits could be used to produce an image. I could create a square image with gray levels corresponding to the pitch of each sample of sound and a number of pixels equal to the number of samples. As a matter of fact, it would be a cumbersome way to represent images, but in principle it could be done. So much the worse for the existence of codes in computer science.

More generally, a code is something which translates something into something else. Therefore, I need at least two sets of entities. For instance, a ciphering code would link certain combinations of characters to certain words, so that I may be able to get gibberish and to decipher it. To make another example, I could have a computer code which links bits to colors. I could stipulate that every three bites define a pixel color: the first bite expresses the amount of red, the second the amount of green, and the third the amount of blue. However, such coding does not mean anything *by itself*. If it were just my stipulation, it would change neither the nature, nor the role of the bits in my computer's memory. But if I were to design my graphic card in such a way that uses those bits coherently with my coding scheme, then any change in the bits would produce a change in the colors on the screen. Yet it is not the code which carries the representational commitment, but rather the causal role of a certain combinations of bits which produce certain colors on the screen. What we call "code" is nothing more than a set of rules to correlate a certain set of entities (symbols, electronic levels, samples) with another set of entities (colors, words, letters). The very idea of code requires two sets of entities. A code, any code, cannot work without two sets of entities: a source set and a target set. A code cannot create its target set by itself.

If I had a code that would translate the neural activity in my experience, I would need the complete set of my phenomenal experiences

instantiated somewhere else. So the code does not solve the problem of experience, but rather shifts it to another place. Where are the experiences that have to be correlated with the neural activities?

Unity

The ontology of the physical world has no place for unities, while our experience is a hierarchy of unities. From a neuroscientific point of view, it is surprising that several neural activities taking place in as many different cortical areas and along a time span of a few hundreds of miliseconds become a unified percept. For instance, perceiving a face requires the activity in all cortical visual areas and takes as much as three hundred miliseconds. Such a problem is usually called the "binding problem" and it has received no clear solution. Many binding mechanisms have been proposed, ranging from temporal synchronization to hierarchical mechanism. So far, no one has been satisfying.

Perhaps the most striking everyday demonstration of the binding problem is offered by our field of view. Watching a normal scene with both eyes, we perceive a unified and continuous field of view with no gap between the left and the right side of it. And yet the visual processing takes place in two separate areas, each in one of the two cerebral hemispheres. So to speak, if we watch someone walking from the right to the left of our field of view, the corresponding visual activity is going to shift from the left to the right hemisphere of our head. How can we explain the fact that we do not perceive any gap in the visual field, ever?

As we will see in the following paragraphs, the problem of unity has deep roots in the ontological domain that arise from the lack of an acceptable criterion for unity. We do not know for sure when a set of events or things become a unity. Further, we do not know whether a unity is something real or just a way to refer to its parts.

Present

Finally, the other troublesome problem is offered by the nature of the present. It is apparently obvious that we live in the present. Yet we do not know what the present is. It is often assumed that it is easy to locate temporally the occurrence of an event. After all, an event has been defined as a property p instantiated at a time t at a location x. I will skip here the not trivial problem whether such a property requires an individual or not. Unfortunately, this definition, as neat as it is, does not match the causal structure of reality as far as we can understand it.

The traditional view of the present offered by Physics runs afoul with our own experience of time. Let me briefly sketch the traditional picture. According to such a picture, the present is a temporal Euclidean point ever running along the time arrow. Such view suggests that:

- t is absolute, uniform, and continuous;
- the state of the universe is somehow all contained in each timeless instant

These two claims have the consequences that the past, all of it, is no longer relevant for the causal history of the universe. The instantaneous present is, so to speak, all that is needed to make the future happen. The past, perhaps appropriately, is no longer. Even more strikingly, the past could never have existed. In order to squeeze all reality in the Euclidean present, Newton introduced derivatives which allow to shorten the span of present up to nothing. Newton got rid of the length of the present assuming that could tend to zero. In such a way, all properties of the world could similarly be squeezed. For instance, velocity could be expressed as a mathematical limit

$$\dot{x} = \lim_{\Delta t \to 0} \left(\frac{\Delta x}{\Delta t} \right)$$

I do not argue here whether such model is physically correct or not. I want to stress that such a model is definitely at odds with time as we experience it. For instance, Alfred North Whitehad points out that (italics added)

> Our observation "present" is what I call a "duration". It is the whole of nature apprehended in our immediate observation. It has therefore the nature of an event, but possesses a peculiar completeness which marks out such durations as a special type of events inherent in nature. *A duration is not instantaneous*. It is all that there is of nature with certain temporal limitations. (Whitehead [1920], p. 187)

Similar views have been expressed by William James, Henry Bergson and many others scholars. Clearly, here we face a conflict between time as we experience it and time as it is described by Physics. Notwithstanding how much we trust Physics, there is a blatant conflict that is not going to be easily solved.

Is the Description of the Physical World Complete?

As we have seen, in many different fields there are conflicts between our experience and the world description offered by Physics. The usual approach to such diffuse inconsistency is to accept Physics and then to try to reduce our own experience to it — *no matter the losses*.

Here, we will take into consideration a different hypothesis, namely that our understanding of the physical world could be enriched by integrating it with what we know from our phenomenal experience. In other words, we will consider whether in the physical world there is anything which could account for unity, representation, present, and quality.

Up to now, such an approach has rarely been taken into consideration, since we are all victims of Galileo's divide. Laymen — and often scientists, too — assume that the physical world is devoid of any formal and qualitative properties. This is rather surprising since our experience of the world is full of qualities: color, smells, shapes, tastes, sounds and so forth. Our experience of the world is not made of numbers, geometrical relations, or physical quantities, but rather of fleshy chunks of experience, each constituted by a specific quality. What is the nexus between qualities and the physical world?

Traditionally, the hypothesis of a world without qualities entails to locate qualities *inside* the subject: if qualities are not in the world, then they must be elsewhere. Qualities and relations were removed from the physical world. Physicists got rid of the problem of explaining reality as such, but rather reality *modulo* a set of essential features that were located inside the subject (whatever the subject was). This epistemic strategy was extremely successful although it induced many to accept assumptions that oversimplified the problem of the nature of the world. Epistemic success transfigured itself in an ontological orthodoxy. But, for once, epistemic efficacy must not be mistaken for ontological truth.

Sometimes, it is assumed that relations in the physical world and intentionality belong to two different domains. Yet, if we ever want to provide a unified picture of world and mind, it is paramount to ground both aspects on a common foundation. So it should not be surprising that I will start my analysis of relations from the physical world.

In science, the removal of the intrinsic relational nature of many phenomena suggested the self-consistency of many entities: mass, absolute space, the living organism, the cell, the genetic code, information, the conscious mind. In time, such self-consistency was strongly questioned (Jammer [1954/1993]; Oyama [1985/2000]; Bickhard [2001]) and rejected in most cases. For instance, according to Mach's principle, the inertial mass depends on the relation with all the other masses of the universe. Absolute space got a relational twist due to Einstein's theory of relativity. The living organism cannot be conceived and understood without its ecological setting. The cell would not exist outside of an interconnected chain of interactions and inside the proper ecological niche. The genetic code has no intrinsic meaning and is tightly coupled with the cellular body. Information has no autonomous existence, it depends on the interactions

between a source and a receiver — whatever they are. It is questionable, finally, whether the conscious mind could be conceived in isolation or is rather a way to refer to a network of causal interactions with the environment.

Another well-known example of the importance relations acquired in developing explanations for physical phenomena is the science of complexity. At the beginning of system theory, it was maintained that systems could be studied in relative isolation; a claim that proved to be fatally wrong. To deal with real systems, scholars started to develop techniques to deal with complexity in practically all fields from engineering to weather forecasting.

In short, the invention of a non-relational physical world suggested that the world is made of self-sufficient individuals with their properties. It is a very simple ontological framework which has been embraced also by most analytical philosophers (Strawson [1959]; Armstrong [1989]). The illusion of a non-relational physical world was extremely attractive since it allowed studying several phenomena in isolation. Unfortunately, such attractive framework does not seem to fit with the empirical experience.

Whitehead wrote at length against such a common-sensical view of the world as made of "bits" which are "enduring self-identically". Each such bit "occupies a definite limited region" and possesses its own set of intrinsic properties such as "its mass, its colour" and the "essential relationship between bits of matter is purely spatial" (Whitehead [1938]).

Contemporary science stresses the interconnected nature of most, if not all, physical phenomena. It is ironical that the non-relational view of the physical world, now mostly out of date, still survives as to the qualities we have an experience of.

The absolute view of qualities is once more a result of their placement inside the subject — whatever the subject is. If subjective experiences were instantiated inside the subject, they would be absolute and not relational. The non-relational view of the physical world ended entailing a non-relational view of the mental world, too. As shown in *Figure 2 a-c*, qualities and relations were squeezed out of a physical world that, being not relational, could not foster them. Unfortunately, this *divide et impera* way of partitioning reality suggested splitting the relational and the qualitative aspect of experience, too. In *Figure 2* (following page), there is the final conceptual result: all aspects of reality (relations, qualities, physical occurrences) lay in separate conceptual slots with no hope of reunion.

As subjects, we are well aware that our own experiences are tightly coupled with the causal flow of physical events. At the same time and *contra* Galileo, we have a strong pre-theoretical intuition that qualities are not a pure mental outcome. Somehow, the green we see is related with the

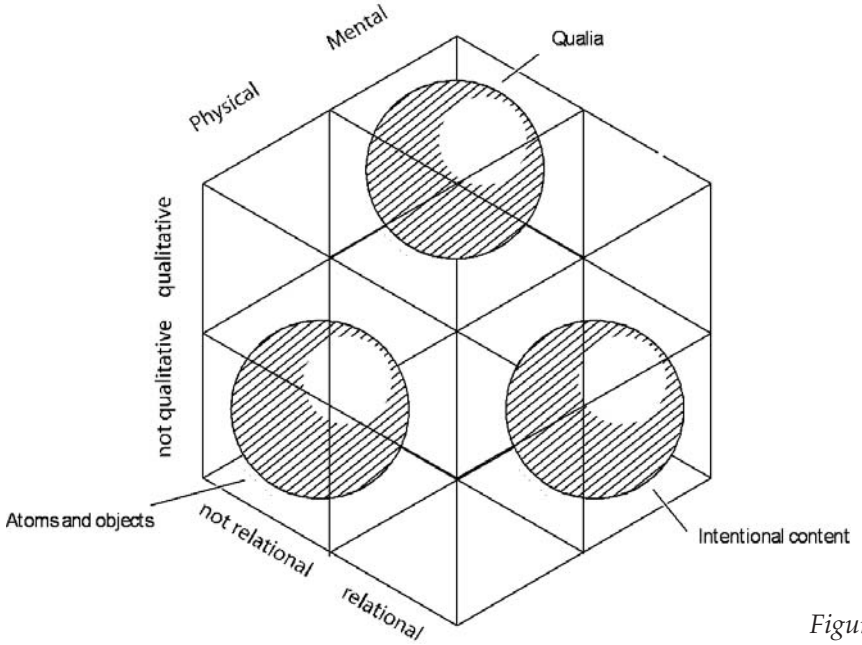

Figure 2

	Not relational	Relational
Physical	Objects Atoms	
Mental	Qualia ?	Intentionality (Brentano's thesis)

a

	Not qualitative	Qualitative
Physical	Objects Atoms	
Mental		Phenomenal experience (Qualia's thesis)

b

	Not relational	Relational
Not qualitative	Objects Atoms	Intentionality ?
Qualitative	Qualia ?	Mind

c

properties of the grass out there, as well as the deep humming produced by a subwoofer is related with the nature of air pressure. Phenomenal experiences have causal consequences and causal antecedents. We are in relation with the world, and the world seems somehow continuous with our being. How do we conceal such empirical and experiential intuitions within the traditional framework that segregates relations, qualities, and physical occurrences in water-tight theoretical slots?

It is fair to suspect that the neat but hopeless conceptual landscape is the unwanted result of oversimplifying hypotheses about the fundamental structure of physical reality. In order to overcome the present limitations, it is worthwhile to take into consideration a new conception of the physical world in which qualities are not located inside the subject, but rather belong to the physical world in general.

The Relational Nature of the Physical World

Here I will consider a particular aspect among those mentioned above — namely whether is it possible to locate relations in the physical world. I will restrict my analysis to a particular case — a process and causal-oriented analysis of wholes — and will eventually try to generalize such a view to other aspects like quality and representations.

In recent years, some authors have pointed out the relational nature of many phenomenal experiences, as well as the relational nature of many physical phenomena (Byrne and Hilbert [2003]; Nöe [2004]; Byrne and Tye [2006]). By "relational nature" I mean the fact that a phenomenon cannot take place in isolation, but is always the result of an interaction between separate phenomena. A paradigmatic example of a relational physical phenomenon is offered by the rainbow (Manzotti [2006]), which cannot either occur, or be conceived without an observer.

However, as mentioned before, the physical world is often conceived as self-sufficient. This is particularly true for the common-sensical picture of the physical world used in everyday life. The world of our experience is a made of macrophysical events involving objects like chairs, tables, walls, buildings, hills, and planets. They seem to be what they are independently both of their surrounding environment, and of subjects.

Furthermore, we are not directly aware of the fundamental properties of the physical world. We have no experience of electricity, gravity, photons as such but rather of much greater entities. We are aware of objects, reflectance curves, and complex relational properties (like an affordance or a sensory motor contingency; see O'Regan and Nöe [2001]; Jones [2003]; Nöe [2004]). I am aware of a chair, a face, a certain shade of color which is a complex result of several conditions, or a pattern of sound waves. This is the reality I have an experience of. The reality I come in contact with is not made of primary qualities, but rather of complex wholes.

Does this macroscopical reality exist autonomously? Or is it rather a reality that has a relational nature? Here, I would argue for the latter option. The target of this paragraph is the macroscopical object. I will argue that an object does not exist autonomously, but requires the relation with a proper physical system. On the other hand, I am confident that the same arguments could well be applied to other cases like colors, smells, tactile patterns, and flavors.

The notion of object is strongly related with that of whole. An object is a whole made of several parts: surfaces, three-dimensional parts, or even atoms. A macroscopical object is definitely not atomic in the etymological sense ("atom" means indivisible).

Consider the classic Dalmatian dog of the *Gestalt* psychology. Is it a whole or rather a scattered sum of black patches? Consider a face. Is it a whole or rather a juxtaposition of facial features? Consider a chair. It is made of four legs and a few flattened surfaces. Is it a whole or just a sum of scattered patterns? Consider the seven stars in the sky that compose the *Ursa Maior*. What is the *Ursa Maior* constellation? Is it a whole or is it a set of separate physical phenomena?

Here, for the sake of simplicity, with the word *whole*, I refer to what has been elsewhere called — albeit with slightly different meanings — "integral whole", "mereological sum", "natural unit", or "fusion" (Simons [1987]; Nolan [2006]). I refer to a scattered collection of elements as an "arbitrary sum". An object is a whole.

I would argue that in order to have a meaningful notion of whole, and thus of object, we need to introduce a relational and temporal aspect.

Assuming a non-relation standpoint, and given n elements (or initial entities of any aforementioned kind), how many wholes are there, if any? There are three possible answers. First, the principle of *Unrestricted Composition* holds that for any group of elements, there is a whole that they constitute (Lewis [1986]; Bigelow and Pargetter [2006]). Succinctly, it states that "whenever two things exist, then there is also a third thing that contains those two as parts" (Bigelow and Pargetter [2006], p. 486). Such view admits the largest possible number of wholes (for n parts, it accepts wholes). The second option — sometimes referred to as *Restricted Composition* — limits the total number of wholes. It is an option closer to our everyday experience. Unfortunately, as we will see, up to now it has been an ambiguous and vague option. Finally, the third option — *No Composition* at all — maintains that there are no wholes.

The main problem of Unrestricted Composition and No Composition is their distance from common sense. The main problem of Restricted Composition is its inherent vagueness. To avoid it, for lack of an unequivocal criterion to distinguish between wholes and arbitrary sums, previous authors suggested accepting Unrestricted Composition or No Composition (Lewis [1986]; Sider and Braun [2007]). As Daniel Nolan pointed out (Nolan [2006], p. 717): "Unrestricted composition seems to disagree with common sense (and it certainly goes well beyond it), while it allows that there is a whole object whenever common sense says there is; it says that there are wholes where common sense does not (there is an object which is my left ear plus the Alpha Centauri system, and it does not include intervening objects in the intervening space, or elsewhere)."

It seems fairly agreeable that, according to most versions of Restricted Composition, a whole made of Nolan's left ear plus the Alpha Centauri system is not *really* a whole. There are collections of things that do not

seem to constitute a real whole. Are they a whole? Hardly. And yet, why? So far, Restricted Composition has not offered a substantial alternative.

The criterion "hanging together when pushed" does not hold for many otherwise acceptable wholes. There are wholes that span in time like an uttered word or a sound — they are smeared across time. A series of sound waves, constituting an uttered word, could well be a whole, without being made of things hanging together. Peter Simons stressed the absence of a working criterion (Simons [1987], p. 291): "How a number, a sigh, a poem, a person, a galaxy, and a thunderstorm could comprise and exhaust a single individual seems beyond understanding".

A possible solution is to consider a whole as a relational entity and, thus, objects as relational entities. What kind of relation are they? I suggest considering a simple causal relation. An object does exist if it is engaged in a causal process. According to this view, something does exist if and only if is the cause of something as a whole. Consider two propositions:

[a] *A* exists
[b] *A* produces effects

Let *A* be any kind of physical entity: an object, a state of affairs, an event, a particle, a person, anything that can be conceived as being concrete (like a stone, a star, a flame, an explosion). My claim is that [a] and [b] are coextensive. In other words, whenever [a] holds, [b] holds too and viceversa.

By absurd, suppose now that [a] and [b] are not coextensive. Then there should be some entity A^* for which [a] is false, and [b] is true, or viceversa. Is it possible?

Consider [a] false and [b] true. If this were the case, there should be an A^* that produces effects and that does not exist. It would be something that would deny the classic picture of reality. It would contradict the law of conservation of energy and matter. It would not make sense. It is, at least, nomologically impossible.

Consider [a] true and [b] false. If this were the case, there should be an A^* that exists and does not produce effects. This looks less problematic than the previous case; yet only apparently. Let us see why. It is impossible to measure or observe something like A^*. To be measured or observed, A^* must produce a distinguishable effect on some instrument of measure. Light is observable since it produces effects on the cones and rods of our retina or other suitable physical apparatus. Mass is measurable since it curves space and thus it exerts a force. By hypothesis, we assumed that A^* does not produce any effect whatsoever. Thus, whether A^* exists or not is not an empirical or scientific fact, since it cannot be the object of any

observation. Furthermore, from a broader point of view, the existence of A^* cannot make any difference for anything else in the universe. In fact, A^* is out of our universe to all practical and non-practical purposes. Another way to put the matter is the following: there is no difference between the existence and the absence of something like A^*. Again, it is nomologically absurd that [a] and [b] are not coextensive.

Then we are left with the fact that whenever [a] is true, [b] must be true and viceversa. If this holds, then existing and producing effects are coextensive. This is quite interesting, since it means that existence is always embedded in a causal relation spanning time and space — something on which we will build upon in the following.

Grounding the notion of existence on that of causation could seem rather hazardous, but there could be no other viable solution. I rest on Davidson's view about causation (Davidson [1969/1980], p. 172): "The inevitable comment (since the time of Mill, anyway) is that the striking may have been *part* of the cause, but it was hardly sufficient for the lighting since it was also necessary for the match to be dry, that there be enough oxygen etc. This comment is, in my opinion, confused. For since this match was dry, and was struck in enough oxygen, etc., the striking of this match was identical with the striking of a dry match in enough oxygen. How can one and the same event both be, and not be, sufficient for the lighting? In fact, it is not *events* that are necessary or sufficient as causes, but events as *described* in one way or another." In short, I do not rest my argument on a type notion of causation but on actual causal occurrences.

The idea that existing is coextensive with producing effects can be fruitfully applied to many problems (Manzotti [2006]). Consider the figure known as Kanisza's triangle (*Figure 3*, on the left). In that figure, there are three black round shapes with a missing sector. Consider each of these shapes as an atomic object. The question is, here as above, how many objects are there in the picture? A possible answer is "three" (No Composition). Another answer is "four" — the three shapes plus the whole made of all of them (a case of Restricted Composition). A further possible answer is "seven" — the three shapes plus the whole made of all of them plus three bi-shapes made of two shapes each (Unrestricted Composition).

Since No Composition does not satisfy our pre-theoretic intuition about reality, Unrestricted Composition inflates the number up to seven, which seems too much. Whereas the former approach turns down every whole, the latter considers every possible combination as real. Unrestricted Composition appears to be too prodigal. The total number of possible wholes is definitely much larger than those that are actually taking place. A number of 100 parts would be enough to produce 1.2×10^{30} potential wholes.

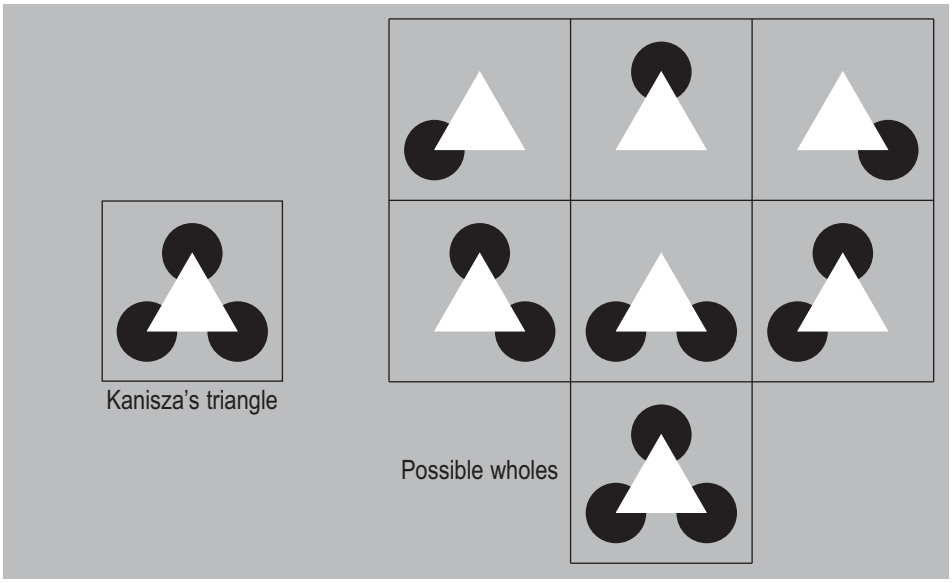

Figure 3
How many objects are contained in Kanisza's triangle? One, three or seven?

As I mentioned above, neither Unrestricted Composition, nor No Composition satisfies our pre-theoretical intuitions. The most common answers would have been "one", "three" or "four". These correspond to the intuition that there are some combinations that are real wholes, while other combinations are not. How to distinguish between them? The whole made of three shapes looks more real than the three intermediate wholes made of two shapes each. This is a phenomenon with a very well-known perceptual explanation. But here we are interested whether there is any ontological difference. Look in *Figure 3*, what makes *g* a whole lot more "substantial" than *d*, *e*, or *f*?

I suggest that the difference is an actual occurrence of a causal relation that makes *g* ontologically a real whole instead of an arbitrary sum. On the basis of the causally related view of existence outlined above, a whole is not something that exists, rather it is something that takes place. The only way to take place is to produce effects. In other words, a whole exists insofar as it produces an effect.

The threshold between possible wholes and real ones corresponds to the difference between those actually producing effects and those not doing it.

In *Figure 3*, I draw explicitly the seven different "potential" wholes made of three blobs. Such a sketch is misleading, since they are potential wholes only, represented in a timeless domain.

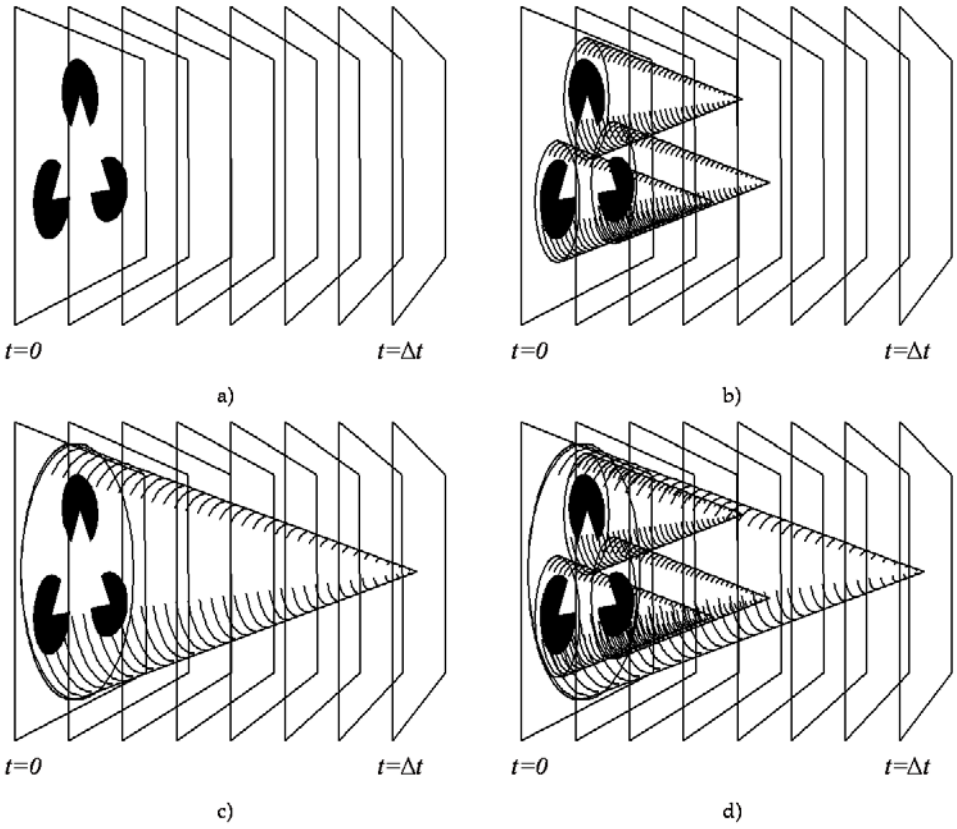

Figure 4

The relation between wholes and parts can be approached in a temporal domain where a whole corresponds to a causal relation taking place in time.

On the contrary, in *Figure 4*, I try to represent explicitly the temporal dimension of these wholes. They do exist, since they produce effects.

In *Figure 4 a*, the three blobs are represented in $t = 0$. Is anything going to happen because of them? If nothing is going to happen because of the three blobs, I claim that they do not exist.

For the sake of the argument, consider the three blobs in a toy universe. In such a universe, there is only one other entity. This other entity, whose nature we are not concerned with, is capable of interacting with a single blob at a time. The entity acts as a context that lets a blob at a time produce an effect. An example of context is an environment with enough oxygen, a given air pressure, a certain level of humidity etc. Other examples are neural structures, locks, any physical system capable of reacting to other physical events.

In such a universe, the only possible occurrence is produced by a two-way interaction between one of the blobs and the other entity. In such a universe, only single blobs exist. This is a universe corresponding to No Composition and is represented in *Figure 4 b*.

Let us modify the toy universe. This time, there is only one other entity, different from the previous one and capable of interacting with three blobs at a time. One or two are not enough to trigger the interaction. Three are needed. In this universe, only the whole of the three units exist; single blobs do not exist. This universe is represented in *Figure 5 c*.

Finally, let us introduce two entities — one capable of interacting with a single blob and another one capable of interacting with three blobs together. In this universe, the most similar to our own, there are four entities — the three blobs and the whole made of three blobs. This is a universe satisfying a version of Restricted Composition — *viz.* a casually grounded version.

Building on the previous considerations, I suggest a definition of a whole which can be used to endorse macroscopical objects. *A whole is any collection either of events, or their relations or both such that they are the cause of a joint effect*.

The proposed definition can be used to get a better picture of what an object is. An object is a part of reality that interacts as a whole with other portions of reality. Usually the latter role is played by subjects, but it is not mandatory.

According to this view, a table is an object because it can usefully interact with human beings in order to let them lay down other objects on a flat surface which has no direct contact with the ground. The Dalmatian picture is a dog since our perceptual and cognitive system allows it to take place in a certain way. Other kinds of observers would not see the whole and thus the scattered sum of black patches would not become a whole. Faces are objects because they are continuously amidst subjects capable of recognizing them. Finally, the *Ursa Maior* constellation becomes an object in its own right, because at the end of a long journey the light rays emitted by its seven stars meet a human eye linked with the proper brain.

A question could spontaneously arise: were there any objects in the universe 10 million years ago? 1 billion years ago? What level of "observer" is required to unify phenomena into a whole, and hence into an object? I suggest that the perception of an object is identical with the taking place of that object. For instance, is it meaningful to conceive characters even without subjects capable of recognizing them? Are there patterns without observers? An observer is here conceived not as an epistemic agent who chooses a favorite interpretation. The observer of x is any physical system that would allow x to take place and produce effects as a unified entity.

X could be made of any complex set of physical phenomena whose existence does not depend on the existence of the observer of *x*. The observer of *x* would not exist without *x* and, symmetrically, *x* would not exist without the observer. I suggest a twofold view. First, observing/representing something is being in relation with that something. Second, being in relation with something means to be identical with that something by means of a process in which two aspects of reality — traditionally conceived as separate — are embodied by the same process.

Consider a closely-aligned binary star system somewhere in the universe, and a planet orbiting the pair at a distance. Does the planet unify the pair of stars into one object? In fact it does; however, it is a very poor observer, since the only two phenomena which are unified are the stars' masses, momentum, speed, and position. A human astronaut, orbiting in the same way, would probably unify many more aspects: shape, colors, textures, patterns on the surface, and many others. The human observer and the planet are both observers of the pair of starts, but they observe and unify different physical phenomena. Thus, they are observers of different objects. For instance, there is a process that begins with a nice color combination of the two starts and ends in the astronaut's visual cortex. Without the astronaut, such process would not take place. The planet would be unable to make it happens. The center of gravity is just a mathematical simplification. There is no such a thing as the center of gravity. Bodies behave *as if they were* attracted by a center of gravity. But the center of gravity is just a conceptual shortcut to make computations easier.

A long-respected tradition assumed that objects must exist independently of any interaction with the surrounding environment. This is, unfortunately, an oversimplification.

A Process Ontology Could Endorse a Richer View of the Physical World.

If an object is something that takes place because of a causal relation between a set of events and a proper context, an object has an intrinsic temporal nature, since all causal relations have a temporal nature due, probably, to the spatio-temporal fabric of our universe.

The problem of the nature of the physical world shifts from a timeless perspective to a temporally-oriented view. An object corresponds to a causal relation in time and space. Hence, objects are not entities that can be defined in any *a priori* way. Rather, they correspond to the way in which events are causally connected. An interesting consequence of the suggested view is the fact that, if there were no time, there would be no objects.

Let me sketch a few consequences.

First, imagine it were possible to freeze time. According to a widely spread opinion, if time were halted, everything would remain frozen like in a snapshot. Raindrops and snowflakes would remain still in the air. Cars and bystanders would stay motionless. But think some more. In such a timeless instant, there would be no sounds, since sounds require time. There would be no neural activity since neural activity is implemented by means of chemical sequences spanning time. There would be no light since light rays travel in time. Finally, there would be no objects, since every object requires time to take place — at least, according to the approach I presented here.

Second, different objects have different temporal durations. For instance, in order to take place, a face needs the time required for light to travel from one person to another plus the time required by the neural machinery of the beholder to allow the face to take place as a whole. Each object has its own specific time equal to the time requested by the corresponding causal relation. Thus, given a certain temporal window, certain objects are excluded.

Third, reality is thus made of objects taking place in different temporal lengths. At the same time, there are objects very short and objects much longer. An interesting example is offered by the human perceptual system where different perceptual objects, corresponding to many different collections of events in the environment, produce effects in different instants (Zeki [1978]; Zeki and Moutoussis [1997]; Zeki and Bartels [1998]). For instance, movement takes more time than colour to produce an effect in the brain. A bright spot would produce a very fast response, while a face would take a longer time. So there are fast objects and slow ones.

Fourth, since objects do not exist, but rather take place, they are temporally located. A persisting object needs to be continuously rehearsed.

Fifth, objects are locatable. There could be either objects whose elements are already scattered in time (like a piece of music made of sounds that are scattered in time) or objects whose elements take place at the same time (like the black spots on a piece of paper constituting Kanisza's triangle). In both cases, the causal relation, thus the event that "completes" the objects, must take place, at least, a little after the last event of the collection.

When does an object take place? If an object is a causal relation spanning from its elements to the joint effect, when is the whole located in time? At least, there must be one first event (or a sub-collection of events, if they are synchronous) at one end of the causal relation and the effect at the other end. The interval of time is finite. When does the object take place? The object cannot be considered complete until the final effect

has taken place. There is not one temporal instant where the object is condensed. The object corresponds to the whole causal relation smeared in time and space.

However, something could go wrong along the way. The object does not take place unless and until the final joint effect does take place. Metaphorically speaking, it is like getting a degree. Assume that you have passed all exams and prepared and printed you thesis. Yet, because of some unexpected event, you miss to defend it, on the very last day. You cannot say that you took a degree. Although the underlying relevant phenomena are practically the same (studying, passing exams, writing your final dissertation), what you did becomes "getting a degree" only after the dissertation, which is the final effect.

In some sense, the occurrence of an object is only potential until it actually produces an effect. However, when it does produce an effect — and only then —, the object takes place from its very beginning.

Objects do not "occur" until the final joint effect happens — incomplete objects have no degree of existence. "Objectness" does not exist on a sliding scale — say, from lower intensity to higher intensity? Although it could seem counter-intuitive, I defend an on/off view of objects: something like the series: O – O – O – O – object! After all, this is exactly what happens when we look at something and, all of a sudden, something snaps and we are aware of that something. Neurons work in this way, too. They fire when their inputs reached a certain threshold. I try to avoid to recur to any kind of fuzzy or potential entities — either something takes place or it does not.

If this relational view of the world, based on a process ontology, is tenable, the traditional separation between the relational mind and the not-relational physical world would not hold any longer. The world and the mind could share the same relational structure embodied by the same physical processes. Furthermore, these processes are promising candidates for mental states in general (Manzotti [2006]).

We can now build on the, maybe still incomplete, arguments presented in the previous paragraphs. There are two conflicting views which I will briefly summarize.

On one side, the Galileian view assumed that:

(1) reality is made of self-consisting and autonomous individuals;
(2) such individuals can be known only by means of relational/quantitative properties;
(3) intrinsic properties of objects are beyond our grasp;
(4) qualities and relations "emerge" inside the subject.

In the first paragraph, we addressed some of the several problems that arose from this view. There is no need to repeat and stress again its main drawbacks and shortcomings. On the other side, the presented view suggests that:

(1) reality has a relational nature based on processes singling out portions of reality;
(2) such processes are known because they are part of subjects;
(3) qualitative and relations are identical with these processes;
(4) qualities and relations are not inside the subject but rather in the world.

It is a view that can be considered a kind of pan-psychism at least according to the broad definition suggested by David Skrbina ([2003], pp. 15-22), since it suggests that they are not located inside the nervous system, but rather take place in the environment. Yet pan-experientialism is maybe a better term, albeit with some minor modifications from Griffin (1998) who suggested that pan-experientialism means that "everything experiences". I would rather maintain that "everything is an experience" in the sense suggested by the late William James or Ernst Mach (Mach [1886/1959]; James [1908/1996]). The difference is that I emphasize a neutral ontological framework in which there is no need to bring out the qualities that, after Galileo, have been localized inside. The world is made of occurrences that, when part of the experience of a certain subject, are described both in relation with other occurrences (as in the objective knowledge), or directly (as in phenomenal experience).

There are occurrences. These occurrences sometimes coalesce in a whole that is the subject. When they are part of the subject, they are not different from what they are when they take place individually.

To experience something means that that something is part of the subject. Therefore qualities are no longer phenomenal or subjective, they are part of the physical structure of the world.

Inside the subject, each occurrence can be experienced directly (as an intrinsic quality or content) or by means of comparisons and relations with other occurrences (as in the objective/quantitative/relational description).

I see a color while Sabrina sees a different nuance. How is that possible under the suggested view? The classic answer would suggest that my brain concocts a different phenomenal quality from that concocted by Sabrina's brain. My answer is that I single out a certain relational structure in light reflectances, while Sabrina singles out a different relational structure. In both cases, the color we see has not been created *inside* our

brain, but it is a physical process taking place partially inside our body and partially in the environment.

We can thus try to address each of the points presented in the first paragraph. The notion of representation gets a twist since there is no more a separation between the represented and the representation. What we refer to with these two cumbersome terms are just two partial and incomplete descriptions of the same phenomenon. The problem of the present, too, is apparently easier, since we have no longer a Euclidean temporal point, but rather a process spanning a discrete amount of time. Similarly, we would no longer need to resort to code et similia. Finally, each process defines a physical unity and thus we can find a way to locate unities.

Whether such model will really be successful, it is difficult to say. However, the general strategy seems promising and could cast a different light on the relations between humanities and hard sciences.

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Understanding Levels: Redefining Science in an Emergentist World View*

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An emergentist world view sets certain challenges to our notion of science and of the kinds of explanations of our world that it seeks. A first is to identify different emergent levels of reality, the living from the non-living, the conscious from the non-conscious, and within consciousness itself the distinctive emergence of the creative powers of the mind and the freedom of decision-making. A scientific explanation of the levels will entail an analysis of what is distinctive about the properties and activities on the different levels, the worlds that they operate in and the upward and downward causal relations involved with other levels. All of these feed into a transdisciplinary approach to personhood.

I

In his book *DNA, The Secret of Life*, James Watson formulated his reductionist creed for molecular biology: "Life is just a matter of physics and chemistry, albeit exquisitely organized chemistry" (Watson [2003], p. 61). Francis Crick went on to ask the further question: "What does DNA do in the cell?" (Crick [1988], p. 89). By 1966, it became known that it is involved in the synthesis of the 20 aminoacids which in turn manufacture proteins. The genetic code, according to Watson, brings DNA to life! Red

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blood cells are produced in the bone marrow by stem cells at the rate of around two and a half million per second. Following Crick and Watson, this was interpreted in terms of the active agent DNA synthesizing the haemoglobin in the cells in a most complex and precisely timed switching process.

This basic reductionist strategy of attributing agency to genes, which after all are only chemical molecules, is now being criticized by some as ontologically and ontogenetically misguided. Alternatively, it can be proposed that in the regular manner and precise timing in which we find DNA exquisitely organized by the cell or, more generally, the organism in protein synthesis we can identify properly biological laws at work. Perhaps Watson, in his above remark, is, without recognizing it, undermining his very reductionism.

What is distinctive about emergent biological laws is that they are developmental, they are involved in the development of organic life from a single cell to the myriad of body designs and related life cycles that we find in the genera and species of our world. So, as well as housekeeping genes involved in protein synthesis, there are also to be found at the animal (but not the plant level) the *Hox* genes that have a fundamental role to play in the development of the emerging body design of the organism, be it a fish, frog, bird, or human. These are distributed in a spatial sequence along the chromosome and their switching on and off is precisely synchronized with the development of the body shape along the parallel spatiality of the head-to-tail body axis. Mutate *Hox* genes and you mutate the design of the body in many instances. This can lead to the reductionist conclusion that the adult human organism is simply the product of the cumulative switching on and off of the appropriate *Hox* genes (or, more generally, the genome) at the appropriate time in the development process.

But is there not much more to development and evolution than can be learnt by focusing on genes and genomes? Is it not the case that no part of any living unity and no single process of any complex activity can fully be understood in isolation from the structure and activities of the organism as a whole?

This leads Jason Roberts, in his *Embryology, Epigenesis, and Evolution: Taking Development Seriously*, to question why organisms are still "so often portrayed as basically or ultimately the product of genes" (Robert [2004], p. 130). For him, taking development seriously involves criticizing the common notions that genes instruct or program the future organism. Acknowledging that there is general agreement about what must be taken into account in a theory of organism-development, Roberts concludes his book with the questions: "Why, then, have the limitations of genes plus accounts of interaction not been more widely recognized and appreciated?

Why do modern consensus metaphors of genetic programs and primacy persist?" (*ibidem*). Again, the question remains: In the exquisite organization of the DNA in organic development, do we not come to understand the properly biological laws of the organism? In organic development does the organism manipulate the *Hox* genes or do the genes manipulate the organism?

To turn to the field of consciousness studies, we find Francis Crick setting a tone with his creed that our joys and sorrows, ambitions, sense of personal identity, and free will are "nothing more than the behaviour of a vast assembly of nerve cells and their associated molecules" (Crick [1994], p. 3). In a debate about dreams at The Science of Consciousness Conference in Tucson, in 2006, a neuroscientist was adamant that dreams were just neural noise; a Freudian, that they had all the meaning and significance of Freud's interpretative analysis in a person's life. Are dreams caused by accidental neural processes or does the organism manipulate the neural basis for the dream out of the life context? As biological organisms can manipulate their chemistry, why should the stresses and strains of the psychological processes of an organism not be able, through their proper autonomy and laws, to manipulate the neural structures and processes in the production of dreams? As Lonergan ([1992], p. 212) puts it, in the drama of our lives with others can there not occur a "subordination of neural processes to psychic determinations"? What precisely might be meant here by that subordination of the neural to the psychological?

It is a question that arises in the context of the study of the interaction of emergent levels of activity in the development of a human being. In his electrical stimulation of the cortex while conducting surgery, Wilder Penfield observed that the sensory motor action that is so produced was so primitive and lacking in dexterity, that it may be likened to the sound of a piano when the keyboard is struck with the palm of the hand (Lewis [1981], p. 200). The memories so evoked were disjointed, hallucinatory, and difficult to analyze. This posed for him the question: How and from where in the *brain* did the concert pianist transform that crude action into the subtle, dextrous movements of a Mozart piano concerto? Or a ballerina transform the crude cortical reflex into the graceful *points* and *pirouettes* of the *Nutcracker Suite*? It is significant that he poses the question in terms of the pianist being the agent of transformation. Reductionists would rephrase the question as: How does the brain produce the concert pianist and ballerina?

A similar question arises in the context of learning a new spoken language with a need for an extensive vocabulary for active use in everyday and technical situations: Does the brain produce the language user or the language learner subordinates and transforms the brain processes

in the course of becoming a competent linguist? Jackendoff acknowledges that the cognitive factors involved in language acquisition are unclear. He divides linguistic structure into the phonological, syntactic, and semantic or conceptual and then asks the question: "What aspects of linguistic structure correspond most closely to the character of awareness — as it were, to the qualia dimension when one is experiencing speech?" (Jackendoff [2008], pp. 31, 81]. There results his strong emphasis on the phonological.

Acknowledging bilingual speakers, he suggests that meaning is universal, it does not come in French or English. Going against what he terms a very deep prejudice of such thinkers as Bernard Baars, for whom conscious thought is taken to be the highest level of cognition, he argues that "the form of thought itself is always unconscious" (Jackendoff [2008], p. 83]. Distinguishing between the unconscious, subconscious, and conscious, Ayn Rand asserts that the self-consciousness of our understanding is greatly heightened when learning a new language, but lessened in our use of it as experts (Rand [2001], p. 58). What is clearly emerging is the elements of distinct levels, the neural underpinning the sensory with its qualia on the phonological level which in turn is the basis of the level of sense or meaning and reference in language-learning and use. One's senses are unavoidably involved in assimilating the correct pronunciation of a word. One's intelligence is involved in understanding the correct meaning of the words spoken and the manner in which they are to be used in conveying meanings in different circumstances.

In her study of language-learning, Maryanne Wolf distinguishes a number of developmental stages (Wolf [2008], pp. 81-162). Humankind was initially oral, pre-literate in its communication and had to negotiate the transition through alphabets and writing to literacy. Involved was the "insight that a system of symbols can be used to communicate across time and space, preserving the words and thoughts of individuals of an entire culture" (*ibidem*, p. 26). Under the influence of his/her teachers, the child as learner also has to negotiate that development and become an accurate reader who can visually identify the physical words on a page as well as their sense and reference. There follows the developmental stages of the competent and expert reader. Through her empirical study of children as learners of alphabet and character-based writings, Wolf has tracked the changes in the brain that accompany the different developmental stages involved in the journey of the reader.

Wolf insists that the thrust of her book is more biological and cognitive than cultural. But she does add, reminiscent of Wittgenstein on the insightful way we use words (Wittgenstein [1922], para. 6.211) that "how we think and what we think about is based on insights and associations

generated from what we read" (Wolf [2008], pp. 5, 17). This would seem to suggest that the decisions we make about what we read and write play a not insignificant role in the kind of reader or writer we become, right down to the neural level.

Wolf also provides a telling account of some personal insights involved in her expert reading of George Eliot's *Middlemarch* over three decades. If one missed a single sentence relating Dorothea's understanding that there was no great unifying work behind her husband's researches, "then much of the nuances of the next fifty pages will also be missed" (Wolf [2008], p. 157). Also significant is the remark that there are layers of meaning and significance in the text to be discovered, the insights into the higher layers uniting the meanings of a series of lower layers. After three decades of identifying with Dorothea's disillusionment, noticing a passage that had previously slipped by her attention suddenly helped Wolf to grasp the different perspective of Mr. Casaubon's fears and unmet hopes. To illustrate the highest form of expert reading, she turns to a difficult passage from Dostoyevsky's *Brothers Karamazov*. The whole of one's life experiences can be brought to bear on interpreting the meaning of such passages.

To Wolf's work, which is concerned with literary texts, there needs to be added a similar analysis of the formative and personal transformations involved in reading both the basic textbooks and the classics in the sciences. Einstein's reading of works on Maxwell and Newton transformed his whole scientific outlook and world. A whole generation of molecular biologists in the making were influenced by Schrödinger's *What Is Life?* The irreducible conscious and intentional depths of such transformative reading need to be probed and illuminated.

In the context of the current confused state of consciousness studies about the way different levels of activity relate Crick makes, for him as a reductionist, a quite problematic remark: "Our wonder and appreciation [of the explanatory quest] will come from our insights into the marvellous complexities of our brains, complexities we can only glimpse today" (Crick [1994], p. 261). He admits that the eventual solution to the currently unsolved problems will come through a combination of our wonder and insights. In a similar vein, Pinker has remarked that it will take an unborn genius — a Darwin or Einstein of consciousness — to come up with a flabbergasting new idea that suddenly makes it all clear to us (Pinker [2007], p. 47). As Watson cannot answer and avoids the question as to how the chemistry of life is so exquisitely organized, so Crick and Pinker are left with a conscious mental residue, the wonder and leap of insight of the discovery process which will resolve and clarify all that is confused and incomprehensible in consciousness studies at the moment.

Once that admission has been made about the source of the breakthrough, it brings with it some unpalatable consequences for reductionists. It involves the recognition that there is a distinct form of first-person consciousness, the scientific form of consciousness that studies the neural correlates of the visual consciousness of others. Called simply human intelligence, it can be argued that that form of consciousness does not reduce to anything else but explains everything else. It is fundamentally accessed, not through fMRI scans or the like, but through narratives of scientific discovery. Until such narratives of discovery have been composed, the insight experiences involved in the discovery process remain in the dark, unknown. Once such narratives of discovery have been recognized for what they are, objectifications of the first person consciousness of the research scientists exploring a particular domain, a reductionist worldview is undermined. In turn, their privileged disclosure of the details of the discovery process can be incorporated into the history of the scientific discipline.

II

David Chalmers has forcibly argued that the qualia of the experiential, the awareness of purple, or the sound of the spoken words, are irreducibly different from the correlative neural processes in the brain (Chalmers [1995], [1996]). Sydney Shoemaker, one of philosophy's most insightful of materialists, "believes that if Chalmers' arguments concerning the separation of the brain and consciousness succeed, he will then have succeeded in overthrowing materialist orthodoxy that has reigned in the philosophy of mind and cognition for the last half century", the identification of brain with mind.[1] Although skeptical about the arguments, Shoemaker acknowledges that they express clearly and forcefully widely held beliefs. What needs to be more adequately signaled in this is the adage that knowledge in all of the distinct empirical sciences from physics and chemistry through the life and neurosciences to anthropology starts with the presentations of our senses, the qualia of the experiential. Sensory experiences and related awareness have this privileged place. But more is needed than this to explain why the things we so experience are the way they are.

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1. The remark is quoted in a review of Chalmers by Robert Almeder, Department of Philosophy, Georgia State University, Atlanta, Georgia 30303). Available at: http://www.scientificexploration.org/jse/bookreviews/11-4/chalmers.html.

I would now like to suggest that Chalmers has not gone far enough with his assertion of the irreducibility of the dual properties of the neural and the qualia/sensory. Effectively, it overlooks further components in consciousness, notably the performance of problem-solving and resolution by means of insights, aha or moments when something clicks and one can go on with things, around which exactly the same arguments can be made. Such elusive insight experiences are now slowly being recognized as foundational for creative mathematics and science. In can also be argued that there is an even greater irreducible qualitative difference between the wonder and moments of breakthrough that come in insight problem solving, and the experiential visual experiences and their imaginative counterparts in and through which the elements of the problem to be solved are presented.

James Watson's book *The Double Helix* is not directly about the molecular biology of the cell, but, as the subtitle of the book makes clear, it is *A Personal Account of the Discovery of the Structure of DNA*. Among others, two things happen in Watson's narrative of discovery. Firstly, there is an account of the actual problem content. There the emphasis is on the chemical properties of DNA. It would eventually find its objectification in the short paper sent to *Nature* in April 1953. Secondly, there is an emphasis on how those properties were discovered. There the emphasis is on the first-person consciousness of the scientific researcher which finds its objectification in his 1968 book. It addresses not the question about the hereditary code in the cell, but how he, with Crick and others as human beings, discovered it. Clearly, there is the dramatic interaction of the small group of scientists involved in the process which, rightly, has fascinated many. Our present focus brackets that drama to address the question: What does the narrative of discovery teach us about the mental powers or processes which make the breakthrough? Where and from what sources and emergent levels in us do scientific discoveries come?

In his early years, Watson was influenced by his reading of Schrödinger's *What Is Life*, in which it is speculated that the key to hereditary processes are locked up in an aperiodic molecule. In 1944, Avery identified DNA as the possible molecule involved. Watson became excited when Maurice Wilkins introduced him to an X-ray diffraction picture of DNA and the discovery that genes could form crystals. This was followed by an introduction to the alpha-helix by Linus Pauling from Jean Weigle. His first approaches to Max Perutz about joining him in Cambridge were unsuccessful, but Watson persisted. There followed, in the fateful collaboration with Francis Crick, a period at times painful of learning from his mistakes. Early in 1953, after, yet again, his scheme had been torn to shreds, this time by American crystallographer Jerry Donohue, he found himself

forced to take on board the corrections. He was so fearful at this time that they would lead him, yet again, to another *cul-de-sac*, that he put the required steps on hold until the following day:

> When I got to our still empty office the following morning, I quickly cleared away the papers from my desktop, so that I would have a large flat surface on which to form the pairs of bases held together by hydrogen bonds. Though I initially went back to my like-with-like prejudices, I saw all too well that they led nowhere. When Jerry came in, I looked up, saw that it was not Francis, and began sifting the bases in and out of various other pairing possibilities. Suddenly, I became aware that an adenine-thymine pair held together by two hydrogen bonds was identical in shape to a guanine-cytosine pair held together by at least two hydrogen bonds. All the hydrogen bonds seemed to form naturally; no fudging was required to make the two types of pair bases identical in shape. Quickly I called Jerry over to ask him whether this time he had any objection to my new base pairs. (Watson [1968], p. 152)

Donohue said no, and the rest is history.

In his account of the content of the discovery in his book, *DNA: The Secret of Life*, Watson refers to the understanding involved as "the insight that made it all possible" (Watson [2003], p. 152). What the event teaches us is that once the correct imaginative presentation of the elements of the problem of the base relations is in place, the image causes the insight. The fact that the base structures as he now understood them were spatially complementary meant that they could hold together a two-chain helix with no irregularities in it. The unzipping and re-zipping of that double helix could in turn be the ground of the hereditary mechanism they were in search of. After many false starts and oversights Watson now communicated the content of his insight to Crick, and later to the staff of the Cavendish and King's College, inviting them to test it and see if they could find any flaws. Although Crick would not give his approval to the overall structure of DNA until the 1980s, the base structure stood up to the test. None were forthcoming.

The content of insights, of eureka moments, or discoveries in this sense are always communicable. When the peer group associated with the problem shares an understanding of what conditions a solution must fulfill, then the content moves out of its solitary genesis and becomes a part of the understanding of the group. In many cases, a new insight can require an intellectual conversion, that is to say a difficult change in ways of thinking about the problem in the group. Still, the communicative nature of the formulations of insights and its rapid entry through the revisions

of text-books into the educational process reveals that the cultural activity and collaboration that is scientific research and its communication breaks free of the slow process of biological evolution and adaptation. In this sense, insight events are at the heart of cultural evolution.

Towards the end of the 1950s, three French researchers — Jacques Monod, François Jacob, and Arthur Pardee — found themselves drawn into an intriguing puzzle concerning the genetics of cell metabolism. In the course of nurturing the bacterium *Escherichia coli* on a mixture of two sugars, glucose and lactose, it was found that it stopped growing for about an hour and then resumed, absorbing the lactose. As the growth rate differed from the sum of the individual growth rates, it was clear that the organism was digesting them sequentially. Monod, Jacob, and Pardee would meet in Monod's office each day, "thinking up hypotheses, possible regulatory mechanisms, and inferring from them the results we could expect from the projected experiment" (Jacob [1988], p. 292). Leo Silzard, "a truculent character crackling with insight and cleverness" held a theory of generalized repressing, Monod of generalized induction. It took a winter of experimenting, the PA JA MA experiments, to decide the matter:

> As things clarified, the excitement grew. There is in research a unique moment: when one suddenly sees that an experiment is going to overrun the landscape. It is the moment when the facts combine to indicate a new and unforeseen direction. When the change taking place is due more to a feeling, to a premonition, than to the chilly facts of logic. Where the dream of novelty suddenly takes on consistency without being fully assured of becoming reality.
>
> (Jacob [1988], p. 294)

There follows in Jacob's autobiography a wonderful account of the distinction between what he terms as day-science and night-science. The former, day-science is the science of the organized textbook such as we find in *Essential Genetics: A Genomics Perspective* by Daniel Hart and Elizabeth Jones. It has the majestic arrangement of a Bach fugue or French garden. Night-science, on the other hand, "wanders blindly. It hesitates, stumbles, falls back, sweats, wakes with a start… At the mercy of chance, the mind frets in a labyrinth, deluged with messages, in quest of a sign, of a wink, of an unforeseen connection. Like a prisoner in a cell, it paces about looking for a way out, a glimmer of light" (Jacob [1988], p. 296). Jacob's account of the struggle of night-science to emerge into the light of day-science in his *Autobiography: The Statue Within* simply has to be read to complete the picture of science.

At the end of an afternoon, on a Sunday in Paris, late in July 1958, Jacob and his wife Lise decided to go see a film that had failed to engage.

Perhaps because of this a current of images and thoughts took over Jacob's idle mind.

> I am invaded by a sudden excitement mingled with a vague pleasure. It isolates me from the theatre, from my neighbors whose eyes are riveted to the screen. And suddenly a flash. The astonishment of the obvious. How could I not have thought of it sooner. Both experiments — that of conjugation done with Elie on the phage, erotic induction; and that done with Pardee and Monod on the lactose system, the PA JA MA — are the same. Same result. Same conclusion. In both cases a gene governs the formation of a cytoplasmic product, of a repressor blocking the expression of other genes and so preventing either the synthesis of the galactosidase, or the multiplication of the virus. In both cases, one induces by inactivating the repressor, either by lactose or by ultraviolet rays. The very mechanism that must be the basis of regulation. But there is more.
>
> (Jacob [1988], p. 297)

His wife discerns that he has had enough of the film and they leave. On the boulevard Montparnasse, he tells her that he thinks he has grasped something of significance. Later, at home, he tries to no avail to communicate the importance of the moment. Only in September does he get to discuss it with Monod, the two faces of whose character he etches with artistry, the charming and the dogmatic/domineering. There follows over time a long conversation between them, Jacob trying to change Monod's ideas, a task that he admits was not easy. Jacob liked his hypothesis, not just because of its simplicity, but for a "crazier reason", effectively the imaginative source of his insight:

> Some weeks earlier, I had observed my son Pierre playing with a model electric train. The train had no rheostat. Nevertheless, Pierre could vary the speed of the train by manipulating the switch, making it oscillate faster or slower between start and stop. Then why not a similar mechanism in the synthesis of proteins?
>
> (Jacob [1988], p. 302)

Reminiscent of the attitude of some to the spatially structured model building of Crick and Watson, Monod considered this "argument" a bad joke. Involved is the presentation to Jacob's senses and imagination of the imagery of a switch which, transferred, caused in him an insight into a possible explanation of their experimental observations. As their conversation continued and eventually engaged with a wider group, Monod came to change his mind. The switch, central to Jacob's insight, was to become a foundational category of developmental molecular biology.

To grow on a sugar, the bacterium had to have a particular enzyme to degrade it. Monod found that the bacterium did not have the enzyme initially. It first produced one kind of enzyme to metabolize one of the sugars, and then produced a different kind to metabolize the other. It seems that the bacterium responded preferentially to one of the sugars to produce an appropriate enzyme not initially present, while at the same time inhibiting the production of an enzyme to metabolize the other sugar. In this the organism was physiologically adapting itself and changing the proteins it produces in accordance with its environment. They had discovered the fact that the parsimonious bacterium adjusted its metabolism according to the food supply.

A third example of an insight/eureka moment has to do with Crick's engagement with the question: What is the function of DNA in the cell, what does it do? It was acknowledged that it produces proteins, made up of the then 20 known aminoacids. This led to the further question: How does DNA code onto the 20 aminoacids in the manufacture of proteins? Essentially, Crick's book, *What Mad Pursuit: A Personal View of Scientific Discovery*, is an account, not just of the solution to the problem of protein synthesis in cells, but of how he and Brenner, with the help of Gamow, Jacob, Marshall Nirenberg and others, came to make it. It opens up for us the creativity of the discovery process. As with the problem of the structure of DNA, the quest for an understanding of its role in protein synthesis went through many frustrating moments. Through learning from the errors, Crick and Brenner entered progressively into the details of the problem, but eventually found themselves stuck. Crick recalls waking up on Good Friday morning, 1960, in a state of utter darkness and confusion:

> In the afternoon, François Jacob presented a seminar in Cambridge which included an account of an experiment, thought up in Paris, but carried out in Berkeley by Arthur Pardee and Monica Riley, concerning gene-enzyme relations. In the course of a cross examination, it became clear to Crick and Brenner that they would have to accept the results of the PA JA MA experiment. But if they accepted their result, then it seems to indicate an oversight in their own work. What alternatives did this leave? At this point, Sydney and François leaped to their feet shouting. And intense discussion followed. According to Crick, both of them had seen the solution to their problem. The messenger RNA was different from ribosomal RNA. It was the Volkin-Astrachen RNA for the phage-infected cell. According to Crick, "once this key insight had been obtained, the rest followed automatically".
>
> (Crick [1988], p. 119)

Volkin and Astrachen have shown that their RNA, unlike ribosomal RNA, had the same composition as DNA and quickly renewed itself. This clearly suggested its relevance for protein synthesis. Crick later described the impact of the moment:

> It is difficult to convey two things. One is the sudden flash of enlightenment when the idea was first glimpsed. It was so memorable, that I can recall just where Sydney, François, and I were sitting in the room when it happened. The other is the way it cleared away so many of our difficulties. Just a single wrong assumption (that the ribosomal RNA was the messenger RNA) had completely messed up our thinking, so that it appeared as if we were wandering in a dense fog. I woke up that morning with only a set of confused ideas about the overall control of protein synthesis. When I went to bed, all our difficulties had resolved and the shining answers stood clearly before us. Of course, it would take months and years of work to establish these new ideas, but we no longer felt lost in the jungle. We could survey the one plain and clearly see the mountains in the distance… The new ideas opened the way for some of the key experiments used to crack the genetic code… (Crick [1988], p. 120)

In 1966, largely thanks to the further insights of Marshall Nirenberg and others, and to the results of an enormous parallel experimental programme, Crick finally put the finishing touches to the code structure for protein synthesis.

Further accounts of moments of insight of enormous scientific importance are narrated by Kary Mullis in his Nobel lecture and Craig J. Venter in his book, *A Life Decoded: My Genome, My Life*. The problem which had exercised Mullis for some time had to do with producing a significant quantity of identical DNA from a small initial sample. On a night drive from Berkeley to Mendocino, he found his mind in overdrive. Suddenly, there occurred what he referred to as three eureka moments out of which was born the technique known as PCR — the polymerase chain reaction. It is one of the basic tools of current molecular biology.

After an initial research career dealing with adrenalin, Venter dedicated his later adult life to the problem of sequencing an entire genome including the human. After a long period of wrestling with the details of the problem, the brainwave came all of a sudden to him "at thirty-eight thousand feet over the Pacific Ocean: I was using the right sequencing technique, but on the wrong DNA". Venter goes on to recall how when, on the next day he shared his eureka idea with his lab collaborators, he was met "with a brick wall of skepticism and doubt" (Venter [2007], pp. 121-122). The consensus was that there was a high likelihood of it failing. Mullis had a somewhat similar experience.

Insights such as those illustrated are not just isolated moments. Rather they are prepared by a long pre-history involving a mastery of the problem as problem, which usually involves the making of many mistakes. Neither are they marginal or peripheral to science, but are definitive in their content of the core of molecular biology. Once they have emerged their consequences for future science and the future manipulation of the world become enormous. In this sense they are not like qualia at all, the immediate empirical/sensible presentations of the elements of the problem. They grasp intelligibility in those sensible presentations, the mechanism of hereditary transmission by means of a four-letter code in the base structure of a double helix molecule in human chromosomes or the triplet code by means of which DNA is involved in the production of proteins. In this they have properties which distinguish them from qualia. There follows a need to open up Chalmer's property dualism to include further irreducible properties such as the creative moments of insight of the human mind and their scientific significance.

Only recently has the importance of these emergent eureka moments in scientific research and problem-solving begun, minimally, to be acknowledged. Related is a growing increase in the use of the word *insight* in scientific literature.[2] In the field of mathematics, there is an awareness that insight problem-solving is almost the entire engine of the growth of mathematical understanding. Robert Kanigel's exploration of the genius of the mathematician Ramanujan makes it clear that Hardy, his mentor, was sensitive to the fact that technical mastery was of slight importance in contrast with Ramanujan's mathematical insights: "The theorem itself was apt to emerge just as other creative products do — in a flash of insight or through a succession of small insights, preceded by countless hours of slogging through the problem". Ideas have to come from somewhere before they could be proved, but where? "That was the mystery, the source of all the circular, empty, ultimately unsatisfying explanations that have always beset students of the creative process. Here, 'talent' came in, and 'genius' and 'art'. Certainly it couldn't be taught. And certainly, when in hand, it had to be nurtured and protected" (Kanigel [1991], pp. 225-256).

In an emergentist definition of science, the consciousness that does original and creative science or mathematics, Jacob's night-science, will then be more significant than that which does day-science. This is in line

2. To take one of many possible sources, Eric R. Kandel, well-known for his reductionism, uses the word with great frequency in his *In Search of Memory: The Emergence of a New Science of Mind* (New York, Norton, 2006): pp. xiii, 9, 67, 75, 83-85, 93, 182, 194, 218-220, 228, 236-237, 241, 246, 268, 273, 275, 279, 281-282, 300-301, 306, 319, 324, 333, 339, 357 — to pick out just a few.

with the remarks in the "Preface to the Series" at the start of Crick's memoir, *What Mad Pursuit*. In contrast with the technical and, in many instances, mathematics-based knowledge accumulated by science in its historical evolution, the doing of science itself is an enterprise

> …conducted by men and women who are stimulated by hopes and purposes that are universal, rewarded by occasional successes, and distressed by setbacks. Science is an enterprise with its own rules and customs, but an understanding of that enterprise is accessible, for it is quintessentially human. And an understanding of the nature of the enterprise inevitably brings with it *insights* into the nature of its products. (Crick [1988], p. ix)

Stephen Mason prefaces his book *Chemical Evolution* with a telling quote from Gerald Holton. After acknowledging that progress in science is threatened by the loss of good people and financial support, he goes on to say that the most sensitive and fragile "part of the total intellectual ecology of science is the understanding, on the part of scientists themselves, of the nature of the scientific enterprise, and in particular the hardly begun study of the nature of scientific discovery" (Mason [1992], *Preface* page].

An emergentist view of science will of its nature give the importance that it deserves to the human dimension of this hugely creative and self-revelatory enterprise. In this it will provide an alternative definition of science to the current dominant materialist conception with its emphasis on reductionism and the aggressive exclusion of the first-person consciousness that does science from its horizon (Wallace [2000], pp. 21-37). It will be argued in section IV that a key to the notion of emergence and related levels is to be found in the experience of making scientific discoveries as experienced in that first-person consciousness. As emergent, such discoveries illustrate the features and qualities of all other types of emergence in the universe.

III

A further emergent feature and associated level of the consciousness that does science as portrayed in narratives of discovery is the element of emergent choices, in particular those concerned with choosing a life career. In the lives of Darwin, Crick, and Venter, there is an early period when they had no idea as to where their life was going and leading them. Still, with hindsight, in many cases there can be discerned in those early periods an extraordinary process of unplanned preparation for the life to follow.

This is certainly the case for Darwin up to the voyage of the Beagle. Such an early phase comes to a head in a period when a self-conscious decision is involved to pursue a research career in science, and within that career specific problems.

In a chapter entitled "The Gossip Test", Francis Crick describes how he came freely to make decisions about becoming a research scientist and about the creative scientific research which he wished to devote himself to in the course of his adult life. After his wartime experience, he found himself at the dangerous age of thirty exploring his life options. Some of his friends even thought that he should go into journalism. He had an ability to turn his hand to new things, was sure that he wanted to do fundamental research, but unsure of his abilities. On consulting Kreisel about the matter, he got the reply: "I've known a lot of people more stupid than you who've made a success of it" (Crick [1988], p. 16). Shortly after, he found himself gossiping with some of his colleagues with a certain enthusiasm about the recent advances in antibiotics and penicillin. Suddenly, he had the insight that what you gossip about discloses what you are really interested in.

Three authors influenced the reflections involved in his decision-making: Linus Pauling's remarks on the importance of the hydrogen bond, Schrödinger's *What Is Life*?, and Sir Cyril Hinshelwood's *The Bacterial Cell*. He confessed to being "mainly interested in the borderline between the living and the non-living, wherever that was" and in discussion with Wilkins in Kings College felt there was too much emphasis on the biology. There followed a crisis when he was offered a job working on the eye, he having already decided that his field was to be molecular biology, not neurobiology. In taking what turned out to be for him a hard decision, Crick told himself "that my preference for the living-non-living borderline had been soundly based, that I would only have one chance to embark on a new career, and that I should not be deflected by the accident of someone offering me a job" (Crick [1988], p. 18).[3]

With some help from his family and a studentship from the MRC, he spent two years at Strangeways. A fateful meeting with Mellanby resulted in his being transferred to the Cavendish Laboratory to work with Sir Lawrence Bragg. It was the subsequent arrival of James Watson

3. Dennis Shasha and Cathy Lazere, in *Out of Their Minds: The Lives and Discoveries of 15 Great Computer Scientists*, offer an illuminating comment about how problems come to computer scientists: "Third, you have to be the right person for the problem. As Donald Knuth puts it, 'It's not true that necessity is the only mother or father of invention… [One] has to have the right background for the problem. I don't just go ahead working on every problem that I see. The ones I solve I say, oh, man, I have a unique background that might let me solve it — it's my destiny, my responsibility.'" (New York, Copernicus, 1995, p. 247)

in the Cavendish that resulted in Crick, with Watson as a collaborator, working on the problem of the structure of DNA, even though it was not his allotted research.

From our present perspective, the important thing is the impact of a life-career choice on a life story. Crick's root decision in his early 1930s to become a research scientist would effectively direct the unfolding of the rest of his life until his dying day. After working on DNA, there was a follow-up dealing with the related problem of the genetic code that was resolved in 1966. At this point, he and Sydney Brenner felt they needed to move into new fields, initially embryology and developmental biology. But a move to the Salk Institute in 1976 brought with it a more radical change in direction. After several years of detaching himself from his old interests, he began to focus on the workings of the brain:

> I decided that my main long-term interest was in the problem of consciousness, though I realized that it would be foolish to start with this… My next problem was to choose some particular aspect of the mammalian brain. How can one study vision in man by working on monkeys?… I decided that, at least at first, I would not attempt to do experiments… Having decided that I could learn about the mammalian visual system, my next problem was to select which aspect to study first… Looking back, I can recall now how very strange I found this new field. (Crick, [1988], pp. 151, 162)

A similar pattern of relations between root and branch decisions, between roads taken and not taken, can be identified in the life of Craig Venter. Initially, Venter made the great decision not to go through with a suicide attempt brought on by the impact of his first hand experience as a medic of the dreadful destruction of human life in the Vietnam War. He returned to America and set about getting an education. At a certain point, he was interviewed in relation to a future career in a medical clinical programme. The interviewer suggested that with his research orientation he might not be comfortable in such a programme, so he chose the path of scientific research. For a long time, he worked on problems associated with the functions of adrenaline. A part of it involved gene sequencing. A paper to *FEBS Letters* followed. This combined with a coincident volume of *Nature* on gene sequencing and led to a "major change in the direction of my science" (Venter [2007], p. 100). The decision led to him eventually setting up the largest gene sequencing laboratory in the world. The rest of his research life to-date has flowed out of that decision. In this sense, decisions have flexible causal consequences on all the lower levels in the unfolding of a human life. Life grows organically rather than mechanically out of them.

From our present viewpoint, emergent decisions are concerned with what the person considers worthwhile doing with their life. In this case, the pursuit was not of manufacturing commodities or infrastructure, but of knowledge of specific genomes, of a solution of a currently unsolved research problem as a value. As there are neural correlates of visual consciousness, so there are also the intellectual correlates of decision-making. One can only make such decisions on the basis of one's understanding, however slight, of some of the details and importance of the unsolved problems. Secondly, decisions are not isolated events in an unfolding life. They have causal consequences; they introduce a direction in a life where previously there was an element of drift. That directing presence can operate almost unnoticed for great time spans. This in turn poses questions about the difficult problem currently being opened up of upward and downward causation.

IV

The different levels of reality and their respective worlds — the molecular, biological-organic, sensory-imaginative-qualia, the insightful, and decision-making — that have been identified pose the challenge: How are we to understand their relationships? Philip Clayton's discussion in his *Mind and Emergence* of the problem of explaining the relationship between levels in terms of upward and downward causality and strong and weak emergence brings a focus into the problem (Clayton [2004]). Adding the dimension of narratives of discovery, with their moments of insight and of decision-making, enlarges the context in which he and others pose the questions. Such narratives of discovery in many instances provide spontaneous accounts of the circumstances and causes of insights and decision-making and of the awakening of the desires to which they are the responses. In the concluding section, I would like to sketch some of the possibilities that this addition and enlargement of the field of the problem might open up.

To begin with a simple illustration, there is the unselfconscious account by Jacqueline de Pré of how, in her mother's kitchen, just short of her fifth birthday, she switched on the radio. Initially, she was not too impressed by the music that was playing but when the cello began, she listened intently. When it had finished, she turned to her mother, who was a music teacher, and said: "I want to make that sound" (Easton [1989], p. 26]. Right then, she fell in love with the cello; it had caused her heart's desire to awaken. For the great majority, listening to music causes a state of enjoyment, or of peace, or of calm in our self-awareness. The causality

involved in du Pré's experience included that and more. The additional causality involved in the awakening of a core human desire is more like the fertilization of a seed or the initiation of a quest than the more straightforward causality involved in switching off a light or causing enjoyment.

Because of the musical environment in her family, du Pré would have had, at such a young age, a necessary and a sufficient initial understanding of what she recognized to be an awakening of her heart's desire in order to choose to pursue it. Such understanding is a lower-level correlate of decision-making. There is in this experience a clear-cut example of upward causation both of the awakening of the desire, and of the subsequent decision. What is also important about it is how it clearly indicates that our core activity of decision making is not isolated from our understanding of the empirical and material world, but causally inserted in it. Du Pré's decision was about what she wanted to do and who she wanted to become in the world. Ending the discernment process, the emergence of the decision is also the emergence and establishment of a principle of downward causality in the lifestory. Du Pré's training began soon after and with it the earlier upward causation of the event gave way to a form of downward and even interactive downward and upward causation.

The causality of mind-world relations is of great interest to Clayton. Whereas du Pré's desire was to become a musician, the desire of the mind of great creative scientists such as Einstein or Darwin is to understand and master a known unknown in the world. Darwin's eventual desire became that of understanding the transmutation of species. After an intense period of exploration, Einstein's desire eventually focused on the problem of resolving the contradictions between the mechanics of Newton and Maxell's electromagnetism that were posed by the velocity of light. In his autobiography, he comments time and again how basic schooling stifled his native curiosity, the potential in the desire of his mind to find and be fertilized by a problem in the world that suitably stimulated him. In and through his reading and his highly imaginative familiarity with certain empirical aspects of the issue the problem came to him. After an experiential period of confusion, groping with a topic, the problem in the world suddenly begins to come into focus and draws the inquirer into it. The causality of that beginning is not an isolated episode separated from what precedes and follows it, but the initiation of a quest.

It seems that the desire of the mind is not internally self-starting, but needs, causally, to be awakened from its slumbers by external stimulation from the world. Does that subsequent desire interrogate the world as a distant external object from across a chasm which excludes any causal interaction? Is the causal relation purely downward, so that the higher level is never moved by the lower? Are the causal relations two-way, so

that there can be both an upward and a downward causality in the growth of the problem? Do some anomalous features in the world in an upward manner directly cause the desire to further awaken, and does it respond by initiating an investigation of them? In the subsequent response to the awakening, can there be indentified in the story a complex upward and downward interaction, as in one phase the desire to know directs the process and in another phase is redirected by the unexpected results of conducted experiments?

There are in many narratives of discovery accounts of how through creative moments of insight we come to understand the workings of the world. This holds true from basic physics, through chemistry — Mendeleyev and Kekulé — the biology of the cell, organisms and their growth, as well as the neural structure of the brain. There is no short-circuiting the discovery process of night-science in the emergence of such knowledge. As there is a causal complex associated with the awakening of the desire of the mind in an investigation, is there also one associated with moments of insight? The two most contrasting accounts in the literature of the mental causality involved in understanding are Kant's and Aristotle's. In Kant's philosophical system strictly understood, our understanding is not in any direct manner, causal or otherwise, related to the empirical world. Although knowledge is a unity of the sensible and the conceptual, it is through sensible intuition alone that our minds are connected with the phenomenal world. The noumenal world is unknowable.

The contrast with Aristotle's theorem in *De Anima* of the identity of the agent and patient, of the one to be known and the knower in an interaction between the mind and the world could not be greater. When the bell sounds, the sounding is an agent that causes the hearing of the sound in the "patient", that is to say the human subject who hears the sound. There is an identity in the relation: what sounds in the agent causes the hearing in the patient.

Aristotle states that the same identity holds true for human understanding. Moments of insight are not isolated uncaused inner mental events. Combined with the formed questioning of the investigator in relation to the data of the problem in the world, the insight in which a solution becomes revealed is caused by the correct arrangement of the imaginative presentations of the problem to the questioning. A large part of the problem-solving process is finding the correct imaginative presentation of the elements of the problem. When Watson brings together in model-building the correct proportions and relations of the base structure, the insight is caused in him by what those imaginative presentations represent. The same is true of the insights of Mendeleyev and Kekulé.

In this sense, there are specific imaginative correlates of insights, different imaginative presentations causing different insights.[4] As the sounding of the bell as agent causes the hearing, the presence to the imagination of the correct arrangement of the elements of the problem in the world acts as an upward agent cause of the insight. The world causes us to understand. In and through that correct arrangement of the elements of the problem a solution can now be conceptualized and spoken about. Correct or not, insights always involve a mind-world relation. If you get the wrong presentations of the problem on the level of the imagination, you get the wrong insight. False theories do not originate in our minds. They originate in the data on which the mind works and which is lacking in some way or another.

Before the discovery made present by the insight emerges, the elements of the imaginative presentation of the problem are what Lonergan terms a "coincidental manifold", an unintelligible aggregate in the world. After the insight into the structure of DNA, protein synthesis, and so forth has emerged, what previously on the sensible level was coincidental is now understood to be intelligible. The insight apprehends the intelligibility of the sensible. This shift in our relation with the world from coincidental to intelligible, where intelligibility can be of many different kinds, is at the heart of the problem of emergence. Lonergan speculates that this emergent relation of the insight in relation to the image is a prototype of all emergences (Lonergan [1992], p. 506). There is a likeness in it of other forms of emergence, but not an identity. Once one has grasped it, one has a measure or standard, so to speak, from which to access problems of emergence and of upward and downward causality in disciplines from physics to consciousness. A reason for this is that it is only through our insights into the imaginative presentations of the problems on the different levels that we have access to the solutions to the problems posed by scientists working in all of those disciplines. It is a highly speculative suggestion which needs to be opened up and tested.

When the solution to a problem in the world has been discovered through the upward movement to insight, it gives rise to the ability regularly to control and go on with that problem situation in new and surprising ways, to downward causality. In discovering PCR, Mullis discovered that a particular algorithmic-like sequence of events solved a particular problem. It now became possible on that basis for PCR machines to be manufactured which could then take their place in the biology laboratories

4. Related is the work of Robert Stickgold, who found that, if students went to sleep shortly after engaging in problem-solving with the game Tetris, the dreams that occurred in the first hour were concerned with transforming their imagination based on the demands of the problem. http://www.hno.harvard.edu/gazette/2000/10.26/01-sleep.html

all over the world. When Venter solved the problem of the mechanics of genome sequencing, it again became possible to mechanize it and install such machines throughout the world. Out of the unintelligible randomness of the elements of the problem in the pre-solution stage, there emerge at different sites in the world the facilities for solving the same problem as the need arises. The problem could now be solved regularly. In problem-solving, downward causality results from the insight grasping in an aggregate of events on the lower level an intelligible solution to the problem which can then be made to recur regularly or as needed.

From the viewpoint of chemistry, the controlled timing and production of red blood cells in the bone marrow and related proteins is just a happy, but also unintelligible coincidence. From the viewpoint of biology, it is understood as one aspect of the solution to the higher problem of living in an environment. From this perspective, the aggregate of chemical activities and their imaginative representations stand to the solution as, more generally, the image stands to the insight. Speculatively, it can be suggested that this is a relation that holds true all along the line, from simple protein synthesis to the complex gene switching that takes place in the growth of an organism. In those emergent and regular recurrences of what from the chemical standpoint are surprising coincidences there can be understood through insight the irreducible laws of the higher science of biology. The secret of life does not exist in the chemistry, but in the exquisite manner in which it is organized.

Without the existence of primitive living things, the chemical environment is quite different. Introduce living things and there emerges the regular occurrence of sequences of chemical activities that from the lower viewpoint would be coincidences. As far as the laws of chemistry are concerned, it is a mere coincidence that fertilization, cell division, protein synthesis, and metabolism regularly emerge and recur in living things. An ability has emerged in the living organisms to render regular at the appropriate occasion and time certain sequences of chemical processes. In them, solutions have emerged to the problem of living on this level and of the transmission of such life.

Along these lines, it can be speculated that the secret of consciousness does not reside only in its neural correlates, but largely in their exquisite organization in the course of such activities as learning and using a language with its spoken words and their meanings, acquiring musical skills or the skills involved in various sports. Those skills are not biological, but meaningful, concerned with living and acting meaningfully in the properly human world.

Neuroscientists now accept that in learning a language, how to perform a surgical operation, play a piano concerto, or control one's anxieties

our neurocircuits are programmed. When, after the skills have been acquired, they are exercised in performing surgical operations, serving at tennis or playing a piano concerto, the neural level becomes activated. Still, from the viewpoint of the neural, that activation is simply a happy coincidence which cannot be accounted for on the neural level. The causes of its activation are found elsewhere in the properly human situations which call forth the skills.

From the present perspective, the imaginative presentations of such processes on the neural level stand to the higher level human activities in the world as image stands to insight. In both the context of the regular recurrence of the content of those neural processes and their higher human context there can be grasped aspects of the higher laws of consciousness. The lower level correlates with the higher, but does not explain the higher finality of meaningfully using a language, acting in a situation, or performing a surgical procedure. Finally, the developmental nature of all levels of life warns us that the road to solutions to these problems is more complex than we can imagine at the present time.

On the model of mental causation, I suggest there is an extraordinary intimacy between the mind and the world. Our spirit of inquiry cannot awaken to its potential, be initiated into its quest without a world there to stimulate it. Our mysterious power of insight is rendered sterile in the absence of the presentations through the senses and imagination of the elements of the problem in problem-solving. There is, in this sense, an extraordinary fit between mind and world. As Crick and Watson found DNA beautiful I find that fit even more beautiful. Despite this intimacy of mind and world, there is still something more to it. In and through the emergence of our mental powers, our proportionate world is opened up far beyond that which is possible for our animal ancestors. It seems there is no corner of the universe beyond our mental scrutiny and insistence, that we can crack its secret. As the unrestricted potential of our desires becomes progressively manifest, do we not find them pointing beyond their very limitations towards the transcendent? As every other level has its upward openness, so too does the desire of the human mind and heart, an upward openness that we experience as a longing for the transcendent.

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The Human Being and the Non-Reductionist Conceptions of Determination*

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Reductionism, Antireductionism, and Human Sciences

The notion of reductionism that I will try to discuss in this contribution does not match that usually assumed by the natural sciences. I refer instead to a tendency towards the simplification of the horizon of being, or of a region of it, through a unifying point of view. This tendency derives from the recognition of a few principles (or "key-elements"), and the consequent "reduction" of all phenomena — the most complex included — to them. When, for example, this epistemic attitude occurs in the analysis of organisms and of their relationships with the inorganic sphere, we meet a series of difficulties when thinking of and explaining the emergence of life. In a similar way, if through the human sciences the spheres of psychology and spiritual life disclose new categorial horizons, we often experience several forms of reduction, when the human sciences are illustrated by categories of the natural sciences, or through an internal confusion in the human ambit. There a further and maybe more complex discontinuity, that really rises, determined by the emergence of conscience and deliberation. It is not by accident that the most recent discussions between the reductionists and the anti-reductionists have been extended from the original biologic territory to the psycho-social one.

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The relevance of the discontinuity between the natural sphere and the human one has often strengthened two mistakes: first, a part of the scientific community presumes that reductionism is an epistemological problem only referring to the natural sciences, especially in the explanation of the emergence of life (in this perspective, the human sciences remain outside the debate, because they reveal a weak form of scientific value, compared to the natural sciences); second, certain scholars tend to deny reductionist projects in order to preserve the emergence of the human sphere as different from the natural world (in this perspective, the worry is about the risk of reducing humanity to a natural mechanism). In both cases, we can note a *deficit* in ontological definition of the sphere of analysis. The first situation, in fact, disregards the categorial variety and importance of the human sphere, while the second one does not see how in the humanist disciplines a form of reductionism lives as well.

Since my purpose consists in a brief analysis of these themes in their consequences on the study of human being, I will start from the idea of the legitimity of the discrimination between the human sciences and the natural sciences, not in the sense of an epistemological antireductionism, but in the light of an ontological difference (Gnoli & Scognamiglio [2008]). In fact, my thesis is exactly the opposite of Hilary Putnam's perspective (Putnam [1973]), which instead accepts one single model (materialism) as an ontology, but refuses it as an epistemological criterion. As I will try to explain, if the reduction *ad unum* of the categorial multiplicity of the levels of reality results as being phenomenologically and ontologically inadequate, on the other hand we do not automatically have to infer that there must be many procedures and methodologies of studying that multiplicity. Any plausible logical deduction which should obtain an epistemological variety from the levels of reality simply does not exist. The multiplicity of models, of procedures, of evaluation systems, and, in a wide sense, of scientific approaches does not necessarily rise from the consistency of the ontological object, but regards the practical, technical, or managerial dimension of knowledge.

I do not intend, with my words, to support the reduction of all other approaches to a single method (for example, the physical one) and I do not wish that there be any type of unitary model. However, we cannot establish a direct correlation between the multiplicity of the *strata* of being and the multiplication of the disciplines. If we consider, for example, the case of systemics, not as an ontological perspective, but simply as an epistemological approach, it reveals — with the notion of "isomorphism" — how we can design, under the idea of an interdisciplinarity, a holistic and unitary horizon of the sciences. The same goes for a theory of the levels of reality, which proves to be synoptic, but also respectful of differences.

In my opinion, in short, we can associate a reasonable epistemological openness to an ontological stratification. I know that this is not a reassuring starting-point, but I think philosophy cannot simplify the problems in order to be "reassuring": this appears to me as rather a religious vocation, while philosophy must at least put on the table all the difficulties and discontinuities that a real and ideal being shows us.

For this reason, I accept the traditional notion of "human sciences" only in order to circumscribe an ontological region of being. In this way, I will try to present the elements of similarity and difference between the general level of "nature", studied by the natural sciences, and that of the "human being", as an object of the human sciences.

On the other hand, I also want to underscore the ontological danger that we meet in the notion of "human sciences", especially if we resort to the plural. Usually, in this notion we accept disciplines that study objects that are categorially heterogeneous — as psychology and sociology do. However, taking into account the difference between the single branches of human sciences, we need to admit that it is not correct to explain the processes of one of them through the analytical results of another approach. For example, pretending to explain historical processes through the psychological theories of behaviour, on the basis of the idea of the centrality of human behaviour and personality in the historical processes, is a sort of reductionism. In my researches on the Holocaust and Nazism, I always came across books and essays in which there was a strong tendency to reduce the complexity of historical phenomena to Hitler's psychosis. For this reason, although we remain within a humanistic horizon, we must always be wary about removing the risk of reductionism, which is a forced and unnatural homologation of beings.

In the most famous debates on reductionism, the centre of the question is the possibility of reducing the essence of a whole to its parts. But in this sense the attention of the scientists and scholars is more often than not centred on the discussion about a static object. In my opinion, a concrete epistemological praxis is constituted by the reduction of every kind of process — and in particular I refer to causal or determination processes — to a single model of explanation. This operation, which can appear a simply economic attitude, betrays the phenomenological differences of the "givenness" of the processes, and so the categorial articulation of reality.

Obviously, to speak about the "human being" also implies to maintain the attention on natural determinations. Indeed, the human being — that surely presents specific and new categories — is nothing without its physical and biological basis, but it is, at the same time, more than its natural constitution.

Nicolai Hartmann, a Thinker of Complexity

In the twentieth century, the thinker who criticized every kind of pretension of reductionism, while maybe substantially backing others, was Nicolai Hartmann. The object of his opposition was every form of theoretical unification of multiplicity under a unique interpretative key. He defended a stratified conception of the real world in a way that anticipated certain guesses of the systems theory. Hartmann did not propose a naïve realism, but his conclusion derived from a difficult comparison with the foundational issues. It is only after an analysis of the neokantian, idealistic, and phenomenological solutions that Hartmann elaborated, in a way that should be interesting to explain, a strong assertion of the necessity of a new ontology.

To illustrate in a few steps the complex building of his perspective, it is useful to establish some general characters of our horizon. The object can *be* in different modes, and these modes of being constitute the frame of ontology. The first distinction regards temporality. In other terms, we must previously distinguish, in the sphere of being, two modes of "givenness": the real being and the ideal being. The main difference is categorial, and depends on temporality. If the former is the world that is in time and has a time, the latter gives itself to us as an atemporal being, that always remains identical to itself. According to Hartmann, the real being includes the *lifeworld*, not only in the space-time dimension, but also in the realm of time only (emotional and cognitive events have a time, but do not occupy any space). On the other hand, mathematical, logical, and axiological structures are ideal objects (Hartmann [1935]).

The real world appears dominated by a group of general categories, which are common to every sort of object in reality. There are, first, the modal categories (possibility, necessity, and reality) and, second, we have the temporal categories (existing, process, and time) and a large group of elementary polarities (form/matter, element/system, and so on) (Scognamiglio [2005]; Hartmann [1940]). Over this series of common categories, Hartmann begins his construction of the special stratification categories. He conceives a succession of four *strata* that are connected thanks to a complex system of categorial laws. The lowest and strongest, basic for the higher (that do not deny, but imply the first) is the inorganic *stratum*. After this, ascending, we find organic, psychic, and spiritual *strata*. The organic *stratum* keeps the same categories as the inorganic, but adds its own properties. This kind of relation is named "over-forming". The psychic *stratum*, on the other hand, even if it needs a physical and biological individual to exist, does not as such store the categories of its antecedents.

This kind of relation is called "building-above". The spiritual being does not retain the lower categories, but presents a new set of properties.

THE REAL WORLD'S CATEGORIAL TABLE

Spiritual *stratum*	**Freedom** / Constancy / Subjectivity / Intersubjectivity (personal being)
Psychic *stratum*	**Psychic causality** / Constancy / Subjectivity (conscience)
Organic *stratum*	Space / Materiality / **Life causality** / Substantiality / Special "life-categories"
Inorganic *stratum*	Space / Materiality / **Physical causality** / Substantiality

MODAL CATEGORIES, POLARITIES, AND COMMON CATEGORIES

There is a special legality that dominates all the *strata*:

— the first principle is the "law of strength": the upper category assumes the lower, but the contrary is not valid;
— the second is the "law of indifference": the lower category is indifferent to its being the basis of the upper one;
— the third is the "law of matter": in an over-forming relationship, the lower category is matter with respect to the upper;
— the fourth is the "law of freedom": every new category presents a kind of freedom and independence.

In this theory, we can find maybe for the first time the notion of "emergence", that Hartmann (1940) introduces as "categorial *novum*".

Through Roberto Poli's revision of this theory, in his "levels" approach (Poli [1998]; [2001]; [2007]), the first two basic strata are unified; I prefer to maintain a strong distinction between living and non-living objects or systems, because the emergence of the category of life appears to me as being still inescapable. The defence of this difference, especially in a non-reduction approach, becomes very important. I think that it is not possible to explain the emergence of life through inorganic categories. We can be sure that a biological being occupies a portion of space and a time fragment, and for this reason it needs and respects the physical laws, first of all mechanical causality. However, with life emerge a series of biological categories, as reproduction, depth, phylogeny, ontogenesis, homeostasis a.s.o. All these new categories do not appear as deducible from a previous sphere of being.

The idea of a stratification of the real world is not only a speculation of an isolated thinker of the last century, but we can find it legitimated and reintroduced by the father of the General System Theory, Ludwig von Bertalanffy (1967).[1] However, I think that Hartmann's simpler and more rigorous stratification can constitute a new starting-point for a non-reductionist view of the processes.

Modes of Determination and the Human Being

In Hartmann's table of categories, we notice how every *stratum* presents a mode of determination, and the upper has a kind of determination that respects the lower, but also presents a *novum*, that makes it freer, but, at the same time, weaker compared to its base. However, most philosophers and scientists do not think of this multiplicity of modes of determination. In this specific situation, a reduction tendency can emerge. There are indeed two possible ways to edify a reductionist solution in the determination processes: mechanicism and finalism. Through our own experience, as bodies and minds, we are induced observe phenomenologically two generic modes of determination. On the material side of our experience, we see first and foremost the natural-causal determination. However, our "spiritual" essence shows the finalistic and free model as indispensable. For this reason, our looking at the world tilts towards either mechanicism, or finalism. In both cases, we are faced with a reductionist operation, because the multiplicity and the variety of the real processes are simplified into a single model. If, since the modern age, we have been induced to the materialistic reduction (but we can find it in presocratic thinkers as well, which could be considered "eliminativists", because, as Aristotle noticed, they eliminated the nature of the animals in order to assign ontological consistence only to the natural elements), with some thinkers of the past we can observe the opposite tendency. For example, Avicenna subsumed under the notion of *causa finalis* every kind of determination: in his view, when there is an end, it is the cause of all causes. On the contrary, William Ockham (whom I consider more compatible with the approach that I am now proposing) circumscribed resorting to the *causa finalis* only to the actions of intentional agents and assigned the model of *causa efficiens* to the natural processes.

1. This author appreciated Boulding's hierarchy, including: static structures, mechanical non-retroactive systems, mechanical retroactive systems, open systems, lower organisms, animals, human beings, socio-cultural systems, and symbolic systems (this hierarchy appears to me weaker as compared to Hartmann's, while it is difficult to explain, for example, the categorial *novum* between static structures and mechanical non-retroactive systems, a.s.o. ascending the hierarchy).

Another error is to consider the dimension of determination merely in causality and teleology (Hartmann [1951]). According to Hartmann, we must distinguish the specific forms of determination in the four strata of real being. If the "process" constitutes a common category, we know that every level of reality presents a proper type of direction and strength in determination. Maybe, if we try to better articulate Hartmann's hierarchy, we can find other under-*strata*, hence other modes of determination.

In the modern age, the causal model prevailed in its mechanical version. This was because the lower and stronger level of reality is that portion of being that we always phenomenologically know and scientifically explain through the causal trains. Organic causation reveals, instead, a difference in constitution, that always implies the concept of development. It is very difficult to define this kind of process, because we always find it mistaken for a sort of teleological tendency. Ludwig von Bertalanffy, arguing the importance of this point, underscored the difference between the mechanical determination of causal trains and the sphere of life, in which he viewed a form of teleology. But Bertalanffy included in this notion properties such as those of equifinality and homeostatic retroaction and he admitted that in these cases we have to think of finality not as the contrary of causality, but only as a different expression of the same process: a sort of circular causality. What Bertalanffy, in agreement with Hartmann, believes to be a "true finality" (Bertalanffy [1967]) requires the foresight of the aim.

The most difficult level of analysis appears to me to be the psychological one (Poli [2006]). If we try to list some phenomena that we include in this *stratum*, as perception, memory, unconscious behaviour, primitive emotions (the complex emotions need an evaluative act, so I prefer to include them in an upper level) a.s.o., we can easily notice a difference if we compare it with the inorganic and biological levels. In the psychological sphere, we do not meet the category of spatiality, but only of temporality. Hartmann also asks for this *stratum* a specific kind of causality, but he does not deepen this side of the real being, and maybe it still remains obscure today. If we analyze some models of explanation of memory in the cognitive sciences, we recognize a tendency to evoke a physical causal model of explanation. The algorithms often represent nothing but causal trains. In the *Gestalt* perception theories, some kinds of holism put into question the simple cause-effect explanation, and also the theory of the insight appear as an explanation that cannot configure a clear sequence. Some elements of systemics are present in Rogers' and similar theories of human relationships, while in Skinner's box, with the introduction of the "goal", we are really over the physical stratum, but not sufficiently over the biological. However, behaviouristic theories can help us distinguish

in the life sphere between the organisms non-sensitive to reinforcement and an upper level of sensitive. The psychoanalytic approach, on the other hand, describes the internal life of the unconscious, preconscious, and conscious through a singular model of temporality, where causes distant in time can determine later effects, after having slept and lain hidden for a long time. This multiplicity of determination models in my opinion shows two aspects of the question:

- the psychological *stratum* has a kind of determination independent from the inorganic and biological, but also from the spiritual level, to which it can not be reduced;
- psychological determination is not yet defined; it needs widening.

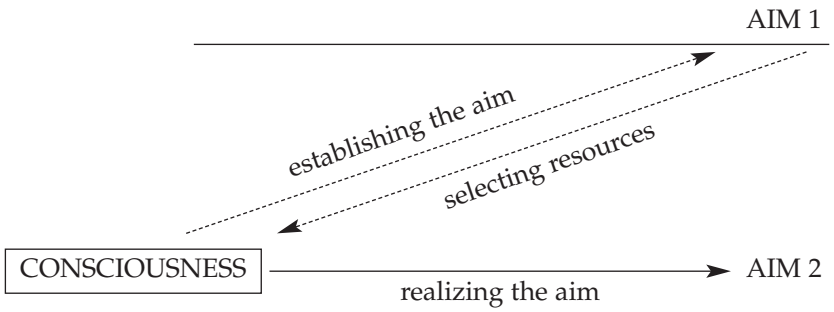
So far, we have spoken about a non-conscious subject, because the emergence of consciousness determines a level step. Indeed, consciousness implies an individual behaviour that sees some aims to pursue and some forms of anticipation. The way in which we can begin to establish an ontological foundation of the possibility of a foresight of the aim is through the idea of spiritual being that Hartmann offers to us. There we can find the emergence of the higher type of determination: free or teleological determination. Every human action oriented towards a purpose necessarily needs a conscious act in which a certain end is "intentioned" (through a future anticipation); after this we have another conscious act, projected backwards, which serves to evaluate the resources necessary to the performance, ending in a "realization" process.

The real complexity of final determination consists in the ideal movement in temporality that it requires. Every human action implies three movements:

- *anticipation* (present to future): to put aims through a time jump;
- *regressive determination* (future to present): to select the resources;
- *realization* (present to future): a real process outside consciousness.

Movements 1 and 2 are "mental", while the third is "material".

HARTMANN'S PROPOSAL



It is very interesting to note that this final determination has a causal foundation. Indeed, if the real world is not determined by mechanical consequentiality, every realization would be impossible because of the total openness of possibilities. Instead, men can produce because they can program a way to manipulate causal trains. They also undertake a control function, because other unforeseen causes could intervene and prevent realization. If an act of "looking ahead" can view the ends and predict the processes, the ways in which the resources achieve the aims have to be conceived only through causality. The final process requires the causal one.

However, the spiritual being is not totally explained through free determination. If personal being and production processes appear understandable under this category, it is not the same for social processes (Hartmann [1933]). Will and intentionality are indeed special processes of a personal being, but not of a social structure. In the social phenomena, as in history, in the transmission of tradition, in communication, we always meet determination processes, which are not the results of a free act.

As in the psychological case, the social and historical determination appears to be very obscure. Sociologists and historians do not reveal sufficient interest in this problem and they always recur to models of determination of the other *strata*. Probably a group, a nation or a population, cannot boast a free determination, because we know only the individual consciousness where we can put the representation of the aim. However, tradition and social influences must have a role to play in the individual deliberative choices, in the form of ideas, sensibility, habits, languages a.s.o. Then, in a dialectic system, we can assert that in the human sphere the determination processes depend on the individual acts, but at the same time these acts are influenced, through a change of the evaluative capacity that they contribute to constitute, to determine the choice processes.

Indeed, when analyzing the individual behaviour, choices, and actions in general, we notice that these elements do not depend only on the personal dynamics of deliberation, but they are influenced by social and historical factors, as well as by other inescapable environmental processes. The subject, in his/her behaviour, is a bundle of processes. We must always consider the double function of physical and biological processes in the body of the subject, but also in the antecedents of his/her behaviour. Moreover, before the emergence of freedom, we must note all psychological dynamics, from instincts to emotions and cognitive processes. The same is true for social and historical transformations. In the end, I need to underline that a theory of the levels of reality, which appears now indispensable to analyze the real world in a non-reductionist perspective, must also include a theory of values, because every anticipative act, whether emotional or productive, is also an evaluative act.

In the social sphere as well, as in the psychological one, I think, the horizon of research is still open, but I also retain as being useful the dismissal of every explanation model, which would reduce social and historical determination to physical, biological, or psychological factors (also in the form of personal tendencies).

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The Economic Sphere*

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Introduction

A non-reductionist view of the object of economics presupposes that the nuclear meaning of that discipline has been clearly delimited: this is required in order to determine its nature and separate identity as a scientific discipline. By "the nuclear meaning of a discipline" I understand a pre-theoretical delimitation of its field of research, such as that of the field of physics, characterized by the laws governing force and energy. Within one and the same field, there may be many theories, competing to explain the same phenomena, or dealing with phenomena so different that it is nearly impossible to trace conceptual connections among them. This last situation calls for a unified-field theory.

In the second section of this paper, I will attempt to defend a rather commonly accepted definition of the field of economics that sees this discipline as a science of choice. In the third one, I will show how the analytical view it involves can be naturally complemented with a classificatory one. According to a classificatory view, the aggregated social-level phenomena, patterns and regularities that economic theories usually deal with, are economic in that sense, even though they are not *prima facie* cases of individual behavior, or are unintended consequences of aggregated individual choices. In the fourth section, I will discuss the meaning of the most general, over-arbitrary economic laws — the modal laws of economics.

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In the final section, I will offer a non-reductionist view of economics, that nevertheless takes into account its intertwining with other spheres.

The Nuclear Meaning of the Economic Sphere

According to the philosophy of the law-idea[1], there are irreducible economic properties and laws, namely those which determine the guiding function of the economic structures and processes. This philosophical statement has far-reaching implications for the view of economics as a science, because it surely implies that all economic structures and processes in the history of mankind are regulated by *the same laws*. Does this mean that it is possible to build an economic theory that explains the functioning of any economic structure or process whatsoever?

According to Herman Dooyeweerd, an economic structure or process is *economic* if its guiding function is

> the sparing or frugal mode of administering scarce goods, implying an alternative choice of their destination with regard to the satisfaction of different human needs. (Dooyeweerd [1985], vol. 2, p. 66)

This sparing or administering of scarce goods is called "the nuclear meaning of the economic modality". Thus, an *economic situation* is one in which there is a man — or a group of men — with defined needs and given resources which are insufficient to satisfy all these needs, so that (i) a decision must be made, based upon a preference ordering, regarding which among those needs are to be satisfied, and (ii) the use of the resources must be optimal in the sense that, to the best knowledge of the men involved in the decision, the greatest number of needs must be satisfied with the given resources. A use of scarce resources which obtains the proposed ends with minimum waste I will call *rational*. Hence, in economic structures and processes, a rational use of scarce resources is the *goal*.

This characterization of the economic modality is strikingly similar to the prevailing view of the economic realm as developed by Lionel Robbins in an influential book published for the first time in 1932. Robbins distinguishes a *classificatory* view of economics from an *analytical* one. An analytical view

> does not attempt to pick certain *kinds* of behavior, but focuses attention on a particular *aspect* of behavior, the form imposed by the

1. From now on WdW (*Wijsbegeerte der Wetsidee*), for short.

> influence of scarcity. It follows from this, therefore, that insofar as it presents this aspect, any kind of human behavior falls within the scope of economic generalizations. (Robbins [1984], pp. 16-17)

The logical analysis of Dooyeweerd's and Robbins' shared definition of the nuclear meaning of the economic point of view clearly displays four universal components in the economic aspect of any economic behavior:

(C1) The human needs or ends have a different importance for the agent;
(C2) The resources or means available to satisfy the needs or achieve the ends are scarce;
(C3) The means or resources are capable of alternative application and can be used to satisfy any of the needs or achieve any of the ends, but not all of them at the same time;
(C4) A frugal or efficient choice regarding this application, seeking to satisfy as many needs or achieve as many ends as possible, starting with those that are deemed as more important by the agent.

By the term *entity*, let us understand anything that has real existence, be it a thing (a corporeal thing like a stone, a plant, or an animal), or an artifact (be it animal like a nest, or human like a car), a process, an event, a state of affairs, and also social structures, like a state or a family. By *aspect*, WdW understands a type of properties and laws (like the type of physical properties and laws). A thesis of WdW is that every entity has active or passive properties of all aspects and is subject, actively of passively, to the laws and norms of all of them. But the nature or "essence" of every entity — except man — is characterized by certain types of properties and laws, precisely those laws that govern its internal structure taken as a whole. Thus, even though every entity somehow functions in all aspects of experience, not every entity is *guided* or *qualified* by the economic modality (for a lengthy and systematic exposition of this thesis, see Clouser [2004], ch. 11). In particular, the presence of conditions (C1)-(C4) makes human acts have an economic aspect:

> when time and the means for achieving ends are limited and capable of alternative application, and the ends are capable of being distinguished in order of importance, then behavior necessarily assumes the form of choice. Every act which involves time and scarce means for the achievement of one end involves the relinquishment of their use for the achievement of other. It has an economic aspect.
>
> (Robbins [1984], p. 14)

Nevertheless, not all human acts are economically qualified. Consider, for instance, a theatrical performance. It is a process whose guiding function is aesthetical, even though there is no doubt that in it scarce goods have to be administered: in order to obtain the best coreographic results, an optimum use of cardboard, lights, wood a.s.o. must be made. There are, of course, other scarce resources whose use has to be rational as well, but all of them are governed by the aesthetical effects that are being pursued by the producers of the performance: what the producers have in mind is a certain artistic achievement, no matter what it takes to obtain it, but unfortunately (for them and the art) under certain budget constraints. Hence, even though there are economic situations involved in the production of the performance, they are subordinated to other aims and purposes. In counter-distinction, an activity whose chief aim is merely to economize — for instance improving a procedure to harvest corn — is subordinated to a purely economic end and should accordingly be properly classified as economically qualified.

The Boundaries of the Economic Process: A Classificatory View

A source of much perplexity and stir for the economists has been the problem of the boundaries of economics or of the economic realm. This problem was first raised by the German historical school, but did not cause much trouble until Marx and Engels advocated, as the cornerstone of historical materialism, the thesis that the economic process is not an isolated system. Much of the troubles that the analytical view has found in accommodating all epistemic activities that qualify as economics arise precisely due to the lack of a classificatory view complementing it. The analytical view must be complemented with a classificatory one because some behaviors — specifically, some forms of organized behavior or social organizations — can be seen as qualified by economic laws, which means that they are of an economic kind, even though this is not to say that they do not display properties belonging to other modalities. I will call "typically economic behavior" any behavior qualified by economic laws. Thus, there are many cases of economic behavior, but not all economic behavior is typically economic.

The notable economist and philosopher of economics Nicholas Georgescu-Roegen has defended the thesis that the economic process is not an isolated system, but at the same time he has recognized that

> equally plain is the necessity of delimiting this process in some way: otherwise, there would be no sense at all in speaking of the economic process. (Georgescu-Roegen [1971], p. 316)

Georgescu-Roegen sees the boundaries of actual objects as "dialectical penumbras":

> Precisely because it is impossible to say, for example, where the chemical process ends and where the biological process begins, even natural sciences do not have rigidly fixed and sharply drawn frontiers. (Georgescu-Roegen [1971], p. 317)

As expected, Georgescu-Roegen finds the economic process even more blurred, since he sees a strong intertwining of the economic with other spheres, particularly the social and the political ones. As a proof of this intertwining, he brings to the fore the interconnection between the biological growth of the human species and the economic process, as well as the relationship between class position, fertility, and genetic effects like refined physical features. Due to the extremely diversified ways in which the interplay of economic and other factors takes place, Georgescu-Roegen ([1971], p. 318) finds that the problem of delimiting the sphere of economics, even in a rough way, is "full of thorns".

Now, from the standpoint of WdW, the situation pointed out by Georgescu-Roegen is normal, since one of the thesis of this philosophy is precisely that every entity functions simultaneously in *all* aspects of experience. This thesis is even stronger than the one mentioned above, since it says that every economic process is also biological, psychical, social, juridical a.s.o., which in a sense means that there are *no entitary boundaries* among the types of processes. The boundaries are rather the qualitative differences among the *kinds* of properties-and-laws themselves. That is why we may concur with Georgescu-Roegen's remark that the problem of the delimitation of the economic process

> is not as simple as Pareto urges us to believe through his argument that, just as geometry ignores chemistry, so can economics ignore by abstraction *homo eticus*, *homo religiosus*, and all other *homines*.[2]

Hence, the question is not whether a purely economic process or structure can be delimited in some way, because no process or structure is purely economic. The question is whether we can delimit an aspect of things which falls under the domain of the economic norms. Then, having

2. *Cf.* Pareto (1927), p. 18.

identified the sphere or side of reality that is law-governed economically, we will be in a better position to determine which processes or structures are economically qualified. In other words, from the standpoint of WdW, the problem of delimiting the economic process takes on the form of determining the qualifying function of the economic entities, precisely by means of the relevant modal laws. These laws establish the conditions that economically-qualified entities must obey, hence the conditions that such entities must satisfy, in order to exemplify the efficient use of scarce resources.

We have already seen how Dooyeweerd characterized the nuclear meaning of the economic modality in terms of the efficient use of scarce resources. Now, according to Georgescu-Roegen, "the economic nature of allocating given means for the optimal satisfaction of given ends cannot possibly be denied", but

> the new field of engineering (or managerial) economics does not cover the whole economic process any more than husbandry exhausts all that is relevant in the biological domain.
>
> (Georgescu-Roegen [1971], p. 319)

What is there to the economic process that is lacking in "managerial economics"? Georgescu-Roegen sees this delimitation of the economic process as too narrow, because it does not seem to take into account the *distributive relationships* among individuals, but only the economic calculations of any given individual. The crucial element that the managerial view of economics seems to ignore is, according to Georgescu-Roegen,

> the increase of what he can claim as his [*i.e.*, the individual's] income according to his position and distributive norms. It is the pursuit of this end that makes the individual a true agent of the economic process. (Georgescu-Roegen [1971], p. 320)

Georgescu-Roegen finds two methods by which the individual can pursue this end:

> First, he may seek ways by which to improve *qualitatively* the means he already possesses. Second, he may seek to increase his personal share of the stock or flow of social means, which is tantamount to changing the prevailing distributive relations. It is because, even in a socialist society, the individual activity is in the long run directed also towards these aims that new means are continually invented, new economic wants created, and new distributive rules introduced.
>
> (Georgescu-Roegen [1971], p. 320)

Georgescu-Roegen's complaint is that a view of economics focusing only on the efficient use of resources is committed to refuse to study the process by which *new* economic means, ends, and relationships are created. Moreover, since these economic species — means, ends, relationships — are "too short-lived for an economic husbandry to offer a relevant picture of the economic reality" (Georgescu-Roegen [1971], p. 320), it turns out that managerial economics is hardly relevant as a theory of the economic process. What is required, so it seems, is a different approach that entitle us to see the development of the economic process in the long run. Georgescu-Roegen's suggestion is that distributive relationships form the core of the economic process, so from his standpoint the focus must be placed upon these and not upon the efficient use of resources.

Georgescu-Roegen is right in placing the distributive relationships in an outstanding place, but the fact that Dooyeweerd (as Robbins) saw in the efficient use of resources the *guiding function* of the economic process does not mean that Dooyeweerd is committed to leave the distributive relationships out of the field of the science of economics. For the field of economics as a science must consider the whole *qualifying* function of the economic process, not merely its *guiding* function. What this means is that the economic process is qualified also by historical cultural laws. These laws direct man in his endeavor to create new economic means, ends, and distributive relationships. But the *creating* of such species is *guided* by the efficient use of resources. Consider, for example, technological innovation in modern economies: there is scarcely any doubt that technological research is always looking for more efficient technologies, which not only means more *profitable* technologies, but more profitable technologies on the ground of a *more efficient use of resources*. This is more specifically exemplified in the search for car engines with a lower consumption of fuel. As an example of the creation of new ends, consider the whole development of what Hegel called the *bourgeois system of needs*, which is in turn the result of technological innovation, and so of an increasing social division of labor. Consider, finally, the important changes in the distributive relationships wrought by the Industrial Revolution. I claim that these changes are the result of a more efficient allocation of labor and resources among the human members of the economic structure.

We can conclude this section, therefore, with the claim that an economic process is a process qualified by both historical, and economic laws. The historical laws constitute the norms for the creation of economic means, ends, and distributive relationships; the economic laws display the norms for an efficient use of resources.

In the following section, I will discuss these laws in some detail.

The Modal Laws of Economics

At the present time, we do not intend to create a specific economic theory, that is, a theory about some particular kind of production system, let alone a mathematical-economic one. Our aim here is to probe for those large-scale laws that direct any economic process disregarding its historic form (*i.e.*, ancient, feudal, capitalist a.s.o.). Since all these processes and structures are *economic*, there must needs be some common structure, lest the term "economic process" be rendered entirely equivocal. I am aware of the sound criticisms raised by historical materialism against certain versions of this project. Roughly, the basic criticism is that almost all such projects intend to transpose laws (or the forms of manifestation of these) that are valid exclusively for certain historic economic formations to all ages. This was the criticism raised by Marx against "bourgeois economics" and with good reason, because there is scarcely any doubt that the production relationships of modern economies are quite different from those of, say, the Roman Empire. Rather, our endeavor is to find those large-scale laws that define the *Gegenstand* of the *science of economics*; which provide the basic, if not the entire conceptual framework within which "a workable body of descriptive propositions for a given [economic] reality" (Georgescu-Roegen [1971], p. 331) can be built.

The guiding thread in our query will be the concept of human artifact. According to Clouser (2005), there are a total of three aspects involved in the qualification of a usual artifact — like a car —, namely the kind of natural material, the kind of production process, and the kind of plan that guided the production process. The first two are foundational, whereas the plan is the guiding function. I think that this is indeed a good approach to the concept of artifact, but it must be refined further. In the first place, the approach presupposes that the prime or raw material used in the production of an artifact is homogeneous, for otherwise it would be unwarranted to speak of *the* kind of natural material. Nevertheless, as a matter of fact, in one and the same artifact several materials with different qualifying functions may enter simultaneously as parts or enkaptic sub-wholes, *i.e.*, parts that can exist and function separately from the whole. Consider, for instance, a garden including stones, plants, animals, and also some artifacts like man-made ponds and lamps. Hence, there is no reason to avoid saying that an artifact may have more than two foundational functions at the same time. Let me call "material functions" those modalities that qualify the materials out of which the artifact is made. The modality that qualifies the production process, on the other hand, I will call the "technical function". The guiding function is expressed — as before — in the plan that guides the production of the artifact.

The former assertions intend to characterize *usual* human artifacts. The distinction I have in mind is that between social and non-social artifacts. Social structures are artifacts in which the material functions are lacking, since they are made out of humans and humans — according to WdW — have no qualifying function. Thus, by *artifact* I understand an entity that is the product of human activity according to a plan, that has at least a technical and a guiding function. The artifact is called *social* if its qualifying function includes only a technical and a guiding function; it is called non-social or *usual* if it also includes material functions. Any human activity that produces artifacts will be called a *labor process*. The science of economics is concerned with both kinds of artifacts and also with labor processes.

Economic means, ends, and distribution relationships are all artifacts and must be analyzed accordingly. Economic means are precisely entities that enter into a labor process and therefore appear as the prime or raw materials of the process, or as instruments (tools) of labor. If the qualifying functions of the raw materials survive the transformations effected by the labor process, the same functions become the material functions of the resulting produced artifact. In many cases, the economic means are themselves the result of another, previous labor process, in which case they are called precisely *prime* materials. Their leading function is "cultural", better called technical, since their end is to feed another production process (production of goods by means of goods). The economic means that are not artifacts or semi-manufactured products themselves are called *raw* materials.

Dooyeweerd characterized the nucleus of the historical modality as

> the *cultural* [what I call "technical"] way of being. Cultural activity always consists in giving form to material in free control over the material. It consists in giving form according to a free design.
>
> (Dooyeweerd [1979], p. 64)

Compare this with Marx's claim that

> what distinguishes the worst architect from the best of bees is that the architect builds the cell in his mind before he constructs it in wax. At the end of every labor process, a result emerges that had already been conceived by the worker at the beginning, hence already existed ideally. Man not only effects a change of form in the materials of nature; he also realizes [*verwirklicht*] his own purpose in those materials. And this is a purpose he is conscious of, it determines its mode of activity with the rigidity of a law and he must subordinate his will to it. (Marx [1976], I, p. 284)

Thus, it turns out that Dooyeweerd's concept of cultural activity and Marx's concept of human labor are virtually identical. This would imply, in effect, that man's capability to *work* or — as Dooyeweerd's prefers to call it, the cultural way of being — is the meaning-kernel of the historical aspect.

It is clear that the cultural activity requires power to be carried out. Without power, no discovery or invention that aims at controlling nature, create a new social institution, or improve an existing one can be historically formative. As Dooyeweerd ([1979], p. 67) put it, "power is the great motor of cultural development". But power and the exercise of power are subject to norms. These norms are precisely the modal laws of the historical aspect and therefore also part of those laws in which the science of economics ought to be interested.

Dooyewerd distinguishes at least three laws within the historical modality, namely: the norm of historical continuity, the norm of the opening or disclosure of culture, and the norm of historical development, also called *principle of cultural economy*. The law of historical continuity forces every creator of new forms to acknowledge the fact that the given cultural structures cannot be dismissed entirely, but only modified to some extent. This puts a bridle, of course, in the mouth of those revolutionaries who would like to destroy everything and create everything anew, and also puts shackles on the hands of those who would like to destroy culture altogether. It can be expressed by means of the *motto* that history is the production of culture by means of culture.

The norm for the opening or disclosure of culture requires

> the differentiation of culture into spheres that possess their own unique nature. Cultural differentiation is necessary so that the creational ordinance, which calls for the disclosure or unfolding of everything in accordance with its inner nature, may be realized also in historical development. (Dooyeweerd [1979], p. 74)

This norm calls upon us to develop new vital cultural forms, in order to give rise continually to new cultural forms. It removes the bridle from those truly creative geniuses and also the shackles from those who want to innovate in any sphere of life.

The norm of historical development, or principle of cultural economy, finally requires that "the historical power sphere of each differentiated cultural sphere should be limited to the boundaries set by the nature proper to each sphere" (Dooyeweerd [1979], p. 81). This is clearly a historical aspectual formulation of the principle of the sovereignty of the spheres, according to which every social sphere must develop without interference from other spheres. Observing this principle guarantees a

harmonious cultural development, preventing the one-sided encroachment of one power-sphere upon the others.

The science of economics is concerned with the laws (norms) that qualify economic behavior, processes, and structures. These laws are the basic framework for the creation of new means, ends, and distributive relationships, since their creation is indeed cultural. This can be expressed as the claim that even though the ordinary production and distribution of goods is not historically guided, it is nevertheless historically founded. In other words, the creation of new economic species is controlled by the historical norms, but always guided by the efficient allocation of resources.

This brings us back to our problem, which was the searching for the modal laws of economics. Clearly, by "modal laws of economics" one must understand the general laws constituting the economic modality. But it is clear that the science of economics cannot neglect the ruling of economic processes and structures effected by historical-cultural laws under the guidance of those belonging to the economic modality proper. It seems to me that, from the point of view of WdW, the grains of truth contained in Hegel's *Rechtsphilosophie*, in historical materialism, as well as in Georgescu-Roegen's philosophy of economics, boil down to this thesis. Hence, the science of economics must be concerned not only with the meaning-kernel of the economic modality and its laws, but also with those of the historical modality. More precisely, it must be concerned with the *connections* between modal economic and basic historic laws. These connections bring us to the structure of individuality or type law determining the radical-type *economic entity*. The general theory of economics has as a task precisely the investigation of this type law; *i.e.*, the law that ordains and governs entities that are economically qualified. The regional theories of economics, as specializations of the general one, have as a task the investigation of the genotypes of this radical type, namely the different production systems. The methodological injunction that can be adopted here is that mathematical models and measurements of an economic process should be produced only when a substantial progress has been made in the *understanding* of its individual peculiarities, under the light of its corresponding genotype. The general theory of economics must satisfy the following methodological constraints:

> *Methodological individualism*. The thesis that all social phenomena should be explained in terms of individuals, properties of these individuals (such as beliefs, desires, other mental states and actions), or relationships among these individuals, where "individual" is *not* a historical category, but means "psycho-physical unit of action with rational capacities".

> *Nomic methodological individualism*. The thesis that also norms and laws should be included in the explanation of social phenomena and social institutions must be seen as relational structures (hence, relationships among individuals) built as human responses to these norms and laws. Nomic methodological individualism requires that economic phenomena be explained in terms of institutions, norms, and choices taken by concrete human beings, or of (intended or unintended) aggregated consequences of these choices. These choices have to do with *allocations* of goods (including services) and labor.

Notice that choices in undifferentiated societies (tribes or clans) are also individual choices. Recall that a choice made by a deliberative council counts as individual, unless it is made by voting. In undifferentiated societies, labor is "immediately" social; *i.e*., the governing chief or council allocates labor, assigning to each member of the community a given task.

The modal laws and norms being ontological, supra-arbitrary, transhistorical, and perfectly general, the nuclear meaning of the economic modality is the *efficient use of scarce resources*. Efficiency is the supreme value of this modality. Hence, economic modal laws are norms ruling the efficient allocation of goods and labor. Both a community (*Gemeinschaft*), and a bourgeois society (*Gesellschaft*) must obey the modal laws, if they are to survive as societies. Admittedly, the *form of manifestation* of the modal laws may vary, depending of the particular social structure

The first modal law imposes itself when the economic process of a society cannot be sustained, reproduced, or transformed, unless goods are distributed among the households, individuals, and productive units in a certain way. This involves, of course, a certain idea of equilibrium. This law is interlocked with justitial laws, requiring that the allocation be made according to a sense of justice. A *Gemeinschaft* that ignores this interlocking is in jeopardy because cooperation among its members tends to wane. A *Gesellschaft* ignoring it may enter into social turmoil.

The second modal law has to do with the social distribution of labor. It can be formulated thus: social labor must be distributed in such a way that all branches of the economy receive the required amount of labor to make feasible the production of all the required goods to reproduce the economy and sustain the members of society (at least the labor power). Marx (1868) phrased this law in the following, rather forceful way:

> It is *self-evident* that this *necessity* of the *distribution* of social labor in specific proportions is certainly not abolished by the *specific form* of social production; it can only change *its form of manifestation*. Natural laws cannot be abolished at all. The only thing that can change, under historically differing conditions, is the *form* in which

> those laws assert themselves. And the form in which this proportional distribution of labor asserts itself in a state or society in which the interconnection of social labor expresses itself as the *private exchange* of the individual products of labor is precisely the *exchange value* of these products.

This law manifests itself in primitive societies is through the setting of a common criterion to measure the contribution of the different members of the society to the labor pool. Says Mandel:

> While primitive society, cooperatively organized, does not know yet another division of labor than that separating the sexes, the rhythm of labor shall be established by custom and rites. The moment a more consequent division of labor is established, the communitarian contribution of each producer will be measured by a common criterion. Otherwise, the cooperation of labor will tend to disaggregate by the establishment of favored and unfavored groups. This common organizational measure cannot be but *the economy of labor time*. (Mandel [1962], pp. 56-57 — my translation, A.G.S.)

According to this same thinker,

> The village can be considered as a great family. The sum total of the annual production must correspond more or less to the needs of subsistence means, clothing, housing, and labor instruments. In order to prevent disequilibrium among these different productions, to prevent the peasants from devoting an exaggerated part of their labor to the production of pottery, leather articles, letting to lie fallow a part of the fields, it is necessary to establish a balance of available labor time and to allocate this having taken into account, first, the essential sectors indispensable for the good functioning of the community, leaving afterwards to each one to employ the rest of his time as he pleases. (Mandel [1962], p. 57)

In differentiated societies, labor may still be clearly social, insofar as there is a conscious accounting of labor. For instance, in the peasant economy of Japan,

> the labor journeys of men constitute the principle of exchange. If a family 'a' is composed of two men working during two journeys over the fields of family 'b', this family 'b' will provide an equivalent (in labor) for the fields of 'a', equivalent that might consist of three men working during one day and a man carrying out a complementary journey or any other combination, equalizing (the work of) two men in two days… When four or five families collaborate in

> a *kattari* group (cooperative work to transplant rice), the calculation is made on the same basis. This demands an accounting book to compare the days and the men at work (the number of journeys carried out). (Embree [1939])

Many other concrete historical examples of societies with a conscious accounting of labor are provided by Mandel ([1962], pp. 57ff.).

In counter-distinction to simpler societies, modern societies are characterized by an increasing social division of labor, resulting in more complex systems of needs and the decentralization of choices. From barter to the introduction of money a long time elapsed, but the net result is that, what in primitive undifferentiated societies was a direct social relationship, in modern differentiated societies became a monetary relationship or one among many *commodities* (this is what Marx called "the fetishism of commodity").

As it has been argued above, the notions of preference, demand, and commodity allocation are essential in the economic analysis. But the notion of labor allocation, or distribution, is also essential. The two facets of any economy are the distribution of goods and the distribution of labor. It is important to understand the mechanism of labor distribution in any economic system, as it is important to understand that of commodity distribution. It seems that prices (in modern-market economies) must be explained in terms not only of consumer preferences (and demand), but also in terms of labor, since the distribution of labor in a society imposes bounds to the fluctuation of prices.

Hence, a non-reductionist view of economics must take into account the following points:

- there are other spheres of human life that cannot be reduced to, or explained in terms of, economic concepts, even though they have an economic aspect;
- the preferences of the consumer are as important for the formation of prices as the mechanism of the distribution of labor, whose form of manifestation has varied throughout history; hence, the labor theory of value and "Neoclassical economics" should be fused into a larger theory.

Toward a General Theory

To say that the general-type law of economics has an economic leading function, which is the efficient allocation of resources, is not tantamount to claiming that managerial economics or "husbandry" is all there is to the economic process. Quite the contrary, it is equivalent to placing

the focus of economic theory precisely on the distributive relationships. Indeed, to allocate scarce resources is nothing else but to *distribute* them, and every such allocation is always made according to more or less explicit rules. These rules presuppose or determine specific social relationships among the members of a community, and these relationships are what is called "distributive relationships". When WdW says that economic structures are historically qualified, it means to imply that these relationships are, of course, *cultural formations*, not eternal natural laws. But the modal laws of economics, together with those of the historical aspect, provide the cosmic framework within which the great variety of distributive relationships takes place.

Hence, it is understandable why the Marxist and Hegelian schools put so much emphasis on the distributive aspect of the economic process. The contemporary Marxist economist Ulrich Krause listed the essential moments of the economic structure as follows (Krause [1982], p. 17):

(1) *Production*: the manufacturing of goods by using products and labor, with nature as the resource.
(2) *Distribution*: the recycling of products as prerequisites of production, as means of production on the one hand (in accordance with the organization or division of labor) and as means of consumption on the other hand.
(3) *Consumption*: the use of natural objects and products of human labor in order, among other things, to sustain the various sorts of working capacity.

If one departs from an abstract consideration of a situation in which man interacts directly with nature in order to extract from it the resources he needs to survive (the Robinsonian fantasy), the social division of labor adds a new element to the concept of a direct interaction of production and consumption between man and nature:

> The essential new element is the feedback through *distribution*, which necessarily raises the issue of social or economic structure. As the direct interaction with nature is severed, the economic structure emerges as the new kernel of the metabolism. (Krause [1982], p. 17)

Now, says Krause,

> the character of the economic structure is highly dependent on the nature of distribution. Many systems are conceivable, and many have arisen historically. That labor of different types is necessary for their preservation is true of all societies. What differs is *how* these various labors are related and coordinated, and that depends on the specific mode of distribution. (Krause [1982], p. 19)

In other words, Krause places the specific difference of the genotypes on the nature of the distribution. For instance,

> the principle of distribution in a market society is based on private property in the means of production and the mediation of the output of private production through the market. (Krause [1982], p. 19)

Thus, we can say that, from different philosophical directions and presuppositions, WdW concurs with Marxism and Hegelianism in placing distribution or allocation at the center of the economic process.

The needs of a man have a historical character. I do not wish to deny that all men at all times need food and shelter. What I say is that these needs can be satisfied by means of very different cultural forms and also that new needs arise on top of these elementary ones. The arising of new needs is governed by the norm of the opening of culture, which is a calling to create new cultural forms according to their proper nature. Hence, human needs go far beyond what is given in nature, so the resources that are needed either for consumption, or for production require *labor* to be produced. Now — since labor is not given in unlimited supply, because it is the cultural activity of a limited number of concrete individual humans —, these resources may be scarce for a given demand. The problem is that this very demand may in turn depend on the given social distribution of labor, which posits an interesting riddle for the economic theory: the interdependence of the factors in the economic process.

At a certain synchronic slice of the economic process, certain means, ends, and distributive relationships — certain cultural forms — are given, while others are being created. What matters most, every economic agent is endowed with a certain structure of cultural power, which includes (i) the enjoyment of things, capabilities, and a certain education that allow him to define his own ends; and (ii) a certain position within the web of distributive relationships that imposes restrictions on the ends that can actually be pursued. Clearly, the type of ends that a given agent pursues is conditioned by his religious faith, morality, and other personal features.

The web of distributive relationships may or may not have an explicit juridical form — *i.e.*, codified like a positive law —, but at any rate it is a *constitution*, *i.e.*, a set of rules or procedures by means of which the sum total of social resources is allocated. Perhaps this aspect of the economic process may be modeled by means of game-theoretic notions, but I will not consider this matter here. Another important question is whether the given constitution is optimal from a justitial viewpoint, given the distribution of power among the economic agents. What I am suggesting is that perhaps a different *use* of the formative power available,

as it is distributed among the agents, might bring a better situation from a justitial viewpoint, a situation that is closer to the fulfillment of justitial and ethical laws. This leads immediately to the cluster of problems associated with social choice, including the question of the "common good" (usually formulated in terms of the problem of a social welfare function).

The central law of the economic process, therefore, governs the interdependence of the factors of the economic process. This is a law of distribution of scarce resources and labor that delimits the distributive conditions under which a certain society may not only reproduce itself, but fulfill the three fundamental historical norms as well as the norms of ethics and justice. It is a law that norms the coordination of the different types of labors — or callings — in such a way that each member of the society can at least return at the end of the productive cycle to the same distributive position in which he was at the beginning.

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The Necessity of a Non-Reductionist Science of Politics*

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Writing in *The Journal of Politics* last year, Jon R. Bond reaffirmed the long-standing hope of many political scientists that someone in their discipline would come along "to do for political science what Newton did for Physics"[1]. Political science "is truly a 'hard' science", according to Bond, though that is "not the only way to study and learn about politics". Nevertheless, he writes, "I believe that while there is an art to politics, there are basic laws that explain political behavior and these laws can be discovered through the scientific method"[2]. While a behavioral science approach to the study of politics emerged in the nineteenth century, it did not really take off until the 1930s and 1940s. The basis for that "take-off" was the belief that the methods developed by the natural sciences and Mathematics would truly be able to provide a thorough cause-and-effect explanation of political behavior. The primary assumptions of the scientific method, according to Bond, include the belief that "the beginning of scientific inquiry is the *fact/value dichotomy*", and that the "core goal of the scientific method is *hypothesis testing and theory building*" of the kind that will yield *quantifiable* results.[3]

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1. Jon R. Bond, "The scientification of the study of politics: Some observations on behavioral evolution in political science", in *The Journal of Politics*, vol. 69, no. 4 (November, 2007), p. 905.
2. J.R. Bond, *art.cit.*, p. 898.
3. J.R. Bond, *art.cit.*, p. 899.

What political science needs today, however, says Bond, is not only an advance in the methods of quantifiable measurement; it needs a revolution in theory. At present, economic theory, with its "rational choice" assumptions, is the dominant theoretical perspective in political science, according to Bond. Progress has also been made in the study of politics by those who take a biological, genetic, ecological, sociological, psychological, or functional approach.[4] However, none of these, and not even all of them together, has yet done for political science what Newton did for Physics. What kind of theory is it, therefore, that will finally allow political scientists to give a truly *hard* scientific explanation of political behavior, and what is it that distinguishes political behavior from all other kinds of behavior? Bond does not answer these questions.

One of the most remarkable things about Bond's essay is its complete lack of critical reflection on his presuppositions about what should constitute a science of politics. The problem is not simply with his hope that political science might one day find its Newton, but with the jumble of competing approaches he seems to accept as legitimate even though they have not yet arrived at a *hard* scientific explanation of *political* behavior. Bond simply confesses his faith in the fact/value dichotomy and in the scientific method as the solid ground on which to stand in order to pursue such a science.

Quite in contrast to Bond, my approach in this paper will be to argue that the study of politics cannot advance on the basis of what are essentially reductionist assumptions held by Bond and most political scientists. The fact/value dichotomy is not a self-evident starting point, but a presumption held on faith — a faith with roots reaching back through Max Weber to Immanuel Kant. Furthermore, the methods developed by the natural sciences should not be assumed to be adequate for the study of all of human life and society, unless, of course, human behavior is fully determined by natural laws and the study of human behavior can yield exhaustive mathematical, physical, chemical, and/or biotic measurement.

My thesis, which is indebted to the work of Herman Dooyeweerd[5], is threefold. First, the "political" is not one among many modes of human

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4. J.R. Bond, *art.cit.*, pp. 903-905. For more on the historical development of the "scientification" of political study along different and competing lines, see the volume published by the American Political Science Association and edited by Ada W. Finifter, *Political Science: The State of the Discipline*, Washington, DC, APSA, 1983. My assessment of some of these developments in the discipline can be found in James W. Skillen, "Toward a comprehensive science of politics", in *Philosophia Reformata*, vol. 53, no. 1 (1988), pp. 33-58. I have drawn on that essay for some of the content of this paper.

5. My indebtedness to Herman Dooyeweerd should be evident here and is apparent in the following publications in particular: James W. Skillen, "Philosophy of the cosmonomic idea: Herman Dooyeweerd's political and legal thought", in *The Political Science*

functioning, such as the numerical, biotic, psychic, social, linguistic, economic, juridical, or ethical. Second, political life cannot be accurately understood by means of a reductionist science of one or all of the modes of human functioning. And third, the proper object of study for political science is the institutional political community of government and citizens. This community or institution is a complex entity that functions simultaneously in all the modes of human existence, such as the numerical, spatial, physical, chemical, biotic, sensory, logical, historical, linguistic, social, economic, aesthetic, juridical, ethical, and fiduciary. Consequently, a proper study of politics requires a non-reductionist approach to its subject-matter that is fully self-conscious of its philosophical assumptions and that recognizes the limits of all its concepts and judgments.

Distinguishing the Analyzable

Let us begin with what is perhaps the most basic requirement of any science, namely distinguishing the object of study. If the point of a careful analytical study is to understand something, then that "something" must be properly identified and distinguished from every other "something". In one sense, this is what has happened in the course of the differentiation of the wide range of disciplines with which we are familiar in our colleges and universities: mathematics, physics, chemistry, biology, linguistics, sociology, and more. If the methods that have been used to distinguish these fields of study are used to study political life, what will they disclose as the precise object of study? At best, such methods will help us understand one or more of the ways the political community functions. This is because every modal or aspectual science, including sociology, psychology, economics, and ethics, is the study of a particular aspect or mode of human functioning, not the study of a complete entity such as a person, human relationship, or institution that functions in all modes at the same time. Aspectual or modal sciences try to answer the

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Reviewer, vol. 32 (2003), pp. 318-380; James W. Skillen, "The Development of Calvinistic Political Theory in The Netherlands, With Special Reference to the Thought of Herman Dooyeweerd" (doctoral dissertation at Duke University, 1974, available from University of Microfilms — no. 74-25, 413 — Ann Arbor, Michigan); and the essay cited above, James W. Skillen, "Toward a comprehensive science of politics". This paper is also indebted to the one presented by Roy Clouser at this conference that expounds Dooyeweerd's philosophy: "A Blue-Print for a Non-Reductionist Theory of Reality". Dooyeweerd's most elaborate discussion of the state as institutional political community is in the third volume of his *A New Critique of Theoretical Thought* (translated by David H. Freeman and H. de Jongste), series A, vol. 3 of *The Collected Works of Herman Dooyeweerd*, Lewiston, N.Y., Mellen Press, 1997, pp. 379-508 (cited henceforth as *New Critique*, III).

question of *how* things function, not the question of *what* functions in this or that way. There is no *entity* that can be identified as a "social", or a "psyche", or an "economic", or an "ethic". Those are modalities in terms of which humans function and, like the natural scientific disciplines, they focus on one or another mode of human experience that encompasses all human experience. Humans function socially, psychically, economically, and ethically (as well as linguistically, aesthetically, and so forth) all at the same time, and they do so in every relationship, organization, and institution in which they play a part. That is why sociology, a modal or aspectual science, has so many subfields such as sociology of the family, political sociology, sociology of religion, and more, because every kind of human relationship and institution as a social function.

Now, if there were a modal function or aspect of human existence that could be identified as the "political", what would it be? Some have argued that power is what defines the political. But what kind of power is political power, or is every kind of power political? Parents have power over their children; teachers have power over their students; a craftsman has power over the materials he is crafting; a surgeon has power over the patient on whom he or she is operating; religious leaders have power over adherents of the religion that unites them; and we could go on to describe other kinds of power. Should we conclude that each of these instances of power discloses the political aspect of each of these relationships or institutions? If we do, then there can be no distinctive political community, because all communities, institutions, and organizations are political insofar as they exert power. That would mean that there is no way, really, to distinguish between state and family, between business and state, or between church and state. All are political in the sense that they exhibit the use of power.

Yet most people know that the word "political" refers not to some universal mode/function of all human relationships but to the public-legal community — the state or nation — of which they are a part as citizens or as resident aliens. That entity exercises a distinctive kind of power, namely the use of (or threat to use) lethal force, and even claims a right to monopolize lethal force. As Dooyeweerd puts it, the distinctive power of the state is its "internal monopolistic organization of the power of the sword over a particular cultural area within territorial boundaries".[6]

Other political scientists and legal theorists have argued that what is distinctively political is the juridical or legal ordering of human experience. After all, the long history of warfare and slaughter has been moderated by civilized people through the establishment of legal controls over the

6. Dooyeweerd, *New Critique*, III, p. 414.

use of force. Any person might decide to use lethal force, but what is distinctively political is the institutional means of limiting the use of force (and other negative human behaviors) by the rule of law over all people in a particular territory. Here, as with the focus on power, we cannot help but notice that not every legal or juridical function identifies something as political. Churches and many other organizations have constitutions or by-laws. Leaders in most organizations are not free to act arbitrarily and without legal accountability. And parents establish rules in their homes. But does this mean that every human relationship, organization, and institution is political insofar as it displays some kind of legal function? To the contrary, most people and most political scientists recognize that the legal or juridical *function* of the state is precisely that — a function, which is different in a political community that monopolizes force under law than it is in a family, or church, or business enterprise.

Neither power (might), nor legality (right), therefore, identifies a universal *political* modality. Instead, the political community functions in a distinctive way both in terms of the power it exerts and in terms of the kind of law it upholds. Clearly, then, the adjective *political* refers to, and derives all its related meanings from, an institutional entity referred to variously as the political community, state, or nation, which is constituted by a government and citizens and includes the international relations among states. If we want to distinguish the "political" from what is not political, therefore, we will have to distinguish the institution constituted by government and citizens from non-political institutions and organizations such as family, church, business enterprise, university, and others. And we will have to account for the distinctive kind of power and legal authority that characterizes the political community in contrast to the kind of power and lawfulness that characterize the internal life of families, business enterprises, schools, and churches. We must remember, says Dooyeweerd, that "every body politic organizes a *people* within a territory into a typical, legally qualified, public community. The State's people is indeed the typical totality of all the citizens irrespective of their family relations, their Church membership or their philosophical convictions, their trades or professions, class distinctions, or their social standing. The State constitutes a typical integrating political unity in spite of any differences or divisions which its people display in other societal relationships."[7]

In sum, the "political" is not a universal function of all human affairs, the study of which can yield a reductionist, cause-and-effect explanation of human behavior. Rather, the "political" is that which pertains to the life and operations of the state or political community. Despite confusion on

7. Dooyeweerd, *New Critique*, III, pp. 437-438.

this matter in the field of political science, most political scientists actually orient their studies to the life of government and citizens, spending their time examining the decisions and behavior of government officials, the making of laws, and the actions of voters, interest groups, and those active in public-policy think tanks. Those calling themselves political scientists may also study the influence of other organizations and decision-makers on government and the governing process; that is because the particular institution of the political community is influenced and shaped in part by all the organizations that operate in the society governed by the political community.

If one does not begin with the recognition that the proper object of political science is the political community in its complex, multi-functional, multi-aspectual particularity, one may end up talking almost meaninglessly about what political scientists do, regardless of whether their work is based on any clear identification of the object of study and regardless of whether their work is productive in any scientific sense at all. That is what the president of the American Political Science Association (APSA) did in his 2007 presidential address to the APSA annual meeting.[8] Robert Axelrod spoke of how political scientists have *imported* many of their concepts and methods from psychology, history, sociology, and economics. But his main purpose was to show that political science has something to *export* to other disciplines. If this is true, then we would expect that Axelrod would be able to show what is unique to the science of politics in contrast to what belongs to psychology, history, sociology, and economics. Yet the examples he cites of political-science exports tell us nothing of the kind and lead nowhere.

His first example cites the appearance of a serious threat to public health and the consequent need for the public to place its trust in the government's decision to deal with that threat. Political scientists, he says, know a lot about "understanding trust in government" and therefore have something to export into the public-health field.[9] But this example has nothing to do with a political-science *export*. A public-health decision made by government that requires popular trust is precisely a *political* matter because it has to do with what is necessary for citizens and government to do.

Axelrod's second example is about a concern to reduce behavior among teenagers that puts their health at risk. This challenge has to do with the strength of "social norms". But when he says that political scientists

8. Robert Axelrod, "Political science and beyond: Presidential address to the American Political Science Association", *Perspectives on Politics*, vol. 6, no. 1 (March, 2008), pp. 3-9.

9. Axelrod, *art.cit*., p. 6.

have something to export in this connection, he refers to what they and sociologists know "about how and when social norms can change over time"[10]. Yet this example moves in the opposite direction from the first one. It demonstrates nothing peculiarly political. Social norms are evident in the life of families, in the media, in schools and neighborhoods and friendships, as well as in the actions of governments and citizens. Axelrod's statement that sociologists and political scientists know something about changing social norms makes my point: there is nothing in this example that distinguishes a political-science export from a sociological export.

The third example concerns a challenge of vaccinating people who face a potential epidemic. The challenge facing those in the location where the danger first arises is how to convince foreign countries not to hoard their stockpiles of vaccine that are needed beyond their borders in the place where the potential epidemic has arisen. Political scientists, says Axelrod, "know a lot about how domestic politics affects foreign policy, and how effective international regimes can be built"[11]. But here, as in the first example, Axelrod refers to something entirely internal to the political realm. There is no export at all, unless he is implying that political science is entirely focused on domestic politics and that international relations and regimes are the object of another discipline's study. But that is not the case. A proper study of political science has to include the study of relations between states and the international organizations they create.

The fourth example Axelrod cites is a study of more than 100,000 nurses who underwent estrogen replacement therapy. The study showed that the therapy protected against heart attacks. Later, however, it was learned that those who conducted the study did not control for the socio-economic status of the participating nurses and the results proved to be inaccurate. Political scientists could have helped here, says the author, because they know that such an experiment should have controlled for things like the socio-economic status in order to avoid reaching the conclusion that "correlation implies causation"[12]. However, like Axelrod's second example, this one reveals nothing unique about political science. Any sociologist or psychologist could have given this advice. If political scientists do have this kind of advice to offer, it is most likely because they imported a method that is used in many functional or aspectual sciences. The example tells us nothing about how to distinguish the peculiar object of political science or about what is distinctive about a political-science export.

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10. Axelrod, *art.cit.*, p. 6.

11. *Ibidem*.

12. *Ibidem*.

Axelrod's next three examples all have to do with what he believes political scientists can export to the field of cognitive and neuropsychology. But the three examples are worse than the first four. Neuropsychologists, he says, in the first instance, "are beginning to understand that the perception of fairness can operate at the neural level" and political science has a lot to say about the perception of fairness and justice.[13] But, of course, there is nothing peculiar to political science in this regard. Ethicists, family sociologists, and students of education also have something to say about the people's perceptions of fairness and justice. The next example has to do with individual altruism *versus* selfishness and, according to Axelrod, political scientists know a lot about "what it takes for cooperation between people to flourish"[14]. But this kind of knowledge tells us nothing about what is unique to political science. Finally, and ridiculously, the author suggests that when political scientists conduct surveys that discover voter disgust with their voting choices, they uncover something that can be exported to neuropsychology, because neuropsychologists discover that "when someone is disgusted with the behavior of another person, the same part of the brain is active as when they are disgusted by an unpleasant odor"[15].

What have we learned from the president of the American Political Science Association about the distinctive object of political study? Nothing whatsoever! Nothing, that is, unless we are willing, with Axelrod, to say that the proper object of a science of politics is whatever someone who is called a political scientist chooses to study. But to say that would merely confirm my point that the so-called discipline of political science today has no clear object in focus for its study. Members of this discipline may survey opinion; measure voting behavior; investigate psychological dispositions; argue about the impact of religious opinions on behavioral patterns; examine economic decisions and outcomes; study genetic influences; or do a thousand other things. But none of this tells us what the "political" is. The fact that most of what political scientists do with their historical, sociological, economic, psychological, and other methods is to study the behavior of public officials, voters, policy-makers, and so forth, reveals their pre-scientific awareness that their study really must focus on the political institutions and behaviors that constitute the sphere of government in relation to the citizens in political communities. Yet this pre-scientific awareness is not elucidated or deepened analytically in a coherent way.

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13. Axelrod, *art.cit.*, p. 7.

14. *Ibidem*.

15. *Ibidem*.

Now, none of what I have said above should be taken to mean that the diverse range of modal or aspectual sciences can contribute nothing to the study of politics. To the contrary, as I will try to argue in the following section, precisely because the institutional entity of the political community functions in all modes of human existence, it is incumbent upon political scientists to study the political community from every modal viewpoint. But this demands that they start with a clear idea of the object of their study and that they refuse to try to give a scientific account of the political community by means of a reductionist modal science.

What Should Constitute a Non-Reductionist Science of Politics?

I have thus far set the stage for an argument that a science of politics must be an *entity* science, not a *modal* or *aspectual* science. It must be a study of *what* the political community is and not of *how* all persons, institutions, and communities function in a single modality. At the same time, however, we have to recognize that a political community of government and citizens does function in all the modalities of human experience. Thus, part of what it will take to develop a thorough science of the political community and of interstate and transnational relations will be an examination of how the political community functions numerically, spatially, psychically, socially, economically, and in all other modes of its existence[16], while it is a mistake to imagine that the political life can be reduced to an explanation from a single modal vantage point. This is why we should not be surprised that political scientists have learned and borrowed from sociologists, economists, psychologists, ethicists, and even physicists, mathematicians, and biologists. The learning and borrowing are not because, as some imagine, political behavior can eventually be explained by a reductionist mathematical, physical, or biological approach, but because the political order functions in all modalities and every modal science that wants to account for reality will have to take the political community into account, just as it needs to take into account the family, friendships, business enterprises, schools, and all other human relationships and organizations.

The first challenge to a science of politics, then, in trying to "distinguish the analyzable", is to properly identify the political community in contrast to everything that is *not* the political community. If one mistakenly

16. Such a multi-modal analysis of the political community is precisely what Dooyeweerd attempts in *New Critique*, III, pp. 467-508.

imagines that the study of politics is the study of power, then, as we have said, one will have to study everything that exhibits any kind of power. If one mistakenly imagines that the study of politics should be the study of law and justice, then one will have to study everything that exhibits any legal or juridical function. But if we recognize that the proper object of study for a science of politics is the political community, then we will indeed need to try to understand the particular kind of justice it should exhibit and the kind of power it properly exercises. And we will pursue such a study with the aim of distinguishing how a political community's responsibility for justice and its use of power are different from the kind of power and justice appropriate in a family, or a school, or a business enterprise.

The proper "object" of study for political science must include everything that pertains to the responsibility of governments and citizens in their political communities, including the relations among states and the international organizations states establish. Today, the most stable and legitimate states are grounded in a basic law or constitution that sets the juridical parameters of their authority and responsibilities. A political community's authority to use force, whether it is police or military force, is typically tied to standards of justice articulated in the constitution and statute laws. In fact, we might argue, as Dooyeweerd does, that part of what allows us to distinguish the political community from a family or business enterprise is that the former is grounded in a monopoly of force, on the one hand, and qualified by juridical norms of public justice, on the other hand.

If we contrast the political community with the family, for example, we can see that the latter is grounded in a biotic bond and qualified by an ethical obligation of familial love. Families do function both historically and juridically, for after all, there is the historical moment when a couple pledges troth and enters into marriage and there is the responsibility for spouses to treat one another and their children justly. But the family does not realize a community of public justice, nor is its basis a historical contract authorizing a particular use of power. Likewise, a political community exhibits biotic functions by the fact that its citizens function biotically and many of its laws deal with public health and natural environmental regulations. A political community also depends on the trust and patriotism of its citizens and thus functions ethically. But a state or political community does not realize an ethically qualified community of blood relatives.

Having said this much about distinguishing the object of a science of politics, we are already confronted with the reason why such a science cannot be modeled on the so-called "hard" natural sciences and mathematics. A human community or institution is not a "kingdom" of bees,

or a herd of animals, or a forest of trees. The bond of a human political community is characterized by human decisions, judgments, arguments, allegiances, compliance or non-compliance with public laws, and ongoing development over the generations. While there is certainly evidence of evolution in animals, the habits and behaviors of dogs or elephants are not much different today than they were as far back as we can see and those bonds lack the exercise of normative responsibilities characteristic of any human community. By contrast, the public-legal bonds among humans that aim to define the just use of force for the sake of the political community's security and internal order have changed radically over the centuries and continue to change today. From the smaller kingdoms in ancient times to the feudal system, from the imperial orders of ancient Rome and the Chinese Middle Kingdom to the modern states, we are confronted with an ongoing development of human political communities that exhibit "norm responsiveness", not merely "natural determinism". Normative arguments and the creative positivization of norms in public laws and in governing institutions show that the future of political communities remains open to new judgments, to the consequences of war, to the outcomes of trade agreements, and to the successes and failures of international organizations.

Consequently, the study of politics must include a full, empirical taking-into-account of the norm-responsive character of human actions. A truly empirical scientist is not free to ignore this reality and to decide, prejudicially, that, even though humans are norm-responsive creatures, the scientist should treat them as naturally determined animals whose DNA or psychic reactions are the key to a full explanation of political behavior. Nor will it be possible finally to explain human behaviors in terms of mathematically reducible measurement. The failure of reductionist scientific endeavors in the political realm is evident from what such endeavors must presuppose without explanation.

Let us assume for the sake of argument that we take a biologically (or economically) reductionist approach to explaining political behavior. The *political* scientist who takes that approach must presuppose the existence of something "political" that can be accounted for biologically or economically. But a reductionist approach aims at explaining away the very object that it is going to study. Moreover, such an approach must also take for granted the social, aesthetic, ethical, linguistic, juridical, and other functions that it intends to explain away biologically or economically. However, if everything really is ultimately reducible to a biological or economic explanation, then nothing else really exists. Or to put it another way, if everything human can be explained in terms of genetics, then how does one explain the genetic meaning of Mozart's musical creativity, or

the inner logic of a law-court argument, or love between spouses? In order to attempt a reductionist account of all of these, one must have already distinguished music, law, and spousal love, none of which is biotic and thus cannot be explained away. The same kind of criticism can be leveled against every other effort to explain all human functions and institutions sociologically, economically, or linguistically.

An authentic science of politics can only be one giving an account of the full meaning of political life, beginning with a proper identification of the object of study — the political community (distinguished from all other human institutions, organizations, and relationships) — and then doing justice to all the modal functions of that entity, including the norm-responsive functions that require an assessment of norms of justice, love, and so forth. Such a science must inevitably depend on a number of prior assumptions and presuppositions of a philosophical and religiously deep nature, as Clouser, following Dooyeweerd, demonstrates.[17] One cannot distinguish the object of political study without presupposing a relationship between that object and everything else that is *not* going to be the object of study. Consequently, the prejudgments and presuppositions on the part of a political scientist must arise from pre-scientific conditions. Will one presume, for example, as Plato and Aristotle did, that the political community (the *polis*) is the largest human "whole" of which everything else is a "part"? Or will one begin with a modern liberal assumption that the political order is just one of many organizations created by contracts among naturally autonomous individuals? Or will one begin, as Dooyeweerd does, with the assumption that the political community is one among a variety of institutions and organizations that reveal our creaturely character — made in the image of God — and that arise from our continued dependence on, and accountability to, God the Creator? None of these necessarily *pre*-scientific starting points can be the *outcome* of scientific thought. To the contrary, no science can even begin without such a foundation.

Nor can scientists avoid presuppositions about the limits of their science when it purports to study an institution in which they are fully immersed. One of the long-standing assumptions of theoretical thought has been that rational analysis proceeds from reason's transcending of its object, or at least that rational analysis can proceed because of the scientific method's "objective" capability. Whether it was Aristotle's belief that reason is ultimately divine or modern science's assumption that properly

17. See Clouser's paper for this conference, "A Blue-Print for a Non-Reductionist Theory of Reality", and his *Myth of Religious Neutrality* (2nd ed.), Notre Dame, IN, Notre Dame University Press, 2005.

disciplined analyses can grasp the laws that determine the behavior of everything subject to those laws, philosophy and science throughout history have generally proceeded from what Dooyeweerd contends is a mistaken belief in the autonomy of theoretical thought. Yet more than one critical philosopher has exposed such belief as a mistake.[18]

For the most part, however, the political science of today takes as its starting point a faith in the scientific method as the best and most exact means of showing, in a hard scientific (cause/effect, determinist, mathematically measurable) fashion, what it is that causes people to behave politically the way they do. Political scientists, whether closer to Marxism or to libertarianism, assume that the object of their study can be fully or sufficiently "objectified" to avoid subjective bias and that in studying the "factual" world (in contrast to the "values" world) religious and philosophical prejudices can be ignored or avoided. Yet, on the basis of those very assumptions and presuppositions, the so-called discipline of political science has not been able to achieve its program or even reach a consensus about what constitutes political behavior. Nor has the importation of multiple modal-scientific approaches (sociological, psychological, economic, historical, juridical, and more) into the field led to clearer delimitation of the identity and norms of the state or political community, which is the very presupposition of anything that can be recognized as political behavior.

The aim of this paper has been to show that the reason for the failures and inadequacies of modern political science is that it has not adequately identified and distinguished the proper object of its study and that it has started with religiously deep assumptions about human nature and the nature of science that are inadequate or fundamentally mistaken. A different starting point with different assumptions about human nature and science are needed. And I believe that Dooyeweerd's illumination of the mistaken assumption of the pretended autonomy of theoretical thought, his assessment of the irreducible, multi-modal character of reality, and his insight into the identity of diverse entities (including human institutions such as the political community), which function in all the modal aspects of reality, provides the most fruitful point of departure for developing an accurate and comprehensive science of politics.

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18. See Herman Dooyeweerd, *In the Twilight of Western Thought*, series B, vol. 4 of *The Collected Works of Herman Dooyeweerd* (gen. ed., D.F.M. Strauss), Lewiston, N.Y., Mellen Press, 1999, 1960, chapters I-II. See also Michael Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy*, Chicago, University of Chicago Press, 1958, and Eric Voegelin, *Order and History*, vol. 5: *In Search of Order*, Baton Rouge, Louisiana State University Press, 1987.

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The Ethics of Responsibility as a Comprehensive Approach.
An Application to the Ethics of Technology*

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Introduction

For more than thirty-eight years, I have taught *Reformational* Philosophy at Dutch state universities. Every two years, I have dealt with the topic of *Ethics of Technology*. As a thinker about the relation between Christian faith and technology, I have always been much interested in this subject. How must we think ethically about, for example, the environmental problem, the cultural distortions resulting from questionable technology, the alienation of many people, the inherent threats of nuclear energy, the information-communication technology revolution, the numerous possibilities of genetic engineering, and the conflict between industrial and organic agriculture.

I have wrestled with those topics for decades. The ethics of technology is a complicated subject. In this article I will try to limit myself to the main lines of argument, I hope without doing injustice to the complexity of the matter.

I approach the ethics of technology from the perspective of reformational philosophy — a normative ethics rooted in a Christian-philosophical standpoint. This perspective differs from other current approaches. Most of the time, people are content to analyse and evaluate case studies

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and practical examples. Within those parameters, a world-and-life view is touched on at most in a descriptive manner. By contrast, I have a broad, normative ethics in view, that contains directives grounded in the convictions of a Christian world-and-life view. In assuming this stance, my intention is to contribute to the cause of critical discernment — something urgently needed when it comes to modern technology as a phenomenon.

Few Critics of Technology

I would like to put this question first: Why are there so few critics of technology?

Technology to date has fulfilled many promises. And it offers many more for the future. Unfortunately, often mesmerized by technology's phenomenal growth, people fail to foresee potentially disastrous consequences. How is this possible? I suspect that our culture is predisposed to see only the positive side of technology. Filled with the spirit of modernity — and postmodernity —, most see little need for a critical look at technology.

Is a quiet admiration of technology really possibly the very heart of modernity? Technology is often fascinating and exciting. And yet, there is a downside. Many grant that technology contributes in important ways to the quality of life, but few suggest that the opposite could also be true. My sense is that it will become increasingly clear that the key issue in our culture is our attitude toward, and our vision of, technical development. Unfortunately, few people in our culture recognize this to be a problem because we allow ourselves to be guided by a technical view of reality. Everything — all reality — is seen and evaluated in light of technological control.

Technology helps us become ever more familiar with the world. At the same time, however, we are increasingly alienated from it because the technical models that guide us when interpreting reality and when changing how things are also flatten and reduce — and sometimes even destroy — that reality. Repercussions of modern technology are manifest in nature and the environment, but also in the coldly pragmatic and objective nature of a technological society with all of its inherent tensions.

In the following sections, I will discuss briefly the need for an ethics of technology, the question of what ethics is, and the spiritual-historical background of modern technology. The spirit of the Enlightenment has produced a scientific-technological picture of the world with an ethical recipe of intentions, values, and norms that is still current. After drawing attention to the cosmological and the ethical deficiencies in contemporary

ethics, I make a case for a different approach that starts with the "enlightenment of the Enlightenment", that addresses both the cosmological, and the ethical deficiencies, and that implies a cultural paradigm different from the current one. I will pay a great deal of attention to ethics as an ethics of responsibility and the motives, values, and norms that such an ethic implies. After summarizing, the conclusion can be that this new perspective will undoubtedly involve struggle, but it will also afford hope.

The Call for an Ethics of Technology. The New Situation: "Technological Culture"

The need for an ethics of technology is not evident to all. But things are changing. The traditional technologies of the guild and, later, artisans were characterized by an interpersonal dimension. A sense of the whole was apparent. The effects of their technologies were short-term and their negative impact minute and predictable. Furthermore, these technologies did not put their stamp on culture, but were a part of it. Handicraft technologies were embedded, as it were, in the natural order. In this rather static situation, there was no demand for an ethics of technology. It was something self-evident and not at all problematic.

Compared to even a century ago, however, we find ourselves in a completely new situation. Modern technology is overly dynamic and has expanded tremendously. It has left its mark on culture and has become a world-encompassing system. In modern technology, everything is connected to everything else. The result is a technological environment. Take away this technology, and our culture collapses. It has become an essential precondition for our whole life.

In particular, the connections between technology, business, and industry have changed the lay of the land. Clearly, modern technology and the economy are tightly interwoven. One cannot do without the other.

A good degree of uncertainty exists as to the fast pace of changes in technology and the economy — of which we are a part, but with which we have little experience. To date, we have been able to draw few lessons from the past. Given the problems that we face, however, such lessons would be extremely valuable. Our lack of experience combined with our apparent inability or ignorance about the ways to solve new problems makes an ethics of technology challenging. Some people do not sense this challenge because they see no reason to question the inevitability of these developments. But technology surely is not an autonomous process. It is a human endeavor for which we are personally and communally responsible — even though the increase in responsibility that technology brings may be difficult to realize and bear.

Specialization in general, technology's complexity in particular, and the connections of both to still other developments add to the urgency of the situation. Technology has penetrated our individual lives to such an extent, that we can scarcely create the distance we need to assess and evaluate it, let alone possibly change its direction. So let us first try to get a sense of the balance between the advantages and disadvantages of technology.

Advantages

Comparing our age with that of a few centuries back, one notices the great advantages of modern technology. The average life span has increased. Sanitary methods and water purification have led to a healthier environment. Mechanization, automation, and the robots have relieved people of much hard manual and routine labor. Because of the connection with the economy, material wealth is greater than ever. We gratefully make use of medical techniques, many of which can help heal diseases. Simultaneously, the hunger of many has been abated. Modern means of communication supply us with unprecedented information. In short, the possibilities for shaping reality according to our wishes have increased enormously.

It is no wonder that technology's potential has received laud and honor for some time now. "The Wonders of Technology", "The Age of Technology", and "The Triumph of Technology" are titles of books or slogans from some thirty years ago, that point to the abundant blessings of technology. Imagined worlds and the picture of reality many people held to were defined by the possibilities of technology. In other words, technological products increasingly directed the development of new technological projects. Possibility became the grounds for applied implementation.

The downside: Problems and threats

In today's culture, however, the darker side of changes in science and technology is evident as well. Influenced by the human desire to master everything, we can and do arrange things as we would have them. Modern technology is beginning to penetrate and direct all of culture. The eventual result will be a "technological culture" in which technology puts a stamp on almost everything and almost everything becomes dependent on technology. When this dependence is connected with the economy, culture tends to become one-dimensional. Environmental problems arise, and the degradation of nature ensues. Likewise, human development becomes one-sided, and society begins to fall apart.

People discuss the threat of nuclear weapons or radioactive waste from nuclear power plants, the depletion of raw materials, the extinction of many plant and animal species, deforestation, the loss of useable land to salinization and desertification, the depletion of the ozone layer and the increase of exhaust fumes with their far-reaching consequences for life and climate, and the scale of urban sprawl and reduction of arable land. Then, there is the growing threat of overestimating genetic modification techniques and underestimating the repercussions of cloning and human gene therapy. Finally, the latest information and communication technologies promise ample information and communication — enough to drown in. Nevertheless, there is actually less face-to-face contact between people than ever before, leading to mutual alienation, loneliness, and social disintegration.

People hope to safeguard their culture through a development of technology that knows no bounds; all the while, what grounds their humanity seems threatened with destruction. The brutalities of current technological developments jeopardize the sustainability of the natural environment and of the biosphere. The values that hold here are being ignored. If, as seems to be the case, the disadvantages are going to exceed the advantages, we are going to be stuck with a major ethical problem.

Vulnerable technology

There is something else. The technological development also faces threats from within. Large-scale technical developments regularly prove to be vulnerable and risky. Due to human error or poorly functioning technology, we are sometimes confronted with far-reaching, unexpected consequences. Think of Chernobyl, the chemical disaster in Bhopal, the "I love you" virus, or the Code Rep-worm. In a similar way, recent terrorist attacks have underscored how vulnerable modern culture can be because of its dependence on technology.

Power over technical power

Our conclusion is that whereas people used to be mainly threatened by the forces of nature, they now also face the threat of a technological attempt to control everything. The pressing question today is whether we can contain and control technology itself.

Given the potential for negative consequences to the risks taken, human responsibility for these moves becomes unbearable. Have we appropriated more technical power than we can manage? Can we prevent what Albert Einstein referred to as "the degradation of the scientific-technological culture"? These are ethical questions *par excellence*.

What Is Ethics?

Now we come to the question of what we mean by *ethics*. The term knows many definitions. Fortunately, most overlap, at least in part, resulting in a large measure of agreement, despite the differences. Most will agree that ethics is a theoretical discipline that reflects on the good or responsible actions of human beings. Ethics is not so much a specialized science as a multidisciplinary or interdisciplinary endeavor. Ethics has to do with the human compliance to all normative aspects of reality.

An ethics of technology must therefore concern itself with people's good or responsible conduct in and towards technology as well as with complying with the legitimate motives, sound values, and norms that hold for technology and its use.

Basic questions and answers regarding such issues do differ. What does it mean to be a human being? What are the criteria for good and responsible human actions? Where does technology fit in when it comes to nature and culture? Which norms and whose values hold here? Answers to these kinds of questions ground one's ethics. Differences in this regard make the task of ethics all the more arduous because there is no longer a unity of vision about humanity, history, the meaning of technology, culture, and the future. Differences in these matters have to do with one's philosophical orientation and the different convictions about life and the world in which these are rooted.

Consensus on values and norms may be what is called for, but a diverging pluralism seems to be the reality that confronts us. My position, however, is that in spite of this diversity, a dominant theme is evident in the spiritual background of technological development.

Spiritual-Historical Background

When discussing the problems and threats of the Technological Age, people often do not get beyond addressing the symptoms. This discussion needs to be more thorough and include the deep-seated causes that developed a long time ago.

I would like to call the dominant way of thinking about things in Western culture "technical thinking". The legacy of this approach is made plain when one attends to the spiritual-historical background of the West. As things have changed, faith in the creation — and, with it, belief in the Creator — has steadily disappeared. Technical thinking as a means of domination is rooted in the autonomy or acclaimed self-sufficiency of the thinker. It does not recognize the limits and limitations of human thinking.

Descartes is the father of modern thought. Descartes dealt with technical rationality in such a way that especially the natural sciences — and, in line with this tradition, later the technological sciences — were used as instruments with the pretense of putting everything under the control of human beings to solve human and cultural problems, both old and new. Descartes says that the laws of mechanics are the same as the laws that hold for nature. He sees nature as a set of automatons. In other words, nature is made up of material mechanisms. The mechanization of the world picture, to use a phrase of Dijksterhuis, is the result. "Nature is a machine, as easy to understand as clocks and automatons, as long as they are investigated precisely enough", says Descartes. Supposedly, once people know the power connections in nature, nature can be deciphered and directed. Because, for Descartes, humankind is *maître et possesseur de la nature* — "master and owner of nature" —, humans can rule over nature and control it.

Descartes no longer acknowledges the integrity and intrinsic worth of plants and animals, but sees them simply as manipulable things. He is sure that manipulation will put us in a position in one way or another to make advantageous use of these "things". Reality in its manipulability is viewed exclusively in terms of its use to us. The fullness of reality is reduced to the technical use that people make of it. This Cartesian mind-set is evident today in bioindustries and genetic manipulation. Technical thinking seems insatiable and increasingly totalitarian and imperialistic.

We encounter this spirit already in a somewhat older contemporary of Descartes, Francis Bacon (1561-1626). Bacon is sometimes called "the herald of the new age". With his slogans "Knowledge is power" and "To conquer nature, we must obey her", he anticipated everything that was going to be possible in a technical sense. Nature must be forced to serve humanity and, in that way, be made into a slave. Bacon says that nature must "be penetrated to her most intimate core". Instead of seeing through the nature-nihilism of this position, he pleads for man as absolute ruler over nature.

Although Reijer Hooykaas designates this development as being "Christian-religious", it cannot be denied that Bacon was driven by a godless pride. In his utopia *New Atlantis*, Bacon describes an ideal society in which all power is in the hands of natural scientists and engineers who will make sure that "Progress" happens. He contends that the development of science and technology should be applauded as imitating the divine works of creation. So, too, biblical-eschatological perspectives are re-interpreted into the prospect of progress. Bacon was even of the opinion that science and technology could help humankind rise above the results of the fall into sin. He regarded his plans for the progress of science and

technology as a restoration of the power that human beings possessed before the fall. His concern was not to alleviate or prevent suffering with the help of technology — science and technology would be able to repair what the fall into sin had damaged. 20th-century philosopher Oswald Spengler captures in a pithy description the themes of creation and redemption become tightly bound into one: "Technology is eternal like God the Father, it redeems life like the Son, and sanctifies life like the Spirit".

Technical thinking, once dominant, is unstoppable — it refuses to acknowledge the impenetrable mysteries that most deeply characterize reality as creation. Once in gear, the tireless process of constructing and reconstructing all of reality ensues. What is there that cannot be measured, weighed, counted, hence controlled? Reality is just one big machine or, to use more modern terminology, one huge information-processing system.

The notion of technological control arose from the pretended autonomy of humankind, from the claim to absolute freedom — and the assumption that the scientific-technical control will enhance this freedom. More and more, any problem that arises is presumed to be an opportunity for scientific-technical resolution. In a certain sense, only problems that are recognized can be solved through science and technology. Positivism later declared all questions relating to spiritual reflection and religious problems as nonsensical; they are, therefore, denied. It is not surprising that the technological culture that took shape is accompanied by secularization and a spiritual void on a scale previously unheard of. We could say that hidden behind the façade of modern technology and the mask of autonomous individual freedom is a spiritual vacuum. That people are not inclined to deny this makes the situation even worse. The result is that a technical way of thinking, a technological mindset, pervades the entire culture. Its influence is evident in many sectors of society. In turn, the interrelationships of science, technology, and the economy are likewise influenced by an over-extended technical spirit.

The spirit of the Enlightenment, in particular, promoted the influence of the technical-control mentality. This movement, which started in the eighteenth century, linked the spirit of the Renaissance — an unlimited confidence in humankind's ability to renew life — with the development of the natural sciences. The pretense of human autonomy — humanity as Prometheus — attached itself to a scientific engagement that knew no bounds. Inspired by the successful development of the natural sciences, the heroic Enlightenment figures believed that they would be able to overcome all problems and to renew themselves and society by means of the natural sciences. Because no other norm except the standards of instrumentalistic science itself was recognized, the way lay open for the limitless scientific-technical manipulation of all reality. This dominating

role of scientific thinking meant that every non-scientific authority was dismissed. With that, the definitive breach from God as the Origin of all things was accomplished.

In the course of time, the power of science soon knew no peers. As Christian convictions were secularized and Enlightenment trends were uncritically adopted, the Christian faith was secularized and resistance to the absolutization of science gradually diminished, a thoroughly secular vision for the future gained sway. Given that spiritual climate, positivism and pragmatism easily undid any resistance to the unhindered scientific-technological control of reality. The greater the influence of secularized science and technology became, the more all of reality was seen as matter-of-factly material and, hence, as controllable in a completely technical and rational manner.

In a certain way, this course of affairs confirms what Habermas called "the ideology of technology" — an ideology inspired by the Enlightenment, which, as do most, restricts or obstructs one's purview and rules. In this case, fundamental questions about what is behind the development of technology, its origin and meaning, and the values and norms that hold for technology are simply not asked. Modernity and expecting too much from modern technology go hand in hand. We will soon see that many people remain committed to unarticulated, deeply materialistic priorities, values, and norms.

David Noble's recent book, *The Religion of Technology*, incorporates probing examples of the expectation of technological salvation. He shows that since the Renaissance, many have claimed that technological practice puts us in a position to behave like gods. Technology is linked here, for the first time, with the idea of co-creation and co-redemption. Notwithstanding the continued effect of evil, the people in philosophical and scientific circles thought they could restore the original paradise with the help of technology. Technical Man is the new Adam. With this as its starting point, the religion of technology focuses on the Earth's future. Technological paradise comes to replace the Kingdom of God and the Christians' hope for the future.

According to Noble, the expectation of salvation through technology lives in all new areas of technological development. This is not Noble's conjecture. With the help of quotations from space scientists, representatives of Artificial Intelligence, developers of cyberspace and virtual reality, and representatives of genetic manipulation, he documents their religious adoration of technology. Limits of space and time are transcended by technology; people strive to achieve machine-like immortality and long to perfect a digital presence of mind that will be all-present in the cyberage. Genetic manipulation likewise assures them of a re-created, new humanity.

The Technological-World Picture

Whatever does not fit into the technological model is usually disregarded or forgotten. As the purview of technical thought expands, the extent of reality shrinks. What remains is taken to be a conglomerate whole that is open for technological improvement. This overextended, technical way of looking at things translates into a technological-world picture to which our culture has become enslaved.

This world-picture, like the technological developments it produced, is not static. In fact, the discoveries and innovations, and the technological advancements to which they give rise, render this world-picture more dynamic and more easily adaptable. The technological world-picture is therefore continually revised by new technological developments. However, it is a human construct that functions as a cultural paradigm — a type of ethical framework within which people think and act. It sets the norm; priorities, values, and standards of excellence are derived from it.

Whatever science can analyze and explain, whatever it can manipulate, fits into this picture of the world; what science cannot analyze or manipulate does not fit in. This picture of the world has with time come to define the development of Western culture, and it continues to characterize the current globalization. There should be no misunderstanding, however: technology and the technological world-picture are not the same. The problems do not lie with technology as such, but with the technological world-picture.

This picture of the world, derived from technical developments, has a far-reaching influence throughout and beyond the scope and realm of technology. Not only has it put a stamp on the relationship to nature and the environment, but the relationship to human society is colored by it as well. By using technology, it strives to dominate or control both nature and society. Technological-economic powers, in particular, are the driving forces behind this picture of the world, and yet we all breathe its air. We all compromise ourselves with the desire for power and control by being touched as we are by the greed of consumerism.

This picture of the world is actually a scientifically technical take on the world. The picture it presents reflects the image of abstract science, emphasizing functionality, rationality, and universality. As such, it tends to reduce and level out reality. Sometimes, its destructive influence even affects nature, from ecosystems to the biosphere, as well as society and the social environment. The ecological crisis has been in the limelight of late, which cannot be said about parallel problems in society.

The Current Ethical Orientation: Its Priorities, Values, and Standards

The technological world-picture generates a breadth of problems. That is not all. It is usually decisive in defining desirable ethical solutions. Because of the technical way of thinking, there is a good deal of coherence in the most current approaches to these matters. In other words, the technological picture of the world defines contemporary ethics as well.

It is difficult to keep oneself from conforming to a technical-system approach to ethical questions. Current discussions about the ethics of technology are, generally speaking, limited to calculating precautions for behavior with an eye to reducing risk. I have sometimes called this "technical ethics". Ethics becomes a technique because people want to streamline and guide the technical development. In the ethics of technology, the "control-technical perspective" is then dominant. People restrict their attention to the adverse symptoms of an otherwise limitlessly developing scientific-technical control. In doing so, this ethics does bring relief to some of the problems technical developments create.

Changes in existing developments, the search for alternatives, and proposals to reject earlier decisions seldom occur. People have become rather entangled in technology. Many may wrestle with that fact, but do not really know which way to turn. Information and communication technologies do not help matters. It is increasingly difficult to adopt another starting point, a different picture of reality with different priorities, values, and standards. In short, industrial and postindustrial societies are permeated by strong technical values, attitudes, and ways of thinking — few of which are being questioned critically.

Attaining power over reality is the implicit priority of this ethical stance. It follows closely on the heels of technological innovation. Values behind this project include economic self-interest (greed) and an across-the-board increase in consumption. The presumed outcome will find mankind front and center, in control, as lord and master of technical progress. What this will do to us as individuals or as a society, let alone how this will affect the environment, are questions few take time even to ask.

The norms that follow from the values of the technological picture of the world are effectiveness, standardization, efficiency, success, safety, reliability, and maximum profit, with little or no attention given to the cost to humanity, society, the environment, and nature. In summary, the first and great commandment of "technological culture" is: "Be as effective as technically possible" and the second: "Be as efficient as economically

possible". The breadth and depth of a technological-materialistic culture hang on these two commandments.

Material values and standards clearly have the upper hand in the technological world-picture. Given recent degradations of nature and related environmental problems, however, some are convinced that these values and standards, which continue to control culture under the banner of "progress", need to be transformed with an eye to "survival". That said, adjustments to date have come after the fact and are seldom more than politically correct.

We continue to encounter more problems in which the technological world-picture and the ethics that accompany it fail us. This is especially clear from problems related to preserving biodiversity and sustainability. Recent decreases in biodiversity are shocking. Within the time span of a single generation, the number of species has been halved. This must surely be the result of looking at the living reality from a predominantly technical perspective.

Sustainability ought to satisfy the requirements of the present generation without jeopardizing the ability of future generations to provide for their needs. Why is sustainability under pressure?

The prevailing technological world-picture and its model of control dominate today's economy as well. Lopsided growth is engrained in the process from the start. As a result, sustainable development is by definition out of the question. Environmental technology may make some steps in the right direction, but these are often subsequently undone or negated by the technical economy, which provides the infrastructure for these environment-friendly technical innovations. The technological world-picture also stands in the way of resolving growing concerns about climate change. Our way of dealing with creation prevents us from gaining a new perspective within which to revise the problematics of this impasse.

The current cultural picture continues to be fed by a technological expectation of salvation. Spiritually, the focus is on technology. Discussion of basic assumptions and questions about meaning are usually excluded, and reality is reduced to something that has to be controlled. The guiding principle is the picture of a technical construction growing ever stronger. Reality has no essential value. The focus is always on its instrumental value. Plants and animals are prized primarily for their material use to us in science and technology. Even human beings are increasingly considered remake-able.

Werner Heisenberg has drawn an impressive picture of this situation: "In what appears to be its unlimited development of material powers, humanity finds itself in the position of a captain whose ship has been built so strongly of steel and iron that the magnetic needle of its compass no

longer responds to anything but the iron structures of the ship; it no longer points north. The ship can no longer be steered to reach any goal, but will go round in circles, a victim of wind and currents" (Heisenberg [1958], p. 30). We have abandoned our culture to just such a lack of orientation. The technical power has undoubtedly increased, but the threat of devastation has also increased. Technological advancement as such is turning against man and his environment. These threats are frequently veiled by the vaunted superiority of technological effectiveness and economic efficiency. The ethical reduction these involve is scarcely discerned.

Cosmological and Ethical Deficiencies

This statement ought to be given a little more attention. Life as many understand it today was shaped and nourished by the spirit of the Enlightenment. Much good can be attributed to that spirit, but also much that is evil. In my estimation, current views about technology, generally speaking, suffer from a cosmological deficiency and an ethical deficiency. Conceptions about the cosmos are often very limited because justice is not being done to the multifaceted depth and breadth of reality. Reality is often reduced to the world that science and technology aim to control — to a positivistic cosmology, a view of the cosmos to which technology is the key. This lopsided take on the world does not do justice to the many-sided dimensions and coherence of reality in its fullness and pays no attention to its dependence on, and orientation with respect to, its divine Origin, no heed to the transcendental direction of everything.

In addition to a cosmological shortfall, there is also an ethical deficit. The world around us is taken to consist of things to be manipulated. Scientific-technological thinking reduces everything to the status of useful object. The unique value and meaning of things is dissolved into the use or benefit that that reality has for humankind. This ethical deficiency can best be characterized as the lack of love, because justice is not done to the peculiar nature, individuality, or uniqueness of things. That is evident today in how the technological model dictates how we deal with animals. We see animals more and more as just production units that supply the technologically-defined functions we say we need. The ideas behind the therapeutic and reproductive cloning of humans also fit in with this technological world picture.

The German philosopher Peter Sloterdijk provides a second illustration. He maintains that the influence of the Enlightenment in shaping humankind has not gone far enough and actually cannot do so, and that human formation needs to be augmented with technological innovation.

Developments in the area of genetic manipulation make that possible, and Sloterdijk is convinced that we should move in that direction.

These things being the case, what constitutes a critical approach to the technological world picture?

Enlightening the Enlightenment

In general, because of their high expectations, people are oblivious to the deepest background of today's "technological culture" and the prevalent ethics of technology. The spirit of modernity seems to coincide with an unrestrained technological development. Yet, as a result of the tangible problems and threats tied to that development, we are confronted in the meantime with all kinds of protest movements. Even so, most people still support the Enlightenment project.

A thoroughgoing evaluation of "technological culture" cannot avoid dealing with the Enlightenment. To suggest that we are dealing with nature and society in too scientific and technological a fashion is actually to take issue with the Enlightenment's abstract postulate of autonomy. The crisis is imminent: It is increasingly clear that our culture cannot handle both absolute freedom, and absolute controlling power.

The great philosopher Immanuel Kant answered the question what the Enlightenment is. People of the Enlightenment have come of age and do not accept any guidance from above: "Have the courage to avail yourself of your own intellect". Kant is concerned not only with the growth of knowledge or a spontaneous act of the will to liberate oneself, but especially with the courageous decision to control praxis by means of scientific knowledge. Human reason is accepted as the controlling instrument: people set out to re-create the world as they wish it to be by means of science and technology. The spirit of the Enlightenment connects itself *via* technology and the economy with happiness and freedom, with optimism, progress, and utility (but does not see the possible ill effects of its striving).

Many current cultural-philosophical critiques highlight the shortcomings of the Enlightenment. People are increasingly convinced that its instrumental rationality has and will continue to have devastating results, because it implies reductionism. Technology is no longer the liberator, but stands in the service of power over humans and nature and, as such, binds humanity, destroys nature, and threatens culture. No wonder that philosophers of culture continue to discuss the meaning of the Enlightenment, but few are ready to let go of its point of departure. To ward off criticism of the practice and science of technology, people try to tweak what the Enlightenment is. Some, like Theodor Adorno and Max Horkheimer,

want to unpack and deepen the Enlightenment. Others, like Heiner Hastedt, champion a broad outworking of the Enlightenment project, one that will include, for example, a new ecological ethics and an ethics for the management of systems technology to overcome reductionism. Yet none of these adjustments involve abandoning the autonomy of the scientific-technological person. It is almost impossible for these thinkers to relinquish autonomy. Instead, they seek to expand the *ratio* to a fuller or broader, multi-sided rationality that covers more areas. The technological world-picture is constantly being adapted.

Reformational philosophy stands in a tradition that grew out of a fundamental critique of the world-and-life view of the Enlightenment, particularly of the pretense of human autonomy and the intellectual hybris and will to power that are connected with it. Although we cannot turn the clock back on the Enlightenment, we must acknowledge its devastating consequences and find a revised ethical framework for its positive results. Addressing the cosmological and ethical deficiencies will also require a different perspective. With Günter Rohrmoser, I advocate the "enlightenment of the Enlightenment"; to put it in terms similar to *Psalm* 36, 9, "In God's light we see light". The divine light of Revelation must enlighten the "Enlightenment" itself. In the light of God's Word, a path can be found between technological paradise and technological apocalypse or, better said, a way that rises above that dilemma. To refer again to Heisenberg's metaphor of the ship: if the captain wants to set his ship on the right course, he will once again have to orient himself by the starry heavens. So, too, a technological culture needs to be evaluated with reference to viewpoints outside technology.

The central point of the enlightenment of the Enlightenment is that we acknowledge that there is more than materiality alone , that there is a spiritual dimension, we live in a created reality, in the context of which a breach occurred between God and humankind; we acknowledge as well, in the perspective of the Kingdom of love and peace, that restoration has been made possible in Christ. His is a Kingdom in which nature and culture will be filled with the glory of God. This religious recognition cannot but throw new light on the ethics of technology.

Covering the Deficit

When we acknowledge that reality is a created reality, we know that the cosmological and the ethical deficit resulting from a reductionist-scientific approach to reality cannot be solved by more science or more technology. For example, however much systems analysis is presented as

a holistic approach — and its merits should be appreciated — it remains an abstract scientific approach rooted in an anthropocentric outlook. Human beings are no longer seen as "lord and master", but, when push comes to shove, it is still they who make the final decisions.

What we need is a vista and a vehicle that embrace more dimensions, something that provides a more comprehensive, holistic approach. People need to acknowledge that the breadth of reality is a given, bestowed — including for scientific analysis — long before science ever was, and that this reality does not depend on itself, but is in all respects dependent on, and involved with, God as its Origin. A cosmology grounded in such a vista clearly will lack the deficiencies referred to earlier.

The most intimate involvement of God with the created reality is characterized by his love. Accepting this unity in love covers the ethical deficit of love. With good reason, the command to love God and one's neighbor is at the core of all the directives, commandments, values, and norms in the Christian religion. All the law and the prophets hinge on this love. This twofold love must be the starting-point for an ethics of technology. This means that everything must be evaluated from the get-go according to its individual nature, including that which is weak and vulnerable. With love as our starting-point, we must acknowledge that every created thing is characterized by earthly and — even more than earthly — divine secrets. This means that besides attending to technology's values and norms, we will pay attention to ecological and social — contextual — values as well. Our task is to trace what the covering of the cosmological and ethical deficit means for a responsible development of technology.

A Renewed Cultural Picture

Is there a picture of reality more basic than science and technology (or the economy) provided that can help us understand how to reorient ourselves with respect to technological development? The cultural philosopher Hans Jonas can be helpful here. Imagine, he says, that we found ourselves on the Moon. We would be impressed by the vastness of the cosmos and, even more so, by how unique the Earth is compared to all else there is to see. It is the only green planet in our solar system, filled to overflowing with a rich diversity of life. If we, Moon-travelers, are to survive, we will have to return to Earth. But, to our horror, says Jonas, we find that planet Earth is in danger, with so many of its life forms threatened by current technological-economic practices. Something is going to have to give. Technology and the economy may not threaten life. They must be used to serve life.

Responsible cultural development evokes an image reminiscent of the Earth as a garden, tended by human beings with the goal of creating a "communal home" within which nature, technology, and culture are in harmony and there is a meaningful place for everyone living and everything that lives. Foremost in that picture is an integral coherence in which everything participates, all the while retaining its own individual value or nature. Before getting involved in scientific-technological activities, one needs to respect the intrinsic value of things. Every human activity should begin with a caring contact and respectful treatment. Creation and its creatures have to be dealt with according to their nature; otherwise, life will disappear. This is no idolization of nature; it is acknowledging the care of the Creator, a care we are to imitate. Technology and the economy ought to be directed to inhabiting the garden and to maintaining and strengthening every living thing in it.

The metaphor of a garden developing in the direction of a communal home also expresses the human connection with, and dependence on, the whole of the creation. Reality is given to us. We are not its lords or masters, but creation's guardians and caregivers. We are allowed to unpack and unfold creation. Just as we carefully unwrap a precious gift, we should treat the gift of God's earth with a sense of awe and gratitude. A change in attitude and behavior is called for.

This image of the garden is also clearly linked to the original meaning of *oikonomos* (*oikos,* "house" + *nemein*, "to manage"). Caring, keeping, cherishing, and protecting go hand in hand with cultivating, harvesting, and producing. In the cultural paradigm of the managed garden, accelerated increases in scope and scale will be transposed to levels that will benefit the coexistence of human beings and the creation. The carrying capacity of nature will be respected and the goal of long-term occupancy will set the direction for sustainable cultural development. Sustainability is possible within the metaphor of the garden. Technology, along with the economy, need not travel the road of manipulation, extortion, and pollution. As World Bank economist Herman Daly puts it, they should maintain the fruit-bearing capacity of the Earth and, where possible, increase it. What we take from the earth should be offered to all human beings, but limited to what we can use and enjoy, now and in the future. Responsible cultural development means living off the interest on the capital given to us, but it does not allow us to touch or deplete the capital sum itself. This notion of living off the interest fits well with human beings as stewards. (And even though some refuse to use the term, what it entails is nevertheless often very attractive to their enlightened self-interest.)

The cultural picture sketched here differs from the current one and calls for a fundamental reorientation of the technological-economic order.

It allows room for growth, but a growth more proportional and selective. Besides the technology and economy involved in building and producing, more attention needs to be given to maintaining, protecting, conserving, guarding, and caring for — in a word, preserving — the diversity of life forms in the plant and animal kingdoms. Ecology, technology, and the economy will be in balance as long as the natural cycles are not broken and the natural resources do not dry up. The whole Earth will come to be seen as one big garden city.

While we must hang on to the original image of the garden that is unfolding in the direction of a communal home, it is also true that the conditions under which human beings are allowed to work in the garden were severely altered by the fall into sin. Since the breach between God and those who were made in his image, thorns, thistles, and death abound, and their effects are evident in technology, too. Through God's love in Christ, there is a new perspective for the sin-marred creation. The meaning of it all beckons: the Kingdom of God. Acknowledging this implies struggle. This struggle is inherent to the human position. To orientate oneself to that Kingdom differs enormously from the materialistic and hedonistic attitude of our age: "What good will it be for a man if he gains the whole world, yet forfeits his soul? Or what can a man give in exchange for his soul?" (*Matthew*, 16, 26).

An Ethics of Responsibility

Which ethical approach is best suited to cover the described ethical deficit of love in the current ethics of technology?

Deontological and teleological approaches to ethics are centuries old, but they no longer fit the dynamic and complex phenomenon of modern technology. Technology is no longer only characterized by the relationship between people and their tools. Due to the influence exerted by science on technology, it has become a dynamic system with global ramifications. Modern technology is likewise intertwined with big business. This complex of scientific, technological, and corporate powers has become a dynamic force with so many members in the cast that an alternative to the older ethical approaches is called for.

Furthermore, deontology, which is an ethics of moral obligation, eventually has resulted in a more pragmatic or even pragmatistic ethics that has relativized what were formerly self-evident norms. Likewise, given technology's many unintended and deferred adverse results, the teleological approach, which evaluates actions according to their consequences, is also not up to the task: Not only must one tend to ascertain

the appropriate goals, but the many possible means to those ends need testing as well.

An ethics of responsibility is, in my opinion, the most suitable approach for an ethics of technology, because it integrates ethos, intention, values, and norms in a coherent way.

Many assume that the ethics of responsibility has philosophical roots, but the theologians H. Richard Niebuhr and Karl Barth were writing about an ethics of responsibility long before Hans Jonas. Already in 1948, when the World Council of Churches was established, an ethics of responsibility formed the guiding principle in discussions about matters relevant to society.

The word *responsibility* — in the sense of accountable *for* and *to* — is very apt because it also indicates that everyone involved in scientific and technological development must act as proxy or steward with reference to one another. To put it in other words, every stakeholder must indicate the priorities, values, principles, and norms — the cultural picture — that constitute the ethos and grounds for one's actions and define one's contribution to the scientific-technological event. As a result, the ethics of responsibility nurtures a positive sense of vocation or calling. In current discussions about problematic developments, ethics is usually associated with "what ought not be allowed", whereas in an ethics of responsibility, one has to begin with an emphasis on the positive. For example, given new technological means to alleviate human needs and suffering, the ethical sense of possibly helping has become one of ethical obligation. In general, a good starting point for an ethics of responsibility seems to be that the participants are aware of the positive tenor of their actions in or with technology and give account of the same to the public.[1] In the image of the garden that is being developed into a communal home, the first and foremost concerns are to make and keep it habitable, provide the basic necessities of life, and alleviate the needs and suffering of all people.

I would now like to turn briefly to the implications of an ethics of responsibility for priorities, values, and norms.

Renewal of Priorities

We have seen from its historical-spiritual roots that the ethos pervading technology today takes power and control as absolutes. The same is true in those sectors, like agriculture, politics, and the economy, where

1. This is not to say that "responsibility" has the same content or profile for everyone. There are different kinds of responsibility: substantial, functional, individual, and professional responsibility. See also Kroesen (2001), pp. 12-22.

technology holds sway. In science, this ethos is unpacked in terms of "knowledge is power". In technology, this becomes technology for the sake of technology, or technological perfection — what can be made must be made.

In industrialized agriculture, harvesting with unbridled scientific-technological power eventually leads to exploitation and land degradation. Materialistic politics and economics, in which people are only concerned with the power of money and material gain, weave cultural powers into a mutually dependent conglomerate. This convergence of powers proves to have a disruptive effect on both nature, and culture. To think that these powers could serve other values than increased power, expansion, and intensity is a delusion.

When it comes to cultural activities undertaken within the perspective of developing the garden into a communal home, one should turn away from oneself out of love for God and one's neighbor. A healthy ethos like this affords a broad field of cultural activities a different sense of priority and even of content than is currently possible. Instead of encircling the ethos of power in self-interest around oneself, the ethos of love has a referential focus that draws one beyond oneself and into a variety of different cultural activities. In science, growth in wisdom becomes the objective; in technology, building and preservation; in agriculture, conservation and care as well as harvesting; in the economy, stewardship; and in politics, service and the promotion of law and public justice. This kind of differentiation helps culture flourish meaningfully and protects the variously qualified responsibilities in these diverse cultural activities.

I now turn to what these authentic priorities mean for science and technology.

Science: Growth in Wisdom

The desire for technological control conditions modern science. The results of its applications do not make science technological; science is technological because it sees reality only to the extent that it is quantifiable and predictable. It is only interested in organizing and controlling reality. Although curiosity and awe drive the aspirations of many scientists to know reality better, my thesis still stands: modern science became technological in core and character because of prevailing cultural powers and priorities.

For one's scientific endeavors to stand in right relation to the fullness of reality we experience daily, one must first acknowledge the origin and meaning of reality and reject an instrumentalist view of science. Science

needs to be integrated into that full experience of reality, thereby deepening experiential knowledge. When that happens, science will serve the cause of growing in wisdom.

When approached in this way, science promotes increasingly comprehensive insight. Reality is no longer reduced to logically independent, causally related factors or subjected to a human definition of the meaning of reality, for example, the benefit that functional reality affords a materialistically oriented humanity. In brief, science will then contribute to a comprehensively wise insight and enhance human responsibility with a view to directing everything that is going on in the world into a garden that is developing in the direction of a communal home. Seen in this light, an interdisciplinary approach is also highly desirable! Too few recognize that technology needs a more comprehensive scientific basis. A broader basis will facilitate a growth in wisdom, lead to more creative and circumspect actions, and help modern technology better serve life. If a more interdisciplinary approach to technology were in place, biology and ecology would have been accepted as foundational sciences long ago.

Technology in the Service of Life: Technology as Prosthesis

What I have said of science in general also applies to technological science — to technology: it should not be allowed to serve as an instrument of scientific-technological control. When it does, technology is robbed of its distinct character or meaning. The practice of technology should not be (as oft is said) the result of an instrumental use or application of science. That route will more readily blind and derail than provide room for the responsible development of technology.

At the same time, instrumental views also diminish the place of invention in technological development. Invention is in many ways the heart of technology. Science ought not to put a limit on human creativity, but old and new scientific knowledge can nourish and even foster human creativity. When training engineers, more attention should be given to responsible creativity through invention and innovation. Doing so will render technology more serviceable to life.

Technology's number one priority should be serving life and society. Technology must function, so to speak, as a prosthesis[2], both individually and collectively. Then people will (continue to) have a say in the matter. Nor is small-scale technology the only option. For example, when it comes

2. "Prosthesis" narrowly defined means an artificial device to replace a missing part of the body. A pair of eyeglasses is one example.

to transporting goods, building underground is the way to go wherever possible, especially if doing so will preserve the environment and cause less disruption to society. Just one example of thinking outside the box and doing the right thing with respect to safety, the environment, and nature, would be the causeway built across the East Scheldt (an estuary in the Dutch province of Zeeland). This half-open, always closable dam is designed to protect the coastline during storms, but, in the meantime, it allows tidal sea life to flourish.

What about the costs? I can hear people protest. They will indeed be higher. In general, we have gotten modern technology too cheaply. We are good at figuring out the economic — or rather, the production — costs, but we usually fail to calculate in the damage to nature and the environment. Alternatively, to keep costs down, we take risks, for example, with respect to safety, that are greater than they ought to be. These are some of the consequences of accepting the technological world-picture as a guide.

Modern technology too often neglects the criterion of service. What it delivers does dazzle, but as the complexity of it all increases, overconfidence does as well. We need to be more wary when turning to technology and to work harder at resisting its temptations. Instead of haughty, we need to become more humble. Timid awe befits us better as we involve ourselves with God's creation. Technological formation should help us cherish life.

Other Values: Ecological, Technological, and Social

Besides having the right posture (ethos) and sense of priorities, the preeminent ethical challenge for a responsible, well-directed technology is defining the values one embraces with respect to nature and the environment as well as to technology, the economy, and society.

The principal ecological values must certainly include preserving biodiversity and clean water and air, keeping and making the soil fertile, and improving the living environment. The biosphere must remain unharmed; therefore, a war must be waged against dangerous emissions. Technology must adapt to natural life environs, not crushing the diversity found there, but maintaining it.

Technical (and economic) values include being fit for habitation; being safe and reliable; providing basic necessities for life, such as food and health; battling sickness and suffering; countering threats from nature; fostering healing and sustainability; lessening the physical burdens of work; and so on. Beyond our physical wants, real fulfillment is found in

spiritual growth, personal relations, and communal life — where technical values also touch social values.

The social values are those of community spirit, sobriety, justice, civility, mutual care and respect — of improving information, communication, and therefore social welfare in general. Is it too daring to suggest that "rest", "having time", and "spiritual flourishing" should be mentioned here as the forgotten social values of technology?

An Integral Framework of Norms: Simultaneous and Multifaceted Application

In my discussion of technological development, I have been focusing on the cultural picture — the ethos, priorities, and values that have to be considered: technology must be serviceable to a great diversity of life forms and befit a responsible garden development, always with an eye on the current situation.

In addition to connecting with nature and culture and being defined by the right ethos and appropriate priorities, one needs to work at keeping to the normative course. A good number of normative principles and related norms are necessary to test the correct direction. These normative principles concern not only technology, but also the multifaceted relationship that technology has with people, nature, and society.

The integral framework of normative principles derived from the philosophical cosmology — or theory of structures — articulated by reformational philosophy constitutes a guide for responsible technological development. These norms include: cultural-historical norms; the norm of effectiveness; the norm of harmony between continuity and discontinuity, large-scale and small-scale projects, integration and differentiation, and universality and individuality; and the norms of clear information and open communication (among all participants); of harmony between people, technology, nature, and society; of stewardship and efficiency; of always doing the right thing for all concerned, including nature and culture; of care and respect for everything and everyone involved in technological development; of service, trust, and faith. Within that framework, we distance ourselves from the suggestion that because "safety does not sell", irresponsible risks are an option.

Honoring such a normative framework[3] ensures that a one-sided technological development makes room for a responsible, richly varied disclosure of nature and society. The practice of technology may not oppress,

3. For more on this integral framework of norms, see Schuurman (2003).

but must serve nature and society. Not a one-sided or one-dimensional technological culture, but a rich flowering of culture should be our aim.

Following this extensive ethical approach implies a broad point of view and, at the same time, a steady course.

Summarization

We come to summarizing conclusions. Technical thinking predominates in industrial society. It also predominates ethics. Virtually everything is viewed in terms of the technical model or, more broadly, the reductionistic machine model. Neither of these models has any room for life as a fundamental and decisive factor. They have guided the application of the power of technology in a tyrannical way. Huge problems have been the result. Today we can see how the "technological culture" threatens *life* itself, to the point of destroying it. A solution to these problems of modern culture is impossible so long as we continue to think and act within the parameters of the technical-scientific, reductionistic model. In the new phase of culture and civilization, however, we will not say farewell to technology as such, but we will have to put it in the service of life and human society. Reality must no longer be viewed as providing mere objects for technical manipulation, but must instead be received in love as a prior given, as a divine creation, as a gift from God. Such an attitude will require respect and awe for the Owner of all things; it will call for openness, humility, meekness, wonder, reverence, and care. Our appreciation of technology will change completely if the will to power and mastery is exchanged for respect for all that lives, in all its multi-coloured variety and multiplicity. It will also alter our attitude toward our fellow man and foster love of the worldwide community of man. The aim of technology should become, not to break down and to reduce reality in order to master and control, but to unfold and cause to flourish. For a healthy disclosure of the creation, we should nurture the perspective of the living and vibrant garden-city, of a culture that takes care of nature and the environment.

A culture whose basic categories are life and love and whose mission is to promote and strengthen the cause of justice and righteousness in the world will orient itself to supra-subjective normative limits. This will make possible a more balanced, sustainable, peaceable and also richly varied development. When people learn to practice moderation, tensions and threats will subside and reductions will be overcome. In light of the perspective here sketched, world problems and global menaces can be pushed back and a more durable, sustainable, just global development

can be realized as we move toward the second decade of the twenty-first century.

In closing, an *ethics of responsibility* involves a large agenda. It calls for its own, distinct development, and a spiritual and philosophical struggle with the dominant traditions of ethics in our culture. Ethics and morality are central themes of our twenty-first century. One step more in this new century requires three steps in the ethics of responsibility.

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Interview

Entretien

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"If Science and Religion Accept to Dialogue, Then the Blind Will See and the Deaf Will Hear"*

Basarab Nicolescu interviewed by Petrișor Militaru and Marius Ene

How and when did the series "Science and Religion" begin at the Curtea Veche Publishing House?

Magda Stavinschi and I founded this series in 2006, at the beginning of the three-year program "Science and Orthodoxy — Research and Education", financed by the well-known American foundation John Templeton.

Up to now, we have published 35 volumes and 24 others are going to be publishing. A special place within the series belongs to the journal *Transdisciplinarity in Science and Religion*, published in English and French. The journal has attracted a good international audience.

In all, fifty-nine volumes, a true library aimed at the general public and scholars and students as well, in a field crucial to our contemporary society. I have to underline that this series is the only one in the world dedicated entirely to the dialogue between Science and Religion, a fact very well appreciated by the John Templeton Foundation.

This impressive number of volumes issued in such a short time was made possible by an excellent cooperation with the Curtea Veche Publishing House, with whom we have a harmonious partnership.

Most of the books are translations, the authors being well-known international names. However, we have encouraged Romanian authors to publish also, a task not very easy, due to the complete novelty of the field in a post-totalitarian Romania. The Orthodox Romanians, as well as

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* SISIF, nos. 26-27, 1 February 2010. Available at: http://www.sisif.ro/.

the scientists were not so much inclined towards such a dialogue, while elsewhere in the world this kind of dialogue between Religion and Science is not only long-established, but has also deepened considerably over the last two decades. Among the Romanian authors, I should mention Metropolitan Bartolomeu, Aurel Sasu, Cristian Bădiliță, Cassian Maria Spiridon and Cătălin Moșoia; from the Orthodox authors from abroad, I mention Alexei Nesteruk, Jean-Yves Leloup and Christopher Knight.

The aim of this series is stated clearly in the introductory phrase on the fourth cover of each book: "The *Science and Religion* series addresses all those who want to explore the potential of a new system of values based on the transdisciplinary dialogue between Science, Religion, Art, and Society".

What about the new system of values based on the transdisciplinary dialogue between Science and Religion?

In a society dominated by the process of globalization, centered on *homo economicus* and on the huge force of techno-science, nobody can impose an old system of values to all the inhabitants of the Earth. Religion? What religion? There are many religions, sharing among them the inhabitants of the Earth, not to mention the innumerable new religious movements. Science? What science? In 2000, a statistics of the National Science Foundation revealed the existence of over 8,000 disciplines in the American universities. Economy? The only value of economy, as formulated today, is the efficiency of efficiency: it can lead to the self-destruction of the human species.

A new system of values can appear only through the dialogue between different domains of knowledge, between different cultures and different religions. This system does yet not exist.

Hence, it will be a collective creation, founded on the transdisciplinary methodology. The birth of this new system of values is the crucial issue of the 21st century.

Can a transdisciplinary relationship be established between ethical laws and physical laws?

Certainly not; the new ethics has a transdisciplinary character and, consequently, it cannot be founded on a definite discipline. However, physics can contribute to the birth of this new ethics not by its laws, but by interpreting the most general results gained by exploring Nature. For

example, the Included Middle, that is fundamental in understanding quantum physics and also one of the defining aspects of the transdisciplinary methodology, will necessarily be present within the new ethics. As a renowned specialist in ethics, the Canadian Jean-François Malherbe, recently showed, we must choose between Parmenides and Heraclitus.[1] The Included Middle is intimately linked to the vision of Heraclitus.

Can it be said that Science and Religion cannot exist but together?

No, it cannot. Science and Religion can exist completely separated, like the blind can live without eyesight and the deaf without hearing. Science is blind to spiritual values and Religion is deaf to the scientific exploration of Nature.

How can Religion contribute to the development of Science through a transdisciplinary dialogue and how can Science participate to the consolidation of a theological conscience in nowadays' society?

Science could open itself to spiritual values and to a spiritual dimension, thus regaining the place it has lost within Culture since the Renaissance. Today, we are talking about "two cultures": humanistic and scientific. Still, Culture cannot be fragmented schizophrenically.

Religion, in its turn, could open toward the problematic of the contemporary society in its entire complexity. Religion has nothing to lose by the dialogue with Science. On the contrary: religious faith, of any kind it may be, can only strengthen itself through the discovery of the beauties of the depths of Nature.

These aspects were marvelously analyzed from the Orthodox point of view by Christopher Knight in his book *The God of Nature: Incarnation and Contemporary Science*, published in the Curtea Veche series.[2]

In November 2001, the Romanian Academy and the French Institute in Bucharest held the International Congress "Science and Religion — Antagonism or Complementarity?", the first of its kind, organized under

1. Jean-François Malherbe, *Un choix décisif à l'aube de l'éthique : Parménide ou Héraclite ?*, in *Transdisciplinarity in Science and Religion*, no. 5, Bucarest, Curtea Veche Publishing House, 2009, pp. 11-36.
2. Christopher Knight, *Dumnezeul naturii. Întruparea și știința contemporană*, Bucharest, Curtea Veche Publishing House, 2009.

the aegis of the Romanian Academy, the Ministry of Culture, the John Templeton Foundation, the Berkeley Center for Theology and Natural Sciences, and others. How did this event contribute to the instauration of the dialogue between Science and Religion in Romania?

It was the starting-point of an activity that has been developing for over ten years now. I, for one, have already been integrated in the activities of the John Templeton Foundation for some years. In particular, I was recruited in 2000 in the "Science and Spiritual Quest" network, precisely in the "Physics and Cosmology" group gathering fifteen scientists of various religions, including atheists, from different countries. Among us, we had renowned personalities like Nobel Prize-winner William Philips. We met regularly in complete freedom, without any press and without any audience, in order to discuss our faith in front of our experience as scientists. We also organized two major public events, one in New York, at the General Theological Seminary, and one in Paris, at the UNESCO.

On this occasion, I had the opportunity to learn that Orthodoxy had a very bad image, as a counter-historical force, obscurantist and reactionary. I tried to convince the people at the John Templeton Foundation that this image is false and that Romania is the ideal country for setting up a national program as a laboratory meant for the dialogue between Science and Religion, that could serve as well as a model for all post-communist countries. In order to prove this potential, I suggested the 2001 Congress, made possible thanks to a reencounter with Mrs. Stavinschi, in Paris, in 2000, on the occasion of a reunion linked to the John Templeton Foundation that seems to me today to have been a miracle. When I visited Romania, after twenty-five years of absence, in 1993, I already knew Mrs. Stavinschi. Without her abnegation, devotion, and relentless work, it would have been impossible to actualize everything we succeeded to do together during these last nine years.

How did you manage to convince the scientists and theologians to take part in the 2001 Congress?

There was no problem with the foreign scientists and theologians; we were already acquainted with each other and had sustained a dialogue for many years. Regarding the Romanians, I certainly was advantaged by my Romanian Academy membership and my long-standing friendship, of over forty-five years, with the great mathematician Solomon Marcus. As for Father Galeriu, when I was a child he initiated me in the mysteries of Orthodoxy and opened my way to the theologians. He directed me to

Metropolitan Daniel, whom I visited immediately at his Durău residence, together with Jean Staune. Metropolitan Daniel accepted to participate as an invited speaker at the Congress. Also at the Congress I had the pleasure to discover Father Doru Costache, whom I consider to be one of the most brilliant Romanian Orthodox theologians of today. Finally, it was a joy for me to offer the stand of invited speaker to the then young and little known researcher Eugen Ciurtin. With humble modesty, Father Galeriu participated only as a speaker in a parallel section with a presentation about Nicolae Paulescu. The proceedings of the Congress, a volume in English and another in Romanian, were published by the XXI: Eonul Dogmatic Publishing House founded by Father Doru Costache.[3]

In this way, step by step, we got to this now unique reality in the post-communist Orthodox countries: the Academy and the Patriarchy have been present together at all our activities until the year 2009. In this context, I have to pay a special tribute to the late Patriarch Teoctist and to the former president of the Romanian Academy, Eugen Simion, whose doors were always opened to us at any moment. We were also greatly helped by high hierarchs of the Orthodox Church, such as Metropolitan (today Patriarch) Daniel and Metropolitan Bartolomeu.

A year ago, you intended to publish in the already-mentioned series at Curtea Veche a volume designed to attest the possibility of patristic thought engaged in a dialogue with modern science. What hindered the publication of this volume?

The history of this volume is all strange. The idea of a work dedicated to the contribution of patristic thought to the dialogue with contemporary science came out in 2007, at a private dinner in Iași, at the Metropolitan Palace, to which I was invited by Metropolitan Daniel, who had just been elected as the new Patriarch. The dinner was attended also by Mrs. Magda Stavinschi and Messrs. Adrian Lemeni and Sorin Mihalache. My proposal was for two volumes, one dedicated to the old patristic thought and another to the neo-patristic one (centered on the works of Dumitru Stăniloae and Andrei Scrima). In our complete agreement, Adrian Lemeni was designated to be the coordinator of the two books. At the same dinner, we discussed other aspects of our cooperation with the Patriarchy, such as the sponsoring by us of a new TV show entitled "Science and Religion" on Trinitas TV.

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3. Basarab Nicolescu, Magda Stavinschi (eds.), *Știință și Religie. Antagonism sau Complementaritate?* (*Science and Religion. Antagonism or Complementarity?*), Bucharest, XXI: Eonul Dogmatic Publishing House, 2002.

In the first volume, 14 authors were involved in producing five different materials. Five of them were from Bucharest (Adrian Lemeni, Petre Comșa, Ștefan Trăușan-Matu, Florin Caragiu, and Costea Munteanu), two from Iași (Sorin Mihalache and Dan Chițoiu), three from Cluj-Napoca (Ioan Chirilă, Cristian Șonea and Ștefan Iloae), three from Ploiești (Gabriel Memelis, Adrian Iosif and Dan Răileanu), and one from Paris (Răzvan Ionescu).

Together with Mrs. Stavinschi, I made every effort to improve the scientific level of the successive versions of the texts that were presented, and important sums of money were invested to produce this volume; especially in order to organize the national meeting in Bucharest, on September 24th, 2008, entirely dedicated to the preparation of the volume. The major difficulties came from the lack of cooperation between the authors.

We hoped back then that the volume would be finalized by the end of 2008. Strangely however, ever more hostile attacks began precisely one year after the enthronization of Patriarch Daniel. The first act was Adrian Lemeni's withdrawing from the board of editors of our journal *Transdisciplinarity in Science and Religion*. Understandably, I was perplexed and I asked for explanations. Following my insistency, Mr. Lemeni told me that during the reception at the Patriarchy on the occasion of the celebration of one year from the enthronization of Patriarch Daniel, a hierarch (he told me his name) avowed to the Patriarch that Transdisciplinarity were not adapted to the dialogue between Orthodox theology and Science; nothing more, nothing less, and without any argumentation.

More hostile acts came afterwards in quick succession: the cancelling of Father Gheorghe Istodor's excellent show "Science and Religion" on Trinitas TV, financed at least partially by our money, then the refusal of publishing a book of the same Father Istodor containing the transcript of a selection of his TV shows in our series at Curtea Veche.

Confronted with this situation, that seemed absurd and unconceivable to me, I asked to be received in an audience by Patriarch Daniel, in order to clarify the matter. Consequently, I was invited by him at a dinner in the Patriarchy Palace on the evening of November 8th.

Taking advantage of my voyage, I planned a work-meeting to prepare the volume, which took place on November 7th, 2008. At the beginning of the reunion, Mr. Lemeni handed me a letter dated November 2nd, 2008, signed by eight of the 14 authors, asking Patriarch Daniel that the volume be withdrawn from the Curtea Veche Publishing House, so it may be published by the Basilica Publishing House of the Romanian Patriarchy.

As can be seen in the annexed document, a number of six authors did not sign the letter: those from Cluj and those from Ploiești. Also in the

same annexed document, it can be seen that Patriarch Daniel wrote on a corner of the letter: "It will be done according to the will of the authors". During the reunion, I told the participants that we would not discuss the content of the letter then, because I would do that the following day, on November 8th, during my private meeting with Patriarch Daniel. Nevertheless, during the work-meeting, I rectified many scientific and terminological errors persisting in three of the works presented there. Some of these errors were extremely serious, certain authors mistaking "methods" for "methodology".

After the end of the work-meeting, Mr. Lemeni came to me and told me that the group of eight signers of the letter were willing to still consider having the book published at Curtea Veche, provided that two imperative conditions be satisfied by the series directors. I accepted the first one: the elimination of the standard statement on the back cover present on all the books within the series. However, it was impossible to us, from a deontological as well as a democratic stand, to agree with the second one: to eliminate from the volume an excellent work presented by the Ploiești group. I should underline here that one of the members of that group is a Protestant, which was probably considered inacceptable by those who had signed the letter.

The reaction to our refusal was straightaway: the dinner that had been programmed for November 8th was cancelled at the last moment and never rescheduled.

The last act of this mini-drama/comedy: the volume issued by the Basilica Publishing House[4] has a fifty-page *Introduction*, forty of which are dedicated to the inadequateness of the transdisciplinary methodology for the dialogue between Orthodox theology and Science.

Each of the four papers in the volume is signed by their respective authors. Unusually, though, the *Introduction* is anonymously assumed by "The authors". What authors? Anyhow, the Cluj-Napoca group had not sign the letter and had not contributed to the *Introduction*. Nevertheless, an analysis of the style and references reveals without any doubt only one author, whom I prefer not to mention, although I know his name.

Casually, I should enhance the fact that the author of the *Introduction* lacks the minimal common sense of expressing his gratitude to me and Mrs. Stavinschi for rectifying the errors within the presented texts, corrections integrated by the authors in their respective published works. Surely, a Robespierre of Orthodoxy cannot afford the luxury of gratitude.

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4. Adrian Lemeni (coordinator), *Repere patristice în dialogul dintre teologie și știință* (*Patristic Landmarks in the Dialogue between Theology and Science*), Bucharest, Basilica Publishing House of the Romanian Patriarchy, 2009 (prefaced by His Beatitude Father Daniel).

What are the arguments brought against the transdisciplinary methodology?

Eight pages of the *Introduction* are dedicated to Jakob Böhme in a context that has nothing to do with Transdisciplinarity: the fact that I have written a book about Böhme does not mean that Böhme is a guiding light of Transdisciplinarity. In the abundant international transdisciplinary literature, the references to Böhme are totally marginal. I wrote that book to give an answer to the famous question by Joseph Needham: "Why was modern science born in Europe?" However, let us examine the author's arguments in relation with Transdisciplinarity, not the history of modern science.

According to the author of the *Introduction*, "The justification of reading this doctrine through the transdisciplinary lecture grid, motivated as a cultural and modern gesture belonging to a contemporary attempt to institute a new rationality, cannot diminish in any way the manifest lack of theological discernment of this act of poisoning, ideationally or imagistic-metaphorically, the contemporary man with elements of 'fallen theology'" (p. 30). All right, so I do not have a "theological discernment" and I lend myself to a "poisoning act" against the contemporary man. But why is this theology "fallen"? Who decided that? Jakob Böhme was never officially a "heretic". Only the priest from Görlitz, Böhme's small home town, who was jealous of the great prestige held by Böhme in his lifetime, shouted in his sermons that Böhme was a heretic and had the cross on his tomb desecrated after Böhme's death.

In 1995, I had the honor to take part in the Vatican ceremony dedicated to the end of Galileo's trial, and on that occasion I had a private talk about Böhme with Pope John Paul II, who had read my book. His Holiness told me then that he thought that Böhme was a "great man". Let us say that I trust the theological discernment of Pope John Paul II more than I do that of the author of the *Introduction*. Moreover, if you want us to stay on a Romanian reference ground, is it not interesting that Petre Țuțea did not refrain from quoting Jacob Böhme positively in his *Treaty of Christian Anthropology*?[5] Is Țuțea perhaps a "heretic", too? This is a recurrent word in the manifesto-*Introduction*.

The author of the *Introduction* states in a doctorial manner that "If, however, at the level of science, we can hope it will not be a lunacy for many […], at the theological level things have their gravity […]" (p. 30).

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5. Petre Țuțea, *Omul, Tratat de antropologie creștină. Problemele sau Cartea întrebărilor* (*Man. A Treaty of Christian Anthropology. The Problems or the Book of Questions*), Iași, Timpul Publishing House, 1992.

I am grateful to this author for his hope that Transdisciplinarity will not be a "lunacy for many", however it will be difficult to have a dialogue in this uncivilized and non-academic manner.

The pinnacle of the grotesque is reached when the author, quoting a book of Alain Besançon[6], suggests that Böhme would be a precursor of Leninism and of the idea of the instauration of the *Reich*… When, in fact, Besançon's basic thesis is that Leninism was a form of gnosis, a thesis that did not gain the support of the scientific community. Quoting Besançon is indeed strange. On the one hand, Alain Besançon is not an expert in Böhme's thinking, but a historian. On the other hand, Böhme is quoted marginally in Besançon's book: in a 450-page volume, he is mentioned only six times, always together with other names. Where Besançon writes "Paracelsus, Valentin, Wiegel, and Böhme", the author of the *Introduction* writes only "Böhme".

This manipulation of quotations seems to be a specialty of the author of the *Introduction*. I will give you a flagrant example. The author writes, quoting from a debate I had within the "Phantasma" Group in Cluj-Napoca, in 2006[7]: "Ultimately, Science remains — even though incomplete — a sort of rampart against religious delirium […] We saw that, for the transdisciplinary thinkers, religious faith is an act of rationalization of the mystery, but a utopian rationalization, with the peculiarity of slipping toward a religious delirium from which we can defend ourselves only thanks to the protection of that rampart called Science…" (pp. 55, 58). Or, my exact words were: "To me, Science remains a kind of rampart against the esoteric delirium or religious delirium, any kind of delirium"[8]. The deficiency in honesty from the part of the author of the manifesto-*Introduction* is unmistakable. I was speaking then about "any kind of delirium" and I never stated that religion had the "particularity of slipping toward religious delirium". As a matter of fact, any human construct can slip toward delirium. Scientific delirium, as an example, has many forms, the most recent being Scientism, a particular scientific delirium that I analyze thoroughly in my works.

The author of the *Introduction* reproaches Transdisciplinarity its "disciplinary conditioning". It is true that I have always maintained that there cannot be any Transdisciplinarity without the disciplines. However,

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6. Alain Besançon, *Les origines intellectuelles du léninisme*, Paris, Gallimard, 1996.

7. Basarab Nicolescu,„Cosmodernitatea" ("Cosmodernity"), in *Steaua*, Cluj-Napoca, nos. 10-11, October-November 2006, pp. 64-82. (It was a debate with the members of the "Phantasma" group — Corin Braga, Ruxandra Cesereanu, Sanda Cordoș, Anca Haţiegan, Marius Jucan, Doru Pop, Vlad Roman, Nicolae Ţurcan, Mihaela Ursa — at the Babeș-Bolyai University in Cluj-Napoca.)

8. *Ibidem*, p. 74.

can there be an Orthodox Theology without the correspondent discipline taught in the faculty of Orthodox Theology? If, as asserted by that author, Orthodoxy is legitimated only through ecclesial experience, then why are the examinations at the Faculty of Orthodox Theology still necessary?

The capital point of the author's argumentation is he claims to be the "adherence" of Transdisciplinarity to the "doctrine of the un-manifested truth". He writes: "The incompleteness of knowledge, the lack of certitude, the inaccessibility of absolute truth, as well as the relativistic attitude and gnoseological [epistemological] 'tolerance' represent, as we have seen, the axial ideas on which the doctrine of the un-manifested truth is founded, ideas to which — we have seen as well — the promoters of Transdisciplinarity unconditionally adhere" (p. 51). This assertion is not only untrue, but sheer nonsense. In the transdisciplinary methodology, there is no possibility for an "un-manifested truth" — the truth is altogether manifest and un-manifest. However, this fact cannot be understood if one places oneself, as the author of the *Introduction* does, in the realm of binary logic and accepts, as he does, the epistemic split between Subject and Object. It is obvious that the author of the *Introduction* completely ignores the meaning of the Hidden Third and pops up a sort of caricature of transdisciplinarity to combat with. This confusedness between Transdisciplinarity and its mockery is severe and explains all the possible divagations.

Finally, the author of the manifesto-*Introduction* discusses the "fiction of trans-religiosity". He writes: "In the understanding of its promoters, Transdisciplinarity is neither religious, nor un-religious, but 'trans-religious' […] However, no religion is empowered to reclaim a privileged position in the sense of its universality. […] The basic stake to be foreseen here is, in our opinion, the denial of the possibility of partaking of any Church, or religious confession, from the universal faith and the godly truth. By contrast, it should be stressed out that for the Orthodox believers there is only one complete faith, the Orthodox faith, and only one Church, the One, Holy, Universal, and Apostolic Orthodox Church" (pp. 54, 56). Only that, on strictly theological grounds, the opinion of the author of the manifesto-*Introduction* is plain wrong. He seems unaware of the fact that the Romanian theologians avoid the phrase "Orthodox religion" in favor of "Orthodox theology", precisely in order to affirm the uniqueness of Orthodox theology, not to relativize it by introducing it into the general body of religious confessions. Does he not know that for the Romanian theologians Orthodox theology is transverse and beyond religious confessions, which corresponds exactly to the definition of the "trans-religious"? This matter was noticed by some of my theologian friends, however others reached the opposite conclusion; anyone with his understanding ability.

Basically, what is the motivation of this strange matter?

I do not know. The Basilica Publishing House could have published this volume without that manifesto-*Introduction*, that was artificially pasted before the other texts.

Nevertheless, I have a hypothesis. I believe this matter is an outcome of certain internal struggles inside the Romanian Orthodox Church, a fight that has nothing to do either with me, or with Transdisciplinarity.

This late revelation regarding the inadequacy of the transdisciplinary methodology to the dialogue between Orthodox theology and the sciences is very strange indeed. Most of the authors of the volume issued by the Basilica Publishing House, including the author of the *Introduction* himself, were until recently enthusiastic supporters of Transdisciplinarity. The coordinator of the volume, Mr. Adrian Lemeni, whom I met in Paris in 2000, told me, when he was younger, that he would like to implement a Transdisciplinary Center within the Faculty of Orthodox Theology in Bucharest, and actively took part thereafter in all our transdisciplinary activities in Romania. Patriarch Daniel himself knew very well what Transdisciplinarity was, since during the 2001 Congress he attended my lecture about the transdisciplinary vision of the sacred. Precisely on that occasion our friendly relationship got going. He did not hesitate to publish an article on the *Necessity of the Dialogue between Science and Faith*[9] before my own on *The Levels of Reality and the Sacred*[10]. In September 2007, His Beatitude honored us with his presence and addressed a Congress that had the word *transdisciplinary* in its title: "Transdisciplinary Approaches of the Dialogue between Science and Religion in the Europe of Tomorrow"[11].

Transdisciplinarity does not need to be legitimized by the Tradition of the Church; likewise, the Tradition of the Church does not need to be legitimized by Transdisciplinarity. The only legitimization of the transdisciplinary methodology resides in the fecundity of its practice in different areas of knowledge. And this fecundity was proved to the greatest extent at international level.

In any situation, the "matter" that you are invoking does not need to be overestimated. The manifesto-*Introduction* does not represent more

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9. Daniel, Metropolitan of Moldavia and Bucovina, *Necesitatea dialogului dintre știință și credință*, in Basarab Nicolescu and Magda Stavinschi, *op.cit*., pp. 22-25.

10. Basarab Nicolescu, *Nivelurile de realitate și sacrul*, *ibidem*, pp. 37-50.

11. Basarab Nicolescu, Magda Stavinschi (eds.), *Transdisciplinary Approaches of the Dialogue Between Science, Art, and Religion in the Europe of Tomorrow*, Curtea Veche Publishing House, Series "Science and Religion", Bucharest, 2008.

than the point of view of an insignificant minority from the ranks of the Romanian scholars, theologians, and scientists. I personally had the opportunity to discuss with a great number of theologians, priests, and theology students who are very interested by the practical applications of the transdisciplinary methodology.

I even go further, asserting that this matter has an extremely positive aspect as well: it has taught us about the obstacles in the way of a true dialogue between Religion and Science in a post-communist country where the mentalities inherited from the totalitarian system are still alive. The results we have achieved during a decade in this laboratory of the dialogue between Religion and Science in Romania can serve as a role model to the neighboring predominantly Orthodox countries.

*

Addendum

It will be done according to the will of the authors.
† Daniel

Your Beatitude, Father Patriarch,

In response to Your Beatitude's request regarding the volume *Repere patristice în dialogul dintre teologie și știință* (*Patristic Landmarks in the Dialogue between Theology and Science*), we make clear the following:

In November 2007, the National Reunion of the ADSTR (Association for the Dialogue between Science and Religion in Romania) took place in Iași, a meeting within the Program "Science and Orthodoxy. Research and Education" (SORE). On this occasion, it was proposed that two volumes be prepared: *Repere patristice în dialogul dintre teologie și știință* (*Patristic Landmarks in the Dialogue between Theology and Science*) and *Repere neopatristice în dialogul dintre teologie și știință* (*Neo-Patristic Landmarks in the Dialogue between Theology and Science*). The proposal was approved by the Board of Directors of the ADSTR, in a meeting that took place in November 2007 as well. In this last meeting, the authors and the themes of the first collective volume were also agreed upon. The Board of Directors of the ADSTR decided that the first volume would be coordinated by Adrian Lemeni and published in the *Science and Religion* series, coordinated by Mr. Basarab Nicolescu and Mrs. Magda Stavinschi, hosted by the Curtea Veche Publishing House.

In September this year, a new National Reunion of the ADSTR took place in Bucharest. On this occasion, the authors invited to publish in the volume we

are talking about participated in a work-meeting in which they addressed some aspects regarding the structure, content, and presentation manner of the texts that would be published. During the discussions, two manners of approaching the volume took contour. More precisely, some of the authors were of the opinion that the patristic landmarks cannot form the basis of a perspective compatible with the use of the transdisciplinary methodology in the dialogue between Theology and Science, while other authors maintained that the patristic Orthodox theology can engage in a dialogue with Science by the way of the transdisciplinary methodology. After receiving the texts proposed for this volume (in an intermediary form), Mr. Basarab Nicolescu proposed the second premise to be assumed as a model for the entire volume by all the authors, stressing that the transdisciplinary methodology is the only one by which the Orthodox Theology and Science can engage in a genuine dialogue.

Given that, we, the signatories of the present document, in our quality of participant authors in the common volume project, produced and assumed a text presenting *the significant and necessary premises* in the dialogue between Orthodox Theology and Science. Following these premises, we have added the reasons for which, in our vision, *the transdisciplinary methodology is inadequate* for substantiating this dialogue.

At the same time, in an exchange of letters with Mr. Basarab Nicolescu, we made it clear that, in case a transdisciplinary approach is desired and the projected volume is to be published under the auspices of Transdisciplinarity, we do not feel ourselves obliged to submit our texts in order to be published in the above-mentioned series.

The SORE Program in Romania, financed by the Templeton Foundation, aims at both Orthodoxy, and Science. Consequently, within the dialogue between Theology and Science both a development of the ecclesial perspective, and the actualization of the patristic landmarks are necessary. A theology anchored in the Orthodox Tradition can give a consistent and specific testimony in front of the openings of contemporary Science. Accordingly, we assure Your Beatitude of our sincere will to continue the efforts of valorizing these openings, maintaining nevertheless the patristic and ecclesial approach.

Taking into consideration all these, we address Your Beatitude in order to receive Your grace for the volume *Repere patristice în dialogul dintre teologie și știință* (*Patristic Landmarks in the Dialogue between Theology and Science*) to be published at the Basilica Publishing House of the Romanian Patriarchy.

With filial love,

Adrian Lemeni, Florin Caragiu, Dan Chițoiu, Sorin Mihalache, Răzvan Ionescu, Ștefan Trăușan-Matu, Petre Comșa, Costea Munteanu

To His Beatitude Father DANIEL
Patriarch of the Romanian Orthodox Church

Events

Événements

Transdisciplinarity in Science and Religion
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International Congress "Romania, a Laboratory of the Dialogue between Science and Spirituality in the Contemporary World"

19-20 October, 2009, Romanian Academy, Bucharest

MAGDA STAVINSCHI
President of ADSTR and IASSO

On December 31st, 2009 a special program came to its end: it was special for the dialogue between science and religion in general, but all the more so for an Orthodox and post-communist country like Romania. It was entitled SORE — "Science and Orthodoxy. Research and Education".

After eight years of experience (the first meeting took place under the aegis of the John Templeton Foundation in November 2001), we could say that the last program was a special one. Let us remember its most important achievements during the last three years.

SORE had an obvious effect over the neighboring countries, a proof being the international meeting organized in February 2009 in Sibiu — "Big Questions about the Universe" — and the subsequent proposal to John Templeton Foundation for a regional program.

The program was primarily focused on the development of research and education in Science and Religion at a national level. A lot of themes were approached by different groups from Romania or France: Bucharest (15), Cluj (4), Craiova (9), Constanța (5), Iași (4), Ploiești (5) and 8 grants, all of them obtained by competition and presented within the framework of the local meetings. A new group was formed in cooperation with the Romanian National Commission for the UNESCO. The research works will be published or spread over the Internet. More that 130 researchers from science and theology and post-doctoral students participated in this

project. The program was sustained by a lot of personalities from Romania, including the president of the Romanian Academy and hierarchs of the Romanian Orthodox Church.

A lot of courses were followed by the students of the theological faculties or other specialties (journalism, history, technology) in Bucharest, Cluj-Napoca, Constanța, Iași. A master course was set up in Craiova.

The country will benefit from a large library created by the book and journals published during the Templeton programs. In the series "Science and Religion" we have published 30 books, original or translated, other ones being in print. The journal *Transdisciplinarity in Science and Religion* has benefited from the contribution of the most important personalities, Templeton prizes included. The chronicles in the media prove the large impact of these publications among the Romanian readers.

On the days of October 19th and 20th, the ADSTR (Association for the Dialogue between Science and Theology in Romania) and the IASSO (Institute for Advanced Studies in Science and Orthodoxy) organized in Bucharest the Congress "Romania, a laboratory of the dialogue between science and spirituality in the contemporary world".

Under the patronage of the Romanian Academy, the John Templeton Foundation from the USA and the Romanian National Commission for the UNESCO, the Congress was honored by the presence of several important participants from Australia, Brazil, the United Arab Emirates, France, Mexico, Romania, Russia, Serbia, the USA, the UK. The Romanian speakers were former President Emil Constantinescu, Solomon Marcus, Basarab Nicolescu, Magda Stavinschi, and Mihail Șora.

The opening speeches were delivered by the Vice-president of the Romanian Academy, Marius Iosifescu, by Theodor Paleologu, Minister of Culture, Religious Affairs, and National Heritage, and Lucreția Băluță, counsellor to the Romanian National Commission for the UNESCO. The Chairman of the Scientific Committee for the organization of the Congress and Honorary Member of the Romanian Academy Basarab Nicolescu read the messages of His Grace Bartolomeu Anania, Metropolitan of the Cluj, Alba, Crișana, and Maramureș provinces, and of Andrei Pleșu, Rector of the New Europe College and director of the Institute for the History of Religions of the Romanian Academy. Ionel Haiduc, President of the Romanian Academy, made a closing speech before Basarab Nicolescu drew the conclusions.

Furthermore, discussions followed and, by the wide range of topics approached, they tried to deepen the dialogue between science and spirituality in the contemporary world, proving once again that Romania is a real laboratory in this area.

The nearly 200 guests, of all ages, were surprised by a unique occasion at our congresses: the live presentation of two lectures, one from Sydney, the other from Belgrade. It was a technical premiere: not being able to take part in the congress, two participants presented their communication by skype. The result was amazing: to talk online with a colleague being in the other hemisphere is extraordinary. Of course, no technicality will ever replace the personal contact, but the experience helped us overpass some difficulties.

An important event was represented by the launch of the book *What Is Reality? Reflections about the work of Stéphane Lupasco*, issued by the Junimea Publishing House, in the presence of its author, Basarab Nicolescu, honorary member of the Romanian Academy. The book was presented by Nicolae Breban, Member of the Romanian Academy, by Cassian Maria Spiridon and Magda Stavinschi. Additional information is to be found on the website www.adstr.ro/congress2009/.

It was an end, but a beginning too. The experience accumulated during these years, with its successes and errors, has pushed us to extend our activity to the neighboring countries and to enhance their spirituality, too, in the benefit of society.

Book Reviews

Livres à signaler

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Transdisciplinary Reality: A Fusion of Horizons of Theology, Science, and Philosophy

VICTOR GODEANU

The collective volume *Realitatea transdisciplinară. O fuziune de orizonturi ale teologiei, științei și filosofiei* (*Transdisciplinary Reality: A Fusion of Horizons of Theology, Science, and Philosophy* — Curtea Veche Publishing, Bucharest, 2010, 276 pages) brings together the effort of a group of three researchers from Ploiești formally representing three different fields of knowledge: Gabriel Memelis (a fine theologian among the few best prospects of Romanian Orthodoxy), Adrian Iosif (an IT scientist with a very keen eye on the issues of artificial intelligence), and Dan Răileanu (a philosopher whose general sense of time and space places him rather among the traditional thinkers). Bound by friendship, all of them share at least one intellectual characteristic: a wide-open mind toward the complex problematic of the relationship between what is perceived as real and the Real itself.

Basically, what they do in their concerted work is fusing the horizons of Theology, Science, and Philosophy in a whole that transverses the commonness of reality, leading to another universe where knowledge is one, yet shared hypostatically. The image coming to my mind while reading the volume was that of a *synthetic* black hole sucking in across the horizon of events the disciplinary knowledge in order to project it thereafter into another space/time defined by the cohabitation of the diversity.

The volume aims to reformulate the basis of the dialogue between Science and Theology within the cultural space of Europe. In order to achieve that, the authors take into consideration the fact that a new perspective on reality and on its conceptualization is needed, by means of a new methodology of approaching all different disciplines: transdisciplinary

interaction. And they begin their attempt by a hard theological statement asserting "the transdisciplinary spirit patent to Christianity". Taking into account certain outbursts of criticism from the mainstream school of Romanian Orthodoxy prior even to the publishing of the book, their engagement on the path of stirring up the sedimented richness of the patristic thought is altogether courageous and worthy. The research does not follow the common, easy accessible path of relating to the resemblances between Science and Theology, but discloses the "congeniality" or conformity of the scientific and theological spirit by revealing the formal correspondence between modern sciences and the Judeo-Christian paradigm.

The theological section of the volume opens with a *Preamble: Orthodox Theology and the Transdisciplinary Spirit*. Further on, the text refers to *Necessary "Exorcisms" and "Counter-Anathemization" of Old and New Clichés. Arguments for a Congeniality of Religion and Science*, which is the most consistent part. Then follow *The Eastern Christian Perspective over Reality* and *Ta onta "ouk ex onton": The Creation "out of Nothing", or about the Difficulties and Solutions of Grounding a Theological Ontology*. The section closes with *The "Perspectival" Founding of Reality: The World "in the face of God"*.

The author of this section, the theologian Gabriel Memelis, demonstrates clearly throughout his part that the fundamental anti-empiricism of the Mosaic Law — that he considers to be "the first 'scientific' religion and science of making religion" — formed the backbone on which, later on, the modern science developed. Without the methodological distancing between subject and object that characterizes the Law of Moses, the birth and further growth of modern science would not have been possible. The Christian faith, in Memelis' view, fulfilled the anti-empiricism of the Old Testament and "extended it over the jurisprudence, ethics, and theology". However, in its historical development, Science radicalized the "emancipation" of the subject from the object, adopting at times an almost completely sealed-off attitude toward nature. Gabriel Memelis maintains that "from the point of view of Theology, the scholastic drift, due to which the separation between man and nature seemed plausible, does not cancel the congeniality we are talking about: in its unaltered setting, the distinction between subject and object belongs to, and is in complete accordance with, the Judeo-Christian matrix" — a very pertinent assertion.

The author notices as well the existence of a bigoted theological and monastic-homiletic discourse nowadays, and also of a rhetorical theology, all of them exalting the empirical side of the religious experience and opposing it to any theological theoretical instruction. Memelis stresses the fact that this attitude is in flagrant contradiction with the way the Fathers of the Church experienced the togetherness of life and theology as one.

Referring to the problematic of Reality in relationship to the godly act of creation "out of nothing", the author explains the importance of placing the creation, in its entirety, in a "suspended state" in relationship to God, a sort of ontological, but never topological distancing.

My understanding of Gabriel Memelis' in-depth and refreshful theological discourse about the congeniality of Science and Theology places it within the paradigm of the parable of the prodigal son, where obviously Theology would be the father and Science the prodigal son wondering around the world in order to discover by his own unmediated experience its very substance and to absorb it as a *sine qua non*, intimate part of his ontology (for those considering that a NT parable belongs solely to the text and context rendering it, I should stress the fact that we talk about a literary means of expression which would be dead and buried unless its multiple layers are constantly peeled off in order for its core to be reached).

The section *The Perspective of Nature Sciences* comprises *Methodological Premises*, then *The Becoming of Modern Science. Reality as a Clear Distinction between Subject and Object*, followed by *The Theory of Relativity* and *The Quantum Revolution*. Further on, the author focuses on *The Virtual reality* and finally on *The Transdisciplinary Reality*.

The author of this second section, Adrian Iosif, starts with a question about the "obsessive" interrogations regarding the "things that are" — that is, about the very nature of reality. Then he observes that there are very few scientists who did not express their opinions about the nature of reality: "To what extent can it be postulated that — without leaving the probity characterizing the scientific act — something *is*, that an entity can be considered objectively as being a part of reality? That is the question…"

The author presents the general methodological premises on which the problematic of *reality* has been scrutinized up to this day, and states that his personal choice starts "from the subject-object relations scheme" developed within the frame of Transdisciplinarity — such an approach offering the benefits of a re-balancing of the subject-object relationship "by asserting a unity preserving the distinctions between subject and object inside the frame of a multiplicity of levels of reality". He also points out the necessary distinction between Real and Reality: "Reality being 'that which resists the experiences, representations, descriptions, images, or mathematical formalizations that we make' (Basarab Nicolescu, *We, the Particle and the World*), while the Real is 'that what it is'. 'The Real is, by definition, forever hidden, while Reality is accessible to our knowledge' (*ibidem*)."

Adrian Iosif notices that the modern scientific revolution presented, up until a certain moment, a complete "eclosion" of the subject, like an

ejection of it outside the object. Practically, the transformation of Science from its medieval, pre-modern state to modernity reveals a "pullback" of the subject from the object.

In reference to the becoming of the modern Science, the author makes a pertinent review of the scientists interested in the Reality theme. The first change in the classic model that guided modern Science came as a consequence of the epistemological nature of Einstein's first theory, the theory of special relativity, which changed the physicists' perception of reality, bringing to it a content it never had within the classical paradigm. The quantum revolution that came after brings a new approach to the concept of reality, deeply changing our representation of it. The author, paraphrasing an assertion of Basarab Nicolescu, says that "the subject and the object are what they are because the subject as well as the object exist in a distinctively simultaneous way within the same processive unity" — in my opinion an excellent synthesis of the transdisciplinary problematic holding a huge theological potential worth to be exploited further.

Adrian Iosif notices that within the dialogue between Science and Christian Theology there are biased quantum interpretations inferring theological truths; a situation that, in my opinion at least, would have a comical load to it if it were not tragic in its very substance. I would like to make a gloss on this topic: in fact, what Adrian Iosif notices is nothing but a fictitious theology, a slanted approach of the problematic of God disconnected from the original spirit of the patristic thought (crossed by a direct and intimate, yet rational knowledge of God).

The third section, *The Perspective of Philosophy*, written by Dan Răileanu, presents *Introductory Considerations*. *The Distinction Subject-Object* (with its subjacent *The Distinction Thing-Phenomenon*, and *The Distinction Real-Reality*) and *Perception and Reality*.

"We cannot have a mature understanding of the concept of 'reality' without addressing the relation *subject-object* from the perspective of Philosophy, central as we have seen up until now for the theological as well as scientific discourses. This relation comprises also the distinction *thing (in itself)-phenomenon* and the dichotomy *real-reality*. Despite the fact that those two concepts are inter-definable, a separate analysis of each is necessary." And that is what Dan Răileanu does: an in-depth analysis of the relationship between subject and object, starting with some historical considerations. In that context, the author considers that the relationship noetic-ontological can be considered "as a setting into the general frame of thinking of the relation subject-object", Plato operating the first break between the noetic and the ontological, although only at a methodological level. The separation is followed further, up to the 20th century, when it was overcome by the transdisciplinary methodology, in which subject

and object, although completely distinct, are consistent with an interaction that makes knowledge possible beyond the Cartesian ontology. Hence, the author asserts the necessity of "a triple perspective over reality: metaphysical, epistemological, and analytical. A coherent approach of reality supposes the assuming of the problematic of the being, as well as the possibility of its knowledge and expression". Dan Răileanu makes a very pertinent observation here and, willingly or not, he proposes a scale: he stresses the fact that while the analytical perspective is indebted to the philosophical thinking of the 20th and 21st centuries, the epistemological thinking, and especially the metaphysical thinking come along from over two and a half millennia of philosophical reflection.

For Dan Răileanu, the Real "has always been the obsession of the thinkers". He adheres to the opinion that it has always been supposed that beyond the complexity of empirical knowledge there could be certain fundamental structures of reality. In his opinion, all that remains to be done in order to reach these structures is to [re?]unite the main three great levels of theoretical knowledge: "the level of the observations, the level of empirical knowledge and the level of theoretical knowledge".

The author identifies that within the specificity of each reside presuppositions and notions that attempt to construct and reconstruct the rational meanings of the world, and there is the place where we can find a methodology akin to the apophatic expression, all in an attempt to justify the ultimate truths.

The closing statement of Dan Răileanu synthesizes his entire essay: "Nevertheless, if now, at the end of the road, we were to look reflexively back over the entire development that the history of philosophy has offered us, we could say that, for the question about the nature of the reality it is possible not to find a definitive answer, because the question itself should be rephrased as a consequence of a fortifying act of our own intuitions, so we could assume the concept of 'reality' in an 'intuitive' manner as a prime concept. Hence, it would be more appropriate for us to ask ourselves: 'To whom can we attribute reality?'…"

The conclusion of the volume asserts the identification of two "contact areas in which a 'shared understanding' can be profiled". It also shows that the Eastern Christian Theology is able to answer the most recent exigencies of the scientific and philosophical analysis regarding the concept of "reality". A fusion of horizons based on the congeniality of Theology and Science is considered possible and, implicitly, "understanding itself" in a transdisciplinary territory.

Published in the same series / Parus dans la même collection :

Valeriu ANANIA, Aurel SASU — *Despre noi și despre alții*

Francisco J. AYALA — *Darul lui Darwin către știință și religie*

Ian G. BARBOUR — *Când știința întâlnește religia. Adversare, străine sau partenere?*

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