Christian Scholarship (the *inner reformation* of the the various *academic disciplines*)

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Introductory Remark

There are many Christian University Colleges and Universities wrestling with the question how one should proceed in giving shape to the all-encompassing scopy of the Biblical calling to serve God in all wlaks of life, including the academic enterprise. The *skeleton* of how this could be achieved presented below should be seen as an attempt to stimulate our communal task of articulating a *distinctly Christian perspective* within the disciplines or special sciences, embracing both the natural sciences and the humanities. The focus will first of all be on the nature of theoretical thought and subsequently an acoount will be given of the inevitability of an *ultimate commitment* directing all scholarly academic activities. For the sake of brevity the *skeleton* will take the form of concise explanations and arguments. [The two sketches on page 13 may enhance an understanding of some rcucial systematic distinctions. The same applies to the collection of quotations found on pages 14 and 15.]

The nature of theoretic reflection

(a) Next to many shared properties, common between non-scientific and scientific thought activities (such as *method*(ology), '*objectivity*,' *systematics*, 'verification'/'falsification' and so on), the truly distinctive feature of the theoretical enterprise is given in the *identification* (i.e. lifting out) of a certain modal aspect of reality by simultaneously *distinguishing* it from (i.e. disregarding) the other aspects of creation (known as: *modal abstraction*). Let us highlight **three** implications.

(b) Firstly, *modal abstraction* implies and presupposes a *more-than-logical-diversity* within creation. Theoretical thought is impossible without (an implicit or explicit) idea of this cohering diversity within creation.

(c) Secondly, *modal abstraction* requires an inter-modal *criterion of truth*, the (cosmological) principle of the excluded antinomy (principium exclusae antinomiae). This principle forms the foundation of the logical principle of *identity*, *non-contradiction*, the *excluded middle* and so on.

(d) Thirdly, *modal abstraction* implies that in order to identify a specific scientific viewpoint one has to *transcend the confines* of any single modal perspective by distinguishing it from other viewpoints. In other words, it implies that the various disciplines (special sciences) are dependent on a theoretical totality perspective, characteristic of *philosophy*.

Provisional General Conclusion

In general we may conclude that a philosophic view of reality underlies all scholarly academic reflection. We mention two additional considerations confirming this conclusion: (a) the history of the disciplines reflects this foundational relation, and (b) the most fundamental questions of the various disciplines reveal overlapping and shared basic issues, such as (i) unity and diversity; (ii) universality and individuality; (iii) uniqueness and (inter-)connectedness (i.e., the coherence of irreducibles/the quest for a basic denominator); (iv) constancy and dynamics.[1]

The history of the disciplines

Schools of thought are normally the outcome of different philosophical starting-points. For example:

MATHEMATICS
Formalism [Hilbert], intuitionism [Brouwer, Heyting, Troelstra], logicism [Russell, Frege];

PHYSICS
Classical determinism [Einstein] and the mechanistic main tendency of classical physics [last representative Heinrich Hertz] versus the Kopenhagen interpretation of quantum mechanics [Bohr and Heisenberg];

BIOLOGY
Mechanistic, physicalistic, neo-vitalistic, holistic, neo-Darwinian, emergence-evolutionistic and pan-psychistic trends – compare;

PSYCHOLOGY
Consider the philosophical assumptions of the initial atomistic association psychology, the stimulus-response approach, Gestalt-psychology [the Leipzig school (Krüger and Volkelt) and the Berlin school (Koffka and Köhler)], depth psychology [Freud, Adler, Jung], the logo-therapy of Frankl, etc.); phenomenological psychology;

LOGIC
Classical logic, dialectical logic, intuitionistic logic [rejecting the principle of the excluded middle], formalistic symbolic logic);

The science of HISTORY
Compare the conflict between *linear* and *cyclical* conceptions of history – though the modern era is largely dominated by the newly emerging ideal of *progress*, the Greek conviction that history is *eternally recurrent* managed to capture modern spirits such as Vico, Herder, Hegel, Goethe, Daniliwski, Nietzsche, Spengler and to a certain degree also Toynbee;

LINGUISTICS
Two lines of thought dominated the 19th century: Rousseau, Herder, Romanticism, von Humboldt and the rationalistic trend running from Bopp, Schleicher, and 'Jung-Grammatici' to Paul [with his historicistic conception of language-in-development], Cassirer developed his neo-Kantian theory of language, Bühler pursued the stimulus of behaviorism in his theory of signs, at the beginning of this century Wundt dominated the scene, De Saussure contributed to the development of a structuralist understanding, Reichling explored elements of Gestalt-psychology in his emphasis on the *word* as the core unit of language, Chomsky revived the doctrine of the *apriori* within the context of his transformative generative grammer;

SOCIOLOGY
The initial organicistic orientation [Comte, Spencer] was continually opposed by mechanistic and physicalistic approaches [cf. L.F. Ward and more recently W.R. Catton], the dialectical heritage of Hegel permeated Georg Simmel's formalistic soci-

1 For the purposes of this presentation we do not consider additional issues, such as the distinction between *concept* and *idea* (we shall indirectly touch upon it in the discussion of the nature of nominalism), *freedom* and *responsibility*, and so on.

ology with its individualistic neo-Kantian focus [Park and Burgess explored this direction in the USA], Max Weber explored the sociological and economic implications of the neo-Kantian Baden school of thought, Talcott Parsons made the systems model [based upon von Bertalanffy's generalization of the second main law of thermodynamics] fruitful for sociological thinking, opposed by conflict sociology [Dahrendorf, C. Wright Mills and Rex and by the Frankfurt school of neo-Marxism], but recently revived by J.C. Alexander;

ECONOMICS

The classical school of Adam Smith, the neoclassical approach [from Cournot and Dupuit to Menger, Jevons, Walras and Pareto] the marginalism of Marshall, Keynes' 'General Theory,' alternative approaches to competition [Chamberlin and Robinson];

LEGAL SCIENCE

The historicistic orientation of von Savigny – followed by the Romanist [von Jhering] and Germanistic [von Gierke] schools, neo-Hegelian [Binder], neo-Kantian [Stammmler, Radbruch], variants of natural law and legal positivism;

THEOLOGY

Dialectical theology [Barth, Gogarten, Brunner] in its dependence upon Kierkegaard and Jaspers, Bultmann [dependent on Heidegger], theology of hope [Moltmann – dependent upon the neo-Marxism of Ernst Bloch], the historicistic design of Pannenberg [dependent upon Dilthey and Troeltzsch], the 'atheistic' theology of Altizer and Cox [influenced by neo-positivism], existentialist-hermeneutical trends [Fuchs, Ebeling, Steiger], theology of liberation [influenced by neo-Marxism].

Shared basic issues

In response to the mentioned basic issues various *systematic* theoretical positions ultimately in the grip of supra-theoretic commitments materialized. Foremost in the reaction against the long reigning legacy of modern positivism, Karl Popper advanced the penetrating critical insight that *faith* in the rationality of reason is not itself *rational* – he speaks about 'an irrational faith in reason' (Popper, *The Open Society and its Enemies*, Vol.I & II, London 1966-II:231). Stegmüller states: "A self-assurance of human thought is excluded, wherever one may consider it. One can never reach a positive result without pre-suppositions. One has to believe in something in order to justify something else" (Stegmüller, W.: *Metaphysik, Skepsis, Wissenschaft*, 2nd edition, New York 1969:314). And in the new *Introduction* he says: "A person does not have to set aside knowledge in order to make room for faith. Much rather one already has to believe something if he wants to speak of knowing and science at all" (1969:33). He furthermore asserts that *an ultimate certainty* is required, for without it would be impossible even to start.[2] He even reverses the classical opposition of faith and reason: in science one believes, in religion one knows (or: one claims to know)![3]

Non-Christian articulations

[Concerning: (a) Unity and Diversity; (b) Universality and Individuality; (c) Coherence of Irreducibles/the quest for a Basic Denominator; (d) Constancy and Dynamics]

(i) Monistic *isms* (such as physicalism, psychologism, historicism, aestheticism, legalism, moralism, pietism) [provides answers to (a) and (c)]; rationalism and irrationalism [response to (b)]

(ii) pluralism and the choice of a basic denominator, such as atomism (individualism) or holism (universalism) [answer to (c)]

(iii) two influential responses to (d) are: (neo-)Darwinism and historicism.

(iv) Finally, more complex responses are given in the opposition between *realism* and *nominalism*, combining responses to different issues.

Though each one of these four responses literally generated ramifications in *all* the special sciences, we briefly mention a few examples concerning the choice of a *basic denominator* and then explain the nature of *nominalism*.[4]

Choice of a basic denominator: examples

1. MATHEMATICS: The dominant trend in modern mathematics (axiomatic formalism) proceeds from an *atomistic* starting point, aiming at an arithmeticistic understanding of continuity (Weierstrass, Dedekind, Cantor, Hilbert). Intuitionism, on the contrary, wants to honor the integral coherence of continuity (its holism) by proceeding from the 'intuition' of a *whole* preceding its parts (Brouwer, Weyl).
2. PHYSICS and BIOLOGY: The classical mechanistic approach in physics and biology is *atomistic*, whereas the vitalistic, holistic and organismic trends universalistically put the concept of organic *wholeness* central.
3. PSYCHOLOGY: Stimulus-reponse psychology is *atomistic* – Gestalt psychology is *holistic*.
4. SEMANTICS: L. Antal advances a completely *atomistic* understanding of the *meaning nuances* of a word. He emphasizes the *word* as a sign-*unit* to such an extent that the multiplicity of possible meaning nuances of a word is denied and transposed to the denotata (Antal, L.: *Questions of Meaning*, Den Haag 1963:53, 54, 58). Representatives of the semantic field theory [Coseriu, Geckeler, Trier, cf. Schmidt, L.: *Wortfeldforschung* (editor), Wege der Forschung, Darmstadt 1973], on the other hand, consider the meaning nuances of a word to be integral parts of a genuine whole (*Ganzheit*).
5. SOCIOLOGY: Variants of *action theory* (G.H. Mead, p. Berger, T. Luckmann, T. Parsons, M. Weber and A. Schutz)[5] and so-called *methodological individualism* (Popper, Hayek and Watkins) tend to think atomistically about society, whereas functional approaches (system theory – Parsons, Buckley, Luhmann, Alexander) are more inclined to think about society in terms of a *whole* with *parts*.
6. ECONOMICS: Classical and neoclassical economic theory is straight-forwardly individualistic (atomistic) while the economic orientation of Othmar Spann is a full-blown unversalism (holism).

2 "Irgendein absolutes Wissen muß es geben; ohne dieses könnten wir überhaupt nicht beginnen"; "Absolute Evidenz müssen wir schon 'haben,' d.h. wir müssen an sie bereits glauben, ..." (1969:194). "Some form of an absolute knowledge must exist; without it we would not have been able to begin"; "We must already 'possess' absolute evidence, that is we must already believe in it."

3 Stegmüller, 1969:212: ("... in der Wissenschaft wird geglaubt, in der Religion weiss man (oder: behauptet man, zu wissen").

4 With regard to *mathematical platonism* (realism) Paul Bernays remarks: "This brief summary will suffice to characterize platonism and its application to mathematics. This application is so widespread that it is not an exaggeration to say that platonism reigns today in mathematics" (*Gesammelte Abhandlungen*, Darmstadt 1976:65). Exactly the opposite is true of *biology*, which is 'reigned' by *nominalistic* neo-Darwinism (see below)!

5 Compare the representative statement of Max Weber: Concepts such as 'state,' 'club' ... signifies specific kinds communal human actions ..., that could be reduced to 'understandable' (verständliches') actions, and that means that it can, without an exception, be reduced to the actions of the individual human beings (Einzelmenschen) concerned (Weber, M. (1973): *Gesammelte Aufsätze zur Wissenschaftslehre*, 4th edition, Tübingen 1973:439).

7. LEGAL SCIENCE: The *fiction* theory of a legal personality is individualistic (von Savigny); the *organ* theory of von Gierke is holistic.

The impact of nominalism

Although most rationalistic and irrationalistic[6] trends in modern philosophy seem to diverge radically, their common root in nominalism transcends this superficial divergence. In respect of the typical structure of entities, nominalism does not accept any conditioning order (*universal structures*) for, or any orderliness (*universal structuredness*) of such entities.[7] Every entity is strictly *individual*. In terms of our distinction between rationalism and irrationalism, *nominalism* therefore represents an *irrationalistic* view in connection with the nature of entities, since every individual entity is completely stripped from its universal orderliness (law-conformity) and conditioning order. This characteristic applies to both moderate nominalism, viz. *conceptualism* (Locke, Ockham, Leibniz and others), and to extreme nominalism, that rejects all general and abstract concepts and accepts only *general names* (Berkeley and Brentano). This irrationalistic side of nominalism, however, does not exhaust the multifaceted nature of nominalism, because universals are fully acknowledged in the human mind, at least as general words in the case of Berkeley's and Brentano's extreme nominalism. This restriction of knowledge to *universals* is typical of rationalism in the sense defined by us. Therefore, it is possible to see nominalism as being simultaneously rationalistic (in terms of the universals – concepts and words – in one's mind), and irrationalistic (in terms of the strict individuality of entities).

The common root of diverging trends in modern philosophy

This dual nature of nominalism forms the starting-point of two diverging developments in modern philosophy.

(i) On the one hand, it provided rationalism with the possibility to elevate human reason to the level of the creator of a rational order in reality. This follows from the fact that nominalism in fact transposes the universal side of entities into the human mind. But the universal side of entities is nothing but the manifestation of the *being conditioned* of creaturely entities by the relevant universal creational order for their existence. Consequently, if an entity is stripped of its orderliness (its universal side), it is simultaneously stripped of its subjection to a universal creational order. What is left is factual reality in its unstructured, chaotic individuality and particularity (contingency). Driven by the new motive of logical creation, this very feature of nominalism enabled modern philosophy from Descartes onwards to *reconstruct* all of reality in terms of natural scientific thought. Only the extreme consequences of this natural science-ideal, cancelling in principle also human freedom, were questioned by Kant in the 18th century. Within the (limited) domain of the science-ideal, however, Kant draws the ultimate rationalistic conclusion of nominalism. Indeed, Kant tries to consolidate and strengthen the preceding natural science-ideal, be it in the restricted form of the rationalistically elevated understanding which (though limited to sensibility in order to save a separate super-sensory domain for the practical-ethical freedom of autonomous human beings), is considered to be the *a priori* (formal) *law-giver of nature*![8] *Nominalism* created a vacuum by leaving factual reality in its individuality unstructured. In order to fill up the lack of determination thus created, Kant introduces human understanding to take hold of this vacant position. Kant does not merely transpose the universal side of entities into human understanding, since in fact he also elevates human understanding to the level of the *conditioning order for things*.

(ii) On the other hand, nominalism provided a starting-point for all those trends in modern philosophy which, in an *irrationalistic* fashion, want to take the unique and contingent character of (mostly designated as: historical) reality serious. This avenue opened up by nominalism was explored by a variety of historicistic designs in modern philosophy, for example from the forth phase of Fichte's thought up to pragmatism, existentialism, neo-Marxism and contemporary postmodernism. If reality is stripped of both its *orderliness* and its *being subjected* to a conditioning universal creational order, it seems to be a "self-evident historicistic truth" that, ultimately, everything is historical and therefore taken up in the dynamic and ever-changing contingent flow of historical events.

6 Rationalism considers *universals* to be the only source of knowledge, thus leaving no room for knowledge of things in their *individuality*. Surely, concept-formation is always bound up with the *universal order for*, and the *universal orderliness of* things. This implies, as already discovered by Aristotle, that one cannot *conceptually* comprehend the *individual side* of an entity. Unfortunately, in a typical rationalistic way, Aristotle identifies knowledge with *conceptual* knowledge, implying that something individual cannot be known (cf. Metaf. l040 a 5 ff.). Contrary to this rationalistic position, we must emphasize that in fact we do have *knowledge* of things in their individuality, although this kind of knowledge is not *conceptual*. Much rather, it is of a limiting and approaching nature. It stretches terms beyond their universality to designate the individual side and uniqueness of things. But this is precisely what *idea-knowledge* is all about – an idea concentrates a conceptual diversity upon (resp. refers it to) that which transcends the limits of all concept-formation. An idea could be seen as a concept stretched beyond its limits, and in this sense as a concept referring beyond its own limits (sometimes called a *limiting concept*). Therefore, rationalism leaves no room for idea-knowledge. *Irrationalism*, on the other hand, always wants to pay tribute to the contingent uniqueness of the individual side of entities or events transcending the limits of concept-formation. Consequently, irrationalism leaves no room for *conceptual* knowledge.

7 The classical legacy of *realism* never left the scene after its dominance of Greek and Medieval philosophy. Plato elevated the God-given *structures for* creaturely existence to his transcendent realm of eternal forms of being. Aristotle rejected this in favor of an emphasis on the *universal side* (orderliness) of entities, interpreted as their universal substantial forms (his secondary substance). Via Plotinus and Augustine these two conceptions were transformed into the ideas in God's mind before creation (ante rem), the universal essence of things (in re) and supplemented by the universal concepts within the human mind (post rem). Nominalism rejected the first two *universalia*. The idealistic morphology of Ray and Linnaeus (17th century), Schindewolf (cf. Schindewolf, O.H.: *Ueber den 'Typus' in morphologischer und phylogenetischer Biologie*, Wiesbaden 1969) and Troll (Troll, W.: *Die Urbildlichkeit der organische Gestaltung*, Experientia 1, 491, 1949; *Biomorphologie und Biosystematik als typologische Wissenschaften*, Studium Generale 4 (376-389), 1951; *Allgemeine Botanik*, revised and extended edition, Stuttgart 1973) as well as *mathematical platonism* continued essential elements of *realism* (cf. Armstrong, D.M.: *A Theory of Universals, Universals and Scientific Realism*, Volume II. Cambridge. Cambridge University Press, 1978; and Armstrong, D.M.: *Universals, An Opinionated Introduction*, Cambridge, Cambridge University Press, 1989). In the recent development of philosophy of science thinkers like Hesse, Putnam, and Baskhar revived realism. Nelson Goodman (cf. Goodman, N.: *Of Mind and Other Matters.* Cambridge. Harvard University Press, 1984) and W.V.O. Quine (Quine, W.V.O.: Structure and Nature. *The Journal of Philosophy*, 1992, 1 (LXXXIX): pp.5-9) defend an extreme nominalistic position in mathematics.

8 The concepts of understanding in Kant's conception function as *formal law-giver* of nature. They are not derived from experience (a posteriori) but (a priori) are lying at the basis of experience: *"Categories are concepts, which prescribe laws a priori to phenomena, and thus to nature as the totality of all phenomena"* (*Kritik der reinen Vernunft*, 1787^2:163). In his Prolegomena Kant writes: "human understanding does not create its *a priori* laws out of nature, but prescribes them to nature" (Kant, I: *Prolegomena zu einer jeden kunftigen Metaphysik die als Wissenschaft wird auftreten kÖnnen*, 1783, Hamburg: Felix Meiner Edition, 1968:79).

A Christian response

A succinct articulation of a Christian response to the above-mentioned basic issues follows below – but before we enter into this discussion we may summarize the biblical starting point of Christian academic reflection:

1) *Accepting God's Law for Creation*;
2) *Acknowledging the interrelatedness and dependance of created reality*;
3) *Confessing the rule of Christ over all domains of creation*;
4) Subjecting oneself to the *key* to knowledge: the biblical basic motive of *Creation, Fall and Redemption*;
5) *Knowing Christ as the fulness of creation* (Col.1:15-20);
6) Upholding the distinctness of '*Structure*' *and* '*direction*'[9]
7) *Avoiding any absolutization of something within creation*.

This many-sided but integral and coherent biblical starting point motivates and underlies the reformational philosophical tradition that guides our remarks below (Calvin, Kuyper, Dooyeweerd).

(a) *Unity and Diversity*

Kuyper first introduced the principle of sphere sovereignty in order to account theoretically for the *diversity* within creation.[10] Dooyeweerd explored and deepened this insight by enriching it in two directions:

(i) the interrelationship between the different (sphere-sovereign) modal aspects of reality is accounted for in terms of the principle of *sphere universality* (modal analogies/anti- and retrocipations);

(ii) interlacements within the domain of concrete things, events and societal relationships – where the internal sphere sovereignty of interwoven structures are kept intact – are called *enkaptic*.

These insights in principle free us from the one-sidedness of monistic *isms* and also from the reductionistic opposition of *atomism* and *holism*.

(b) *Universality and Individuality*

In our brief characterization of *nominalism* the fundamental distinction between *order for* and *orderliness of* has already surfaced. *Universality* characterizes God's law for creation. It also constitutes a *side* of whatever is subjected to God's law in creation. In its lawfulness/orderliness/law-conformity every *individual* entity, event or societal collectivity, in a *universal* way, shows that it is subjected to a correlating God-given law. The *being* human of *this* person, and the *being* alive of *this* plant are instances of the mentioned universal *orderliness*.[11] The humanistic ideal of autonomy, i.e., that the human being is a law unto himself or herself, proceeds from the antinomical assumption that the *conditions for being human* and the human being meeting these conditions *coincide*!

(c) *Coherence of Irreducibles*

Perhaps it can be claimed that one of the most basic philosophical problems confronting the various academic disciplines concerns the 'coherence of irreducibles.' One may consider all *monistic* approaches in philosophy and the special sciences as implicitly answering this question in the *negative*. Pan-psychism (for example the orientation of de Chardin), attempts to reduce every phenomenon to a *psychical* perspective. In a similar way, the classical mechanistic approach in physics, following Galileo's discovery of the *kinematical* law of inertia, has tried, at least in its main trend, to view all physical bodies exclusively in terms of mechanical movement.[12] However, Planck's discovery of the quantum and the establishment of the second main law of thermodynamics, i.e., the law of non-decreasing entropy (indicating the *irreversibility* of physical processes), revealed the untenability of this *monistic mechanistic* approach in modern physics.

What is normally referred to as 'primitives' in logic and foundational studies, indeed pertain to the 'irreducibles' mentioned above. These primitives also reflect the inherent limitations of concept-formation and definition – in the final analysis every definition can only define something in *indefinable terms*. Whenever one tries to define a truly primitive notion, the inevitable result is (antinomic) reduction. Zeno's classical reasoning against the reality of movement is nothing but an attempt to define *pure movement*, a primitive notion in *kinematics*, solely in *static spatial terms* – as if a moving body possesses from moment to moment a *definite place* in space. In his fourth fragment one reads: "something in motion neither moves in the space it is occupying, nor in the space it does not occupy" (Diels-Kranz, *Die Fragmente der Vorsokratiker*, Berlin 1960, Vol.I, B Fr.4). When a moving body is every moment of its 'movement' at one specific place, it is after all *at rest*, since 'being in one place' simply means 'not being in motion.' It is not of any help, as Descartes has tried to do, to define movement in terms of *change of place*.[13]

(d) *Constancy and Dynamics*

Heraclitus and Plato: Heraclitus' concern for the dialectical opposition of *constancy* and *change* inspired his famous statement: we cannot step into the same river twice, for fresh and ever fresh waters are constantly pouring into it. Cratylus, a pupil of Heraclitus, confronted Plato with this problem of constancy and change, as can clearly be seen from Plato's dialogue with that name. In this dialogue, Plato had to account for the nature of *knowledge* in terms of something more fundamental than *change*. He found it in what he termed to be the essential form of what is known (*αὐτὸ τὸ εἶδος*).

Galileo: Galileo grasped the fact that uniform motion (constant motion) is a primitive notion and therefore not in need of a *physical cause*. The physical meaning of a cause always implies certain effects, i.e., *dynamic changes*. What needs a cause is not *motion*, but a *change* of motion (cf. the analysis of Stafleu, M.D.: *Time and Again, An analysis of the foundation of physics*, Toronto/Bloemfontein, 1980:80) – for instance acceleration or deceleration. This implies that the *phoronomic* (kinematic) facet of reality is indeed a (foundational) condition for energy-operation (with its implied causes and effects). Physical changes pre-suppose some form of continuation (persistence, constancy), for only on the basis of something *persistent* is it meaningful to point towards *changes*.

The impasse of historicism: A correct understanding of constancy and change highlights the impasse of *historicism*. According to historicism everything (law, morality, art, faith, language and so on) is taken up in the flow of historical change and is everywhere only comprehensible as elements of a *historical process*. Contrary to this claim we are accustomed to speak of *legal history*, *art history*, *economic history*, and so on. But if law, art and economics are nothing

9 This distinction needs a qualification. The structure of creation is not 'direction-*less*' and the *direction* is not 'structure-*less*.' Therefore, we should distinguish between God's *direction-giving* structure *for* creation and the *structured* direction manifest in the God-obedient or God-disobedient response of humankind.

10 Initially Johannes Althusius (1557-1638) pointed out that the diverse societal collectivities distinct from the state ought not to be seen as *parts* of the state since each of them has its own laws proper to it. Althusius writes: "It can be said that individual citizens, families, and collegia are not members of a realm (i.e., the state – DFMS), ... On the other hand, cities, urban communities, and provinces are members of a realm" (*Politica methodice digesta* (1603, 3rd edition 1614), trans. by F.S. Carney, The Politics of Johannes Althusius, London 1965, p.16). Concerning societal life forms distinct from the state Althusius declares: "Proper laws (*leges propriae*) are those enactments by which particular associations are ruled. They differ in each specie of association according as the nature of each requires" (1965:16).

11 In other words, in the being human (universal side) of every individual human being that person, in a universal way, exhibits that it is subjected to the (equally universal) God-established law for the existence of human beings.

12 The most comprehensive, but perhaps last attempt to reduce all physical phenomena to kinematical movement, is found in the mechanics of H. Hertz – he was the first to broadcast and receive radio waves and established that light and heat are electromagnetic waves.

13 *The Principles of Philosophy*, Part II, IV – since *change* is a physical term and *place* is a spatial term.

but history, we in fact must deal with the contradiction of a *historical history*. Whatever **is** history, cannot **have** a history; and whatever **has** a history, cannot itself **be** history. The irony is that historicism, reducing every facet of reality to the historical mode, thus has eliminated the very *meaning* of history – if everything **is** history, there is nothing that can **have** a history![14]

Remark: *Einstein's theory of relativity*

> Eventually Einstein explored the insight that change presupposes constancy. He did this in his special theory of relativity by postulating that the velocity of light in a vacuum is *constant* – with respect to which all motion is *relative*. The historicistic climate at the beginning of the 20th century explains why he chose the expression 'theory of *relativity'* instead of calling his theory what it actually in the first place **is**: a theory of *constancy*!

Thus far we have emphasized the *irreducibility* of primitive terms residing in the different universal modalities or aspects of reality. Of course they also display a remarkable *coherence*. To account for these inter-relationships, we provisionally have to overlook other differences between the natural aspects (number, space, movement, the physical, biotical and sensitive aspects) and the aspects typical of human activities (the logical, historical, sign-mode, social, economic, aesthetic, juridical, ethical and certitudinal aspects).

When we differentiate between life in a *biotic* sense and *social life*, we are confronted with a *moment of similarity*: the term **life**. However, life in a biotic sense differs fundamentally from life in a social sense. Therefore, *in this moment of similarity* the *difference* between the social aspect and the biotic aspect reveals itself. It sounds almost paradoxical to say that two aspects show a *similarity* precisely in that moment which reveals the *difference* between them. This kind of a 'difference in terms of similarity' may be called *an analogy*. Surely, *modal analogies* are not the only kind of analogies which one can distinguish, since also entities evince differences in their moments of similarity. These entitary analogies are very common in ordinary (and even scientific) language where they are designated by *metaphors*. So-called scientific models are nothing but entitary analogies employed in scientific parlance.

Inevitable choices underlying the special sciences

We now return to some inevitable choices (implicitly or explicitly) confronting the various disciplines.

Basic concepts of disciplines

Every single scientific discipline uses *concepts of function* (they differentiate into *elementary basic concepts* and *compound basic concepts*) and *type concepts*.

Provisional examples:

> the concepts *entropy*, *volume*, *mass*, *acceleration*, and *uniform motion* are all physical *concepts of function* (elementary basic concepts), whereas the concepts of elementary *particle*, *atom*, *molecule*, *macro-system*, and *galaxy* are *type concepts* (thing concepts); the concepts *birth*, *growth*, *differentiation*, *integration*, *adaptation*, *maturation*, *ageing*, and *dying* are biological *concepts of function* while the systematic classification of the plant and animal kingdom concern *concepts of types* (*phyla*, *classes*, *orders*, *families*, *genera*, and *species*); the concepts *social order*, *social stratification*, *social constancy* and *dynamics*, *social differentiation* and *integration*, *social solidarity*, *social conflict* and *consensus*, *social control* and *power*, *social significance* and *interpretation* are all (elementary) basic concepts of sociology – they differ from the typical totality concepts referring to societal collectivities such as the *state*, the *firm*, the *school*, the *church*, and so on; the concepts *legal object*, *jural subject*, *subjective right*, *legal norm*, and so on are all (compound) basic concepts of legal science, to be distinguished from the structural (typical) differences between diverse *spheres of law* in a differentiated society, such as the domain of *public law* (encompassing *criminal law*, *constitutional law*, *administrative law*, and *international public law/law of nations*), *civil* (or: *common*) *law* (protecting the *personal freedom* of the individual within the legal intercourse of a differentiated society), and *non-civil private law* (the irreducible spheres of competence unique to non-state societal entities).

Analogical basic concepts

What we have called the *elementary basic concepts* of scientific disciplines actually reveal the inescapable inter-modal coherence existing between the different sphere-sovereign aspects within creation. Because it accounts for the *coherence* between different aspects of creation, any special scientific discipline delimited by one modal aspect only, inevitably has to use *analogical (modal) concepts* which are also used by other disciplines, be it that the latter use them in a manner colored by their respective (modal) points of view. A few examples may elucidate this point sufficiently.

1) *Wholeness/Totality*

The concepts *whole*, *coherence* and *totality* appeal to the original irreducible meaning of the spatial aspect. Something continuous (such as a one-dimensional line) evinces an uninterrupted connectedness, i.e., *all* its *parts cohere*. But if all the parts are present, then the whole/totality is given! The apparently 'purely arithmetical' definitions of Weierstrass, Dedekind and Cantor deal with the idea of sets of numbers as *infinite totalities*, implying that the unique character of the spatial aspect is essential in their attempt to reduce space to number – an obviously circular argument! Regarding the *totality character* of continuity, Paul Bernays (the well-known co-editor of 'Die Grundlagen der Mathematik' – in collaboration with David Hilbert) remarks: "(it) undeniably belongs to the geometric idea of the continuum. And it is this characteristic of the continuum which would resist perfect arithmetization" (Bernays, *Abhandlungen zur Philosophie der Mathematik*, Darmstadt, 1976:74). To this one should add his final assessment of *arithmeticism* in mathematics: "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 representations of number (*Zahlvorstellungen*)" (1976:188).

Most variations of *holism* use some or other non-spatial modal perspective and then explore within that context the (analogical) meaning of the original spatial whole-parts relationship. In every non-spatial aspect the whole-parts relation is *differently* qualified. Certain developments in the modern concept of matter illustrate this point amply. The very nature of spatial continuity initially suggested that *physical space* shares the spatial feature of being *infinitely divisible*. It eventually turned out not to be the case. In a commemorative article dedicated to Carl Weierstrass (1825-1884), the famous mathematician, David Hilbert, points out that those maintaining that mat-

14 It should be noted that the inter-modal nature of every antinomy does imply a logical contradiction (which is intra-modal), but not vice versa. Descartes' definition (i.e. reduction!) of movement as a "change of place" implies the following logical contradiction: if body is its place, and if movement is a change of place, then a body can only move if it changes 'essentially' – implying that it cannot move (or, *succintly*: a body can move if and only if it cannot move). The illogical concept of a "square circle", however, does not pre-suppose any (inter-modal) antinomy, since it only concerns the (intra-modal) logical error of not correctly identifying and distinguishing between the two *spatial* figures concerned. This distinction between antinomy and contradiction was overlooked in Hart's work: *Understanding Our World* (1984, cf. pp.132, 133).

ter is *continuous* and therefore *infinitely divisible*, are mistaken. Contrary to the popular conception that 'nature does not make leaps,' continued empirical research and systematic reflection[15] confirms that 'nature indeed makes jumps' (Hilbert, *Ueber das Unendliche*, Mathematische Annalen, 1925:81-82).[16]

Whereas the original meaning of space (with the implied whole-parts relation) entails both its *continuity* and *infinite divisibility*, physical *space*, on the contrary, is *neither* continuous *nor* infinite(ly divisible)! The interrelation between the physical and spatial aspects clearly implies that there are both similarities and differences: physical space and original space are *extended* – their similarity, but only the latter is continuous and infinitely divisible, distinct from the former which is discontinuous and finite – their difference.

Similarly, *biotical space* should be distinguished from *mathematical space*. Whereas the latter is *homogeneous* the former is *heterogeneous*, due to the *differentiated* nature of diverse *organs*. Einstein's theory of relativity employed a non-Euclidean geometry to analyze physical space. Perceptual space also reflects a non-Euclidean character. Von Bertalanffy writes:

> This organizational constraint of the ambient goes even much further ... It also concerns the forms of intuition, considered by Kant as *a priori* and immutable. The biologist finds that there is no absolute space or time but that they depend on the organization of the perceiving organism. Three-dimensional Euclidean space, where the three rectangular coordinates are equivalent, was always identified with the *a priori* space of experience and perception. But even simple contemplation shows, and experiments in this line prove that the space of visual and tactile perception is in no way Euclidean. In the space of perception, the coordinates are in no way equivalent, but there is a fundamental difference between top and bottom, right and left, and fore and aft. Already the organization of our body and, in the last resort, the fact that the organism is subjected to gravity, makes for an inequality of the horizontal and vertical dimensions. This is readily shown by a simple fact known to every photographer. We experience it as quite correct that, according to the laws of perspective, parallels, such as railroad tracks, converge in the distance. Exactly the same perspective foreshortening is, however, experienced as being wrong if it appears in the vertical dimension. If a picture is taken with the camera tilted, we obtain 'falling lines,' the edges of the house, e.g., running together. This is, perspectively, just as correct as are the converging railroad tracks; nevertheless, the latter perspective is experienced as wrong; the explanation being that the human organism is such as to have an ambient with considerable horizontal, but negligible vertical extension (*General System Theory*, Penguin University Books, 1973:242).

It is clear that *social space* (social distance) differs from mathematical and physical space – the body guard of the president is *physically close* to him but there is a large *social distance* separating them in terms of their societal *status* (respective positions within society).

2) *The system concept in economics and sociology*

In the development of modern sociology and economics the concept of an *equilibrium* – taken in the sense of a *closed physical system* – exerted a tremendous *reductionistic* influence. If a closed system is in a state of *equilibrium*, it is impossible for that system to *produce* any *energy*. Furthermore, it does not need any energy-input to maintain its equilibrium state. The capacity to perform work is only made actual when the system is *open*. Von Bertalanffy gives the following definition of an *open system*: "An open system is defined as a system in exchange of matter with its environment, presenting import and export, building-up and breaking-down of its material components" (Von Bertalanffy, General System Theory, 1973:149). Examples of open systems are the following: a *glacier*, a *fire*, any *living entity*. Whenever a living entity approaches a true state of *physical* equilibrium *death* is in sight!

The 'flowing equilibrium' which, thermodynamically seen, is present in an open system, in some cases is signified as *homeostasis*.[17]

(a) *Sociology*

In the autobiographical sketch of his intellectual development (1977), Parsons mentions the fact that he was first of all confronted with the problem of an equilibrium in the form in which it was developed by Henderson and Pareto, and by the way in which it was implemented by Schumpeter in the science of economics. He adds that at a very early stage he was influenced by Cannon's *physiological* conception of *homeostasis* – a conception showing direct links with the then predominant social-anthropological views of A.R. Radcliffe-Brown and his followers (cf. Parsons, T.: *Social Systems and the Evolution of Action Theory*, New York 1977:48).

Parsons frames his analytical distinction of the *social system* in the following terms:

> The social system-focus is on the conditions involved in the inter-action of actual human individuals who constitute concrete collectivities with determinate membership (Parsons, 1961:34).

The primary categories used by Parsons in his functional classification are that of *pattern-maintenance* (also designated as *latency*), together with *integration*, *goal-attainment* and *adaptation* (Parsons, T.: *Theories of Societies*, edited in collaboration with Shills, Naegele and Pitts, New York 1961:30). He declares that the "function of pattern-maintenance refers to the imperative of maintaining the stability of the patterns of institutionalized culture defining the structure of the system" (Parsons, *Theories of Societies*, 1961:38) and then adds the following remark:

> Pattern-maintenance in this sense plays a part in the theory of social systems, as of other systems of action, comparable to that of the concept of inertia in mechanics. It serves as the most fundamental reference point to which the analysis of other, more viable factors can be related (Parsons, 1961:39).

When Parsons, Bales and Shills formulate a law imitating Newton's first law of motion (basically Galileo's law of *inertia*), they characterize it as being merely "another way of stating one aspect of the fundamental postulate that we are dealing with equilibrating systems" (Parsons, T., Bales, R.F. and Shills, E.A.: *Working Papers in the Theory of Action*, New York 1953:100 – note the influence of Pareto and Schumpeter). Parsons, Bales and Shills do not comprehend the *difference* between the kinematical and the physical aspects. They also do not adequately distinguish between *closed* and *open systems* within the physical aspect. Consequently, they wrongly identify *homeostasis* with the analogy of *inertia* (a kinematical meaning-figure) in their characterization of 'equilibrating systems.' The same comment is relevant with respect to Parsons' use of the concept of *pattern-maintenance*, seen by him as something comparable with the concept of *inertia* in mechanics. *Maintenance* always requires new *energy-input* (into an open sys-

15 The 'Wirkungsquatum *h*' by Planck (1900) and the formulation of Einstein's theory of relativity (1905, 1916).

16 Hilbert also points out that the conception of reality as being *infinite* depends upon *euclidean geometry*. By employing non-euclidean geometry (such as it was done in Einstein's theory of relativity), is was shown that the unlimitedness of physical space does not warrant the inference of its supposed infinity (1925:83).

17 Alexander gives a brief history of the term *functionalism*. The emergence of this term from a study group conducted by the physiologist L.J. Henderson at Harvard in the 1930s, was influenced by biological functionalism and by Canon's notion of *homeostasis* (Alexander, J.C.: *Neofunctionalism*, Sage Publications London 1985:8). Von Bertalanffy also made an appeal to Canon's notion of homeostasis in the development of his system theory (1973:10, 14, 21, 78, 169) by Cannon in 1929 (cf. Cannon, *Organization for Physiological Homeostasis*, in: Physiological Review, 9, 1929:397).

tem) – something different from the inertial notion of *mere* continuation.

(b) *Economics*

Modern economic theory (the classical school) was firmly in the grip of the modern *humanistic science-ideal* which aimed at reducing the normative dimension of creation to *deterministic natural laws*. Initially a deterministic and physicalistic understanding of *causality* guided this development, amended by an increasing focus on variants of the physical notion of *gravity* (an almost inevitable and obvious effect of Newton's successful *theory of gravity*), eventually crystallizing in the urge to account for economic activities in terms of an *equilibrium*.

Adam Smith still (antinomically) believed that there exists no relation between the *usability* (practical value or *utility*) of a commodity and its *exchange value*. At this point the dominant concept of *causality*, still prevailing in classical economic thought up to Ricardo, turned out to be untenable. As its substitute a physicalistically conceived conception of a *system in equilibrium* was introduced. Wicksell points out that the cost of the production of a commodity and its relative price (exchange value) does not stand in the relation of *cause* and *effect*, but determine each other *mutually* as distinct members of a unitary economic *equilibrium system* (1913:73).[18]

What comes to the surface here is the decisive difference between the classical theory and the theories of Menger, Jevons and Walras. The latter thinkers managed to transcend the limitation present in the approach of Adam Smith by drawing on seminal insights of von Mangoldt, Dupuit and Gossen.

The inherent many-sidedness and dynamics of economic life does not warrant the fiction of *static economic equilibria*.

Economic theorists attempted to introduce the physical concept of equilibrium to explain the nature of the *free market*. Pareto, for example, pursued this avenue explicitly. Before the age of seven this French born thinker moved to Italy where he eventually (in 1896) completed his doctoral studies (in order to become an engineer) at the university of Turin – dealing with the *fundamental principles of equilibrium in solids*. (cf. Bousquet, *Vilfredo Pareto*, in Recktenwald, H.C. (editor): *Lebensbilder groqxqer NationalÖkonomen*, Kiepenheuer & Witsch, Berlin 1965:391).

Pareto argues that the *molecules* which constitute the social system are the *individuals* (Pareto, *Treatise on General Sociology*, 1916 (Dover-edition) 1963, cf. par.2080). Society is therefore to be seen as a *system in equilibrium* with a number of inter-dependent elements which, with the aid of the mathematical concept of function, must be studied in *quantitative* terms. The resistance offered by a society to internal and external forces leads to a recovery of the previous situation:

> A society where this occurs can therefore be considered as being in a state of equilibrium, and of *stable* equilibrium (Course d'Economie Politique (1896), par.585, translated by Finer, *Vilvredo Pareto: Sociological Writings*, London 1966:104).

Although D'Alembert's mechanics allows for the study of the *dynamical condition* of a system, both economics and sociology must, according to Pareto, "consider a series of *static equilibria* (my italics – DFMS) rather than the dynamic equilibrium" (Finer, 1966:104). This mode of thought represents a fundamental assumption of neo-classical economics – Walras, for example, argues that successive changes in prices would always lead from a state of disequilibrium to that of equilibrium.[19]

The influence of this physicalistic legacy within modern economic theory (dating back to the rise and development of modern physics during the 17th and 18th centuries), however, exhibits an inherent tension with another powerful tradition of the 19th century, the idea of *organic transformation*. The effect of the latter both in economic theories and in the practice of various societies, is seen in the contradictory claim that the economic arena, due to the operation of the 'invisible hand' (the market 'mechanism'), inherently tends towards a state of equilibrium, while at the same time *economic growth* ought to improve the quality of life world-wide.

What is remarkable in this regard, is that the notion of a *closed system* (in equilibrium), as it is developed in classical physics, stands in flat contradiction with a deepened understanding of *biotical* phenomena.

Already the discovery of *irreversible processes* – initially by Carnot in 1824 and eventually through the discovery of radio-activity in 1896 (by Madam Curie and Henri Becquerel) and the quantum of energy *h* (by Max Planck) in 1900 – terminated the reign of the main mechanistic tendency in modern physics. By 1850 Clausius and Thompson, independently of each other, formulated the second main law of thermodynamics.[20]

Von Bertalanffy generalized this law to include cases of a *constant interchange* of systems with their environments:

> Chemical equilibria in closed systems are based on reversible reactions; they are a consequence of the second principle of thermodynamics and are defined by minimum free energy. In open systems, in contrast, the steady state is not reversible as a whole nor in many individual reactions. Furthermore, the second principle applies, by definition, to closed systems only and does not define the steady state. A closed system *must*, according to the second principle, eventually attain a time-independent state of equilibrium, defined by maximum entropy and minimum free energy, ... A closed system in equilibrium does not need energy for its preservation, nor can energy be obtained from it. ... the chemical equilibrium is incapable of performing work (Von Bertalanffy, *General System Theory*, (1973:132).[21]

A deepened understanding of thermodynamically open systems once and for all makes it clear that *living processes* cannot be explained with the aid of a *closed systems* model. This attempt caused the neo-vitalism of Hans Driesch to introduce *entelechie* as an immaterial *vital force* capable of *suspending* physical laws since living

18 "Die produktionskosten der Güter und ihre Tauschwerte (relativen Preise) stehen eben nicht 'wie Ricardo annahm, in dem einfachen Verhältnisse von Ursache und Wirkung zu einander..., sondern (bedingen) einander gegenseitig als die verschiedene Glieder eines einzigen wirtschaftlichen Gleichgewichtssystems.' Es ist das große verdienst von Menger, Jevons und vor allem Walras, diesen Nachweis geführt und damit gezeigt zu haben, daß 'das Hinweisen auf die Produktionskosten sogar auf den denkbar einfachsten Voraussetzungen als theoretische Erklärung der tauschwerte der Waren unmöglich ist, so anwendbar es als praktische Regel oft auch sein mag' " (Schneider, *Einführung in die Wirtschaftstheorie*, IV. Teil, Ausgewählte Kapitel der Geschichte der Wirtschaftstheorie, I. Band, J.C.B. Mohr, Tübingen 1962:192).

19 "Walras zeigt, wie ein Prozeß der sukzessiven Änderung der Preise und der Mengen von einem Zustand des Ungleichgewichts zum Gleichgewicht führt" (Schneider, 1962:264).

20 Clausius introduced the term *entropy* only in 1865. Thomson's formulation of 1852 reads as follows: All the available energy strive at dissipation, it aims therefore at a uniform dispersion (cf. Apolin, *Die Geschichte des Ersten und Zweiten Hauptzatzes der Wärmetheorie und ihre Bedeutung für die Biologie*, in: Philosophia Naturalis, 1964:440).

21 Hart considers the way in which "a cell exchanges its material components many times over without losing its identity" to be one of the long list of irreducible properties of living organisms (1984:399, note 64). However, Von Bertalanffy's generalization not only shows that living entities are thermodynamically open, since, as we have mentioned above, there are also numerous examples of *physical* systems that are thermodynamically open, such as a glacier or a fire. This dynamic equilibrium, designated with the term 'Fliessgleichgewicht' by Von Bertalanffy (1973:165), concerns a *physical* feature of living entities, not a distinctive biotical one! Hart here needed a reference to the well-known work of E. Schrödinger (dealing with the physical aspect of the cell – Schrödinger, E.: *What is life? The physical aspect of the cell*, 1955) (cf. Hart, 1984:124, 139).

entities manage to build up more and more internal order through *growth*. The apparent 'equilibrium' present in a living entity, however, is completely different from any true equilibrium in a *physical* sense. The latter state is incapable of performing any work. Von Bertalanffy points out that the *dynamic pseudo-equilibrium* of living entities is kept constant at a certain distance from *true equilibrium* enabling it to perform work while requiring continuous import of energy for maintaining the distance from true equilibrium (Von Bertalanffy, 1973:133). SchrÖdinger describes this state of affairs by saying that living things feed on *negative entropy* (SchrÖdinger, 1955:71 ff.).

The way in which *economic life* analogically reflects its inter-modal coherence with the physical mode of reality is not by approximating instances of *static equilibria*, but by analogically evincing the feature of a *dynamic equilibrium*, i.e., of thermodynamically *open systems* (Von Bertalanffy).

The notion of *static equilibria*, present in the so-called *Walras-Pareto-Optimum*,[22] cannot be reconciled with a (thermodynamically) unstable process of *growth*. Within the field of biological contemplation the followers of the neo-vitalistic approach of Hans Driesch had to alter their arguments after Von Bertalanffy's generalization of the second main law. While fully acknowledging the nature of thermodynamic open systems, Schubert-Soldern thus continues the neo-vitalism of Hans Driesch in the following remarkable way. To explain the (thermodynamic) 'state of highest improbability,' i.e. *instability*, present in a self-maintaining system (such as a living entity), he introduces an 'instability factor' (Schubert-Soldern, R.: *Mechanism and Vitalism*, London 1962:62, cf. 68).

We are fully justified in saying that the steady flow of building material in a living entity, physically seen, causes it to be in an *unstable* condition. At the same time, and without any contradiction, we may also say that the same entity is, seen from a biotical perspective, in a *stable* condition! Whenever *physical* stability is approached (true equilibrium), *biotical* instability is on its way as an inevitable symptom foreshadowing *death*. This non-contradictory fashion of grasping both the (physical) instability and the (biotical) stability of living entities, points at the irreducible nature of the biotical aspect. Evidently, in a purely physical sense it is contradictory to claim that the same entity can exist both in a *stable* and in an *unstable* way – something economists upholding the classical equilibrium concept would have to assert as soon as they want to account for phenomena of economic *growth*!

Dobb aptly remarks that more recent theories of growth effectively transcended the limitations of the assumed prevailing state of equilibrium by introducing a *dynamic element* in the conceptional scheme of Walras.[23]

Once the issue of economic growth managed to break through the rigid walls of the *general equilibrium approach* the myth of an a-normative economic realm is unmasked. Questions about *excessive* economic growth unmistakenly points at the *normative* character of economic activities and accounts for the absence of an awareness of *having enough* within societies dominated by a materialistic life-orientation.

Without pursuing this matter any further in this context, it must be clear that the true meaning of the economic aspect of creation can only be understood when it is analyzed in its unbreakable coherence with all the *non-economic* modes of reality and when it is seen in its concentric relatedness to the central commandment of love – articulated in the call to *stewardship*. Every humanistic attempt to isolate and 'autonomize' the economic realm of creation is ruled out through this articulation of our biblical faith relating to God's creational order.

Subject-object relations

Within the structure of all the (post-arithmetical) aspects subject-object relations are encountered. They appear at the *factual side* of an aspect – in subjection to the *delimiting* and *determining* law-side.

(a) *A line as a 'continuum of points'*

While the idea is ancient, modern Cantorian set theory again came up with the conviction that a spatial subject such as a particular line must simply be seen as an infinite (technically, a non-denumerable infinite) set of points.

If the points which constitute the one dimensional continuity of the line were themselves to possess any extension whatsoever, it would have the absurd implication that the continuity of every point is again constituted of smaller points than the first type, but which would necessarily also have some extension. This argument could be continued *ad infinitum*, implying that we would have to talk of ever-diminishing points. In reality such diminishing points build space up out of space since it simply uses its feature of being infinitely divisibile.

Anything which has factual extension has a subject-function in the spatial aspect (such as a chair) or is a modal subject in space (such as a line, a surface, and so forth). A point in space, however, is always dependent on a spatial subject since it does not itself possess any extension. The 'length,' 'surface' or 'volume' of a point is always zero – it has none of these. If the measure of one point is zero, then any number of points would still have a zero-measure. Even an infinite (denumerable) set of points would never constitute any *positive distance*, since distance presupposes an *extended subject*.[24]

In the mathematical theory of measures a little trick is used in an attempt to overcome this limitation. Cantor had proved that the real numbers cannot be counted off one by one, that is, they are non-denumerable. But then additon cannot be defined, since in order to add, a set must be denumerable: only then can one and another one and so on can be added. In such a case it is said that the non-denumerable set of points between two points x and y have a measure larger than zero – in order that a line can be defined as a set of real points.

In this mathematical argument implicit use is made of a disclosed idea of infinitude. Our original awareness of number depends on a temporal order of one, another one, and so forth (the *successively infinite)*. When we consider a sequence of numbers as if all the elements of the row are observed *at once* – as the points on a straight line are in view at the same time – we come across a deepened sense of infinitude, the *at once infinite*.

Without the nature of spatial simultaneity this supposition of an *at once infinite* set has no foundation. The *at once infinite* is a numerical anticipation to the spatial aspect. It is an anticipatory analogy in number of space. Thanks to this analogy the arithmetical order of

22 Compare the Dorfman, Samuelson, Solow twofold modification: every competition equilibrium constitutes a *Pareto-Optimum* and vice versa [Dorfman, R., Samuelson, P.A., Solow, R.M. (1958): *Linear Programming and Economic Analysis*, New York, 1958:409 ff.].

23 "Die neuere Wachstumstheorien jedoch laufen im Gegensatz zu Schumpeter, für den Wachstum eine Störung der vorher bestehenden Gleichgewichtslage darstellte, jedenfals in ihren formalen Aspekten auf eine Dynamisierung des Walrasianischen Begriffs des generellen Gleichgewichts hinaus. ... Dabei ergaben sich die schwerwiegende Zweifel , ob die Gelichgewichte der Wachstumsmodelle überhaupt stabil seien" (Dobb, *Kapitalismus*, in: Sowjetsystem und demokratische Gesellschaft, Vol.III, 1969:562).

24 The following classical "definition" of a line is well-known: *A straight line is the shortest distance between two points*. A straight line is a factual spatial figure extended in one dimension. The *measure* of this extension, however, is indicated by the numerical analogy of distance (size). We can say in a particular instance that the length (i.e. the numerical analogy) of a line is so much. The so much of a line, however, is not the line. In other words, the extension of the line cannot be defined by the indication of its length. The length of a line presupposes the factual extension of the line – from which it remains *distinct*. For this reason Hilbert imported the term line as an undefined term in his famous axiomatic foundation of geometry (cf. Hilbert, D. *Grundlagen der Geometrie*, 1899).

succession is directed in anticipation towards the spatial order of simultaneity.[25]

The *at once infinite* presupposes the irreducible, unique nature of the spatial aspect and cannot be used subsequently to reduce space to number (a distinct number of points) in terms of a non-denumerable set of real points.[26] This reductionist attempt is antinomic and implies the following contradiction: space can be reduced to number if and only if it cannot be reduced to number (i.e. if and only if the *at once infinite* is used, which presupposes the irreducibility of the spatial aspect)!

A point always functions in an objectively limiting way with regard to a spatial subject. If it is a one-dimensional subject, points serve as its beginning and end. If it is a two-dimensional figure (such as a square), points serve as the corners, and so forth. A line, which is a subject in one dimension, can also function in a limiting (objective) sense in higher dimensions – e.g. limiting the surface of a square, or acting as the edge of a cube. In similar fashion a surface can act as a limiting object in three dimensions, as when it delimits the volume of a cube. In general it can be stated that whatever is a spatial subject in *n* dimensions, is an object in *n+1* dimensions. A point is a *spatial object* in one dimension (an objective numerical analogy on the factual side of the spatial aspect), and therefore a *spatial subject* in no dimension (zero dimensions). In terms of the principial difference between a *spatial subject* and *spatial object*, it is impossible to deduce spatial extension from spatial objects (points). Consequently it is unjustifiable to see a line as a set of points.

(b) *Economic price theory*

Menger, Jevons and Walras advanced a position stating:

(a) a commodity 'in itself' does not have any (economic) *value* – it always 'only' has a 'subjective value' for a determined group of commodities;
(b) the (economic) value of a group of commodities is dependent upon the *marginal utility* of the mentioned group, i.e. upon the *increase* or *decrease* of the marginal utility of the commodities;
(c) that the marginal utilities of a commodity decrease when its number increases (Schneider, op.cit., 1962:193).

It is of critical importance to realize that the extremes of an *objectivistic* and a *subjectivistic* price theory flows from breaking apart the *economic subject-object relation*. The statement that something does not have an economic value *in itself*, simply affirms that nothing can *objectify* **itself** within the economic aspect of reality. However, the *act of objectifying* it is not itself 'objective.' It requires the activity of an *economic subject* since all forms of objectification result from *subjective* actions. This indispensable *subjective* element in the act of objectification explains the advance of the theory of marginal utility. Unfortunately this approach did not realize sufficiently that the normative determinedness of human behavior invalidates any notion of *arbitrary* marginal utilities. The relative price of commodities and their marginal utility are always 'positioned' within the universal framework of the economic modality – explaining why concrete economic interactions can always be evaluated as being *economically sound* or *uneconomical* (i.e., economically *anti-normative*). Though dependent upon the economic (objectifying) activity of an economic subject, the *economic value* of a commodity is not *exclusively* determined by that subject, since it is fitted in the structural economic subject-object relation.

As soon as one enters the domain of economic actions and transactions, mediated by the interaction of differently structured *economic subjects* within the economic domain – individuals or societal collectivities according to their economic subject-function – it turns out that we are dealing with a complex $subject_1$-$object_1$-$object_2$-$subject_2$ relation. $Subject_1$ is the primary subject (i.e., the *producer/supplier*) $object_2$ is some (produced) commodity *not yet* (fully) *objectified* in the economic aspect; $object_2$ is the *economically objectified* commodity, an objectification embodied in its *price* (i.e., its *economic* object-*function*); and $subject_2$ represents the *demand* for this commodity (by other economic subjects/consumers).

Law and subject

Our first example questions two *holy cows* of the modern scientific dispensation:

(a) *The ideal of 'objectivity': 'Facts' and 'Values' revisited*

It belongs to the legacy of modern humanism since Kant to distinguish two supposedly disconnected spheres of being, viz. that of *facts* and *values*. Kant himself has expressed this fundamental dualism as follows: understanding, as the formal law-giver of natural reality is only concerned with what *is*, whereas practical reason (showing the primacy of the humanistic personality ideal) alone can cope with the *ought-to-be*. The positivist and neopositivist trends in modern sociology try to uphold the *factual* claims of the humanistic science-ideal. In a rather witty way MacIver reacts as follows:

> The following seem to be the chief tenets of their creed. First, I believe in facts, and to be saved I must discover new ones. Second, when I have discovered them, I must if possible measure them, but, failing that consummation, I must count them. Third, while all facts are sacred, all theories are of the devil. Hence the next best thing, if one can't discover new facts, is to refute old theories (MacIver, M.I.: *Is Sociology a Natural Science*? contained in: A Critique of Empiricism in Sociology, London 1967:21).

The influence of neo-Kantian value-philosophy did not cancel the polarity between *is* and *ought-to-be*, but merely introduced their value-idea in the latter sphere. Subsequently we encounter the opposition of facts and values in the differentiation between (scientific) *description* and (non-scientific) *evaluation*. However, in its *subjection* to the modal logical norms of identity and contradiction, every analytical act (as an act of identification and distinction) ought to *conform* to these (and other logical) norms. Hence it should be seen as just another form of *evaluation*, viz. *analytical* evaluation.

It is a generally accepted view that subjectivity should be seen as something *disturbing* scientific endeavors – hence it must be replaced with the ideal of *objectivity*. However, to see subjectivity as a *disturbing* factor in scientific activities presupposes the existence of some or other *normative standard*. If the input of subjectivity in the course of scientific research and reflection is evaluated as something *arbitrary*, this very evaluation already applies a normative standard by judging subjectivity (in its arbitrariness) as not conforming to the norm.

The opposite of *arbitrary subjectivity*, however, is not *objectivity* but *norm-conforming* subjectivity! Arbitrariness is an *anti-normative* figure, presupposing the existence of a norm and leaving open the option of norm-conforming subjective actions.

(b) *Absolutizing the law-side or the subject-side of creation*

In our discussion of the nature of *nominalism* we have remarked that it is both *rationalistic* and *irrationalistic*. *Rationalism* absolutizes the universality of God law *or* the universal orderliness of creaturely subjects, whereas *irrationalism* absolutizes factual reality in its uniqueness and individuality. *Rationalistic* and *irrationalistic* trends are discernable in *all* the disciplines. We mention some examples.

25 In Aristotle's discussion of Zeno's antinomies – i.e. that of Achilles and the tortoise – the distinction between these two types of infinity is indicated as the *potential infinite* and the *actual infinite*. Historically other terms have also been used, such as *incompleted* and *completed infinity*.

26 The 'definition' of the line as a set of points is thus known in mathematical literature as an *arithmeticistic* approach.

MATHEMATICS: (1) Intuitionistic mathematics does not only reject the possibility of formalization but eventually introduced the notion of *lawless sequences* as a key notion in its analysis of the 'continuum' (expanding the initial idea of an **ips**: infinitely proceeding sequences – restricted to the successive infinite).[27]

PHYSICS: (2) *Determinism* in physics absolutizes the determining law at the cost of its correlate: the factual subjectivity of physical entities. *Indeterminism* attempts the opposite. The former is usually identified with the use of the concept of *causality*, while the latter wants to discard this concept from the conceptual framework of physics. However, as soon as the strict correlation *and* irreducibility of *law* and *subject* is acknowledged, no need exists any longer to opt for anyone of these two extremes – and at the same time we may continue to employ the concept of *causality* in the following specified sense: nothing happens *without* a cause (as correctly affirmed by determinism and incorrectly denied by indeterminism), but what the effects may be need not be *fixed in advance* (as correctly stressed by indeterminism on the basis of Heisenberg's principle of uncertainty and incorrectly denied by determinism).

BIOLOGY: (3) In the *neo-vitalist* biology of Hans Driesch the notion of 'GanzheitskausalitÄt' evinces an attempt to extend the deterministic concept of law to encompass biotical entities (considered as equipotential, harmonic systems – Driesch, H.: *Philosophie des Organischen*, Leipzig 1920:416 ff., 542 ff.). As a representative of *emergence evolutionism* (alongside thinkers such as Lloyd-Morgan, Samuel Alexander, Alfred Whitehead, Bernhard Bavinck, M. Polanyi, and W. Zimmermann), Richard Woltereck openly acknowledges the antinomy between the continuity in descent and the discontinuity in existence (*Ontologie des Lebendigen*, Stuttgart 1940:300). Continuing the irrationalistic romantic understanding, Woltereck considers *law* to be the product of a creatively free and developing 'world-subject' (1940:9, 122).

POSTMODERNITY: (4) What nowadays is often considered to be a defining feature of 'postmodernity,' namely the emphasis on the contingency and uniqueness of historically changing circumstances and 'vocabularies' (Rorty), actually dates back to a crucial transitional phase in the development of the science of history about 200 years ago.

Whereas, roughly speaking, one can say that the 18th century is the period of extreme (conceptual) *rationalism*, the transition to the 19th century can be designated as an acute awareness of the *historical dimension* of reality. By the end of the 18th century this, first of all, was due to the pioneering work done by Herder. Korff calls Herder the *German Rousseau* and Cassirer praises Herder as the Copernicus of the (science of) history (Cassirer, *Das Erkenntnisproblem in der Philosophie und Wissenschaft der neueren Zeit – Von Hegels Tod bis zur Gegenwart (1832-1932)*, Stuttgart 1957:226). Proß sees in Herder the key figure who, in rejecting the 'AufklÄrung' (*Enlightenment*), prepared the rise of *romantic historicism*.

Although early romanticism transposes the *universal* to the *unique*, it did not distance itself from the inherent *atomism* (indvidualism) of the 18th century. The step to *holistic irrationalism* was eventually given by Schelling, Fichte and Hegel. We should observe that although Herder believes that society is subject to thorough *historical change*, he does not want to advocate an *anchorless relativism*. To curb this unwanted consequence, Herder upholds the *ideal of humanity* which guarantees, as universally binding rule, the *unity* and the *meaning* of history (cf. Cassirer, 1957:228).

Niebuhr, the tutor of Leopold von Ranke, demonstrates the transition from the 18th to the 19th century in a remarkable way. From the *romantic movement* – including Goethe and Schiller (Germany), Bilderdijk and Da Costa (The Netherlands), and Shelley and Keats (Britain) – he received his appreciation of *mythical thought*. Without relinquishing the imaginative exuberance present in myths and sagas, Niebuhr wants to treasure the *historical way of thought* in its own right.

With an obvious hint to Plato's classical allegory of people living in a cage (*The Republic*), Niebuhr compares the historian with a person who's eyes adapted so effectively to the dark that he can observe things that would be invisible to the newcomer. Where Plato appraises these 'shadow-images' *negatively*, Niebuhr assesses them *positively* – for on occasion he characterizes the work of the historian as "work done under the earth."

In opposition to Plato, who acknowledges only knowledge directed at the true (static) *being* of things as worthwhile, Niebuhr is convinced that only *historical change* provides knowledge. This kind of knowledge is the most appropriate type of knowledge for humanity comprising the vital self-developing of human beings.

Over against the deification of universal (conceptual) knowledge during the 18th century, we are here brought into contact with the importance of *historical change*. However, this *irrationalist* and *historicist* reaction against Enlightenment *rationalism* contains hidden problems that would become explicit only during and at the end of the 19th century. It is noteworthy that this process was anticipated by the first critical reactions to Kant's *Critique of Pure Reason*. It was in particular Jacobi, Hammann and Herder who pointed out that Kant neglected the nature of *language*.[28] Herder even calls 'man' a 'creation of language.'[29] Also Fichte emphasizes that language mediates the spirituality of reason and consciousness (Reiß, *Politisches Denken in der deutschen Romantik*, Francke Verlag, Bern 1966:24).

During the 19th century Dilthey embodied the flourishing of historicism and at the same time set into motion a reflection conducive of the so-called 'linguistic turn.' He reacts intensely to the positivistic mode of thought with its emphasis on *explanation*. He wants to find a new criterion to distinguish between the natural sciences and the humanities. This follows from the fact that the mental world is stamped by the presence of values and aims requiring a new method to capture this teleological domain. In contrast with Kant's critique of pure reason Dilthey develops a critique of *historical reason*. This critique entails the human capacity to understand itself as well as society and its history, constituted by humankind.[30] Karl Mannheim, one of the prominent sociologists of the first half of the 20th century and the founder of the sociological subdiscipline known as *sociology of knowledge*, had a solid understanding of the romantic roots of Dilthey's irrationalistic historicism:

> Dilthey is borne by, and may be the most important exponent of, that irrationalistic undercurrent which first became self-aware in Romanticism, and which, in the neo-Romanticism of the present, is on the way, in altered form, to effecting its attack on bourgeois rationalism (Mannheim, *Structures of Thinking*, edited by David Kettler, Volker Meja and Nico Stehr and translated by Jeremy J. Shapiro and Shierry Weber Nicholson, London: Routledge & Kegan Paul 1982:162 – this manuscript was last reviewed by Mannheim in 1946 or 1947).

27 Cf. Brouwer, L.E.J.: *Historical background, principles and methods of intuitionism*, in: South African Journal of Science, 49, 1952-1953:139-146; and Troelstra, A.S.: *Informal Theory of Choice Sequences*, Studia Logica, Vol.25, 1969. – Principles of Intuitionism, Berlin 1969.

28 That Kant indeed distorted the meaning of history emerged also more clearly during the 19th century – beyond the rise of historicism as such. The discovery of non-Euclidean geometries (by Gauss and Lobatsjevski) relativized Kant's *table of categories* by making it clear to what extent his analysis of *understanding* was *historically* dependent upon Newton's *Principia* (1686).

29 "Der Mensch ist ein freidenkendes, thätiges Wesen, dessen Kräfte in Progression fortwürken; darum sei er ein Geschöpf der Sprache!" (*Johann Gottfried Herder, Abhandlung Über den Ursprung der Sprache, Text, Materialen, Kommentar*, Editor Wolfgang Proß, Carl Hanser Verlag, 1978:73).

30 Already during the 18th century Vico had claimed that humankind knows *history* better than *nature* since it was *made* by humankind.

ETHICS: (5) Over against various (rationalistic) forms of *casuistry* – that wants to posit positively *valid* norms for all times and places – variants of an irrationalistic ethics always emphasized the uniqueness of the (historically changing) situations in which we have to take decisions. Karl Barth (*Kirchliche Dogmatik*, III:4, par.52) claims that God's law does not meet us in the form rules, principles and general moral truths, but in the form of "purely historical, unique and once-only (einmaligen) concrete commands, prohibitions and directives." In his well-known 'Das Gebot und die Ordnungen' (1932) Emil Brunner accuses most of protestant ethics as being 'kasuistisch' because it is 'gesetzlich'! One of the most radical examples of an irrationalistic position is given in the work of Fletcher (1966) on situational ethics.

The possibilities given in any universal and constant starting-point (i.e., in any pre-positive creational principle) provide the *basis* for specific acts of *form-giving* (positivization) in diverging unique historical situations. The rationalistic trait of natural law conceptions and casuistic notions of ethics cannot account for this freedom to positivize that is contained in a (creational) principle. The irrationalistic nature of historicism, on the other hand, cannot do justice to the *universality* and *constancy* of such a starting-point which actually forms the basis of ever-changing positivizations. This one-sidedness of both natural law and historicism (casuistry and situational ethics) is a direct consequence of the *autonomy*-theme in modern philosophy. The autonomy-ideal hypostatized the *freedom to positivize* – thus trying to eliminate the very nature of a principle as a universal and constant starting-point for human action. When *positivizations* are elevated to the level of being universally *valid*, we encounter *rationalistic casuistry*. And when the *freedom to positivize* is one-sidedly accentuated, we encounter an *irrationalistic situational ethics*.

The way in which the majority of contemporary social scientists use terms like *values, norms, beliefs* (cf. Sorokin, Parsons, Znaniecki, and others), sometimes called the *cultural system*, does not allow for principles as universal and constant starting-points that ultimately condition human action in a *task-setting* way, since they identify these terms with the *result* of free and formative human actions – typical of *historicism*.

The long-lasting influence of nominalism in our modern Western culture has ultimately succeeded in ruling out the biblical view on the creational order for the existence of creaturely subjects. The relativistic and self-contradictory nature of historicism is simply a symptom of the contemporary world- and life-view. Any confrontation with historicism that does not penetrate into this pre-scientific root has not succeeded in unveiling its deepest motivation and impasse.

What, in the final analysis, is therefore ultimately decisive, is the basic (pre-theoretic) commitment to the modern historicistic world- and life-view with its autonomy-ideal[31] and nominalistic theoretical articulations on the one hand, or, on the other hand, the commitment to a different world- and life-view, namely that of biblical Christianity, which does allow for the acceptance of universal and constant principles that (as creational order for) *condition* human subjectivity in a truly *normative* way and at the same time leave human beings with the *accountable authentic freedom* to positivize responsibly in changing historical situations.

The order of creation indeed shows us the *good direction* towards obedience to the will of God. However, due to the radical nature of the fall into sin, this God-obedient direction was redirected in service of some or other idol borne from the apostate human heart. The creational order still exercises its normative appeal to obey the will of God, but in order to accomplish this we must be *freed* from the effects of sin by the redemptive work of Christ. Only in Him and through the work of the Holy Spirit are we, in principle, freed from the apostate inclination of our hearts and redirected towards obedient service to God within the world-wide, all-encompassing Kingdom of God in Christ. Obedience to God-given creational possibilities is a *positive task*, not something *structurally negative* which we have to transcend.

The distinction between modal and typical laws

The unrestricted scope of *modal laws* justify the choice of referring to them with the expression *modal universality*.[32] All entities function in all aspects of reality, explaining why *modal laws* hold irrespective of the peculiar nature of different entities. The law determining the nature of entities is always *limited* to a specific class (group) of entities. The law for an atom is only applicable to atoms; the structural principle for marriage is only applicable to marriages and not to states or business enterprises. Therefore, the term *typical* refers to a specific *group* of entities whereas *modal laws* encompass all possible entities whatsoever. *Typical laws* (type-laws) only hold for a *limited class of entities*.

The relative justification of the so-called *scientific method* is closely linked with the nature of *type-laws* since the latter cannot be discovered in a *a priori* manner. They have to be discerned through experience and experimentation where possible. Though positivism and neo-positivism explored this domain, they attempted to do it at the cost of modal universality. However, the effect of this one-sidedness also revealed the Achilles' heel of positivism: the inevitable use of 'property terms' (i.e., terms residing in different modal aspects of creation). A brief historical digression may elucidate this impasse.

Property terms as the Achilles' heel of positivism

Our Western speculation about the structure of reality more or less started when the Pythagoreans became convinced to adhere to one statement above all else: *everything is number*. After the discovery of irrational numbers – revealing within the seemingly form-giving and delimiting function of number the *formless* – Greek mathematics as a whole was transformed into a spatial mode (the *geometrization* after the initial *arithmatization*). As a consequence *material entities* were no longer described purely in *arithmetical terms*. *Space* now provided the necessary terms used to characterize material entities. This spatial angle of approach remained in force up till the rise of modern philosophy, since philosophers like Descartes (1596-1650) and Kant (1724-1804) still saw the 'essence' of material things in (spatial) *extension*.

It was due to Galileo and Newton that the main tendency of classical physics eventually underwent a shift in modal perspective because since then it attempted to describe all physical phenomena exclusively in terms of (kinematical) *motion*.[33] Writing about the foundations of physics, David Hilbert[34] 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. 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" (*A brief History of Time*, London 1988:10). Since the introduction of the atom theory of Niels Bohr in 1913, and, as we have remarked, actually since the discovery of radio-activity in 1896 and the discovery of the energy quantum *h* by Planck in 1900, modern physics realized that matter is indeed characterized by *physical energy operation* –

31 Just recall the definition which Rousseau gives for freedom: "obedience to a law which we prescribe to ourselves is liberty" (Du Contrat Social, *Du contrat social et autres oeuvres politiques*. Editions Garnier Frères, Paris, 1975:247).

32 H. Alt completed his Phd Dissertation on this theme. Cf. Alt *Modale universaliteit*, unpublished PhD, Dept. of Philosophy, University of the Orange Free State, Bloemfontein 1995.

33 The British philosopher, Thomas Hobbes (1588-1679), was familiar with the mechanics of Galileo enabling him – as opposed to Descartes – to employ the basic concept *moving body* as descriptive tool.

34 Perhaps the greatest mathematician of this century.

i.e., that the physical aspect of reality must indeed be seen as the *qualifying function* of matter.

This brief sketch of the genesis and growth of the concept of **matter** illustrates the way in which different (modal) *property-terms* served to characterize matter – starting with the perspective of *number* and then proceeding to the aspect of *space*, the *kinematical* aspect and eventually the *physical* aspect of reality. What is important to realize is that the description of matter is decisively dependent upon a particular *theoretical view of reality* (Kuhn would have used the expressions *paradigm* or *disciplinary matrix*) which is entailed in the preference which is assigned to specific *property-terms*. Is it possible to account for **this** foundational choice in an ***empirical*** way? Is it possible to *perceive* the numerical aspect? Can we *weigh* the spatial aspect? Can we determine the *volume* of the kinematical aspect? Can we measure the 'distance' between the physical aspect and the numerical aspect? What is the 'taste,' 'color' or 'sound' of any one of these aspects?

The obvious absurdity of these questions not only illustrates the untenability of the positivistic *faith* in 'facts,' but at once point at a crucial distinction operative throughout the history of the special sciences, namely the distinction between *aspects* and *entities*. As should be known by now, the reformational Christian philosophy of Dooyeweerd pointed out that these aspects enable our scholarly reflection to discern a *universal coherence* between different *kinds of entities* – just recall the universal scope of the fundamental laws of thermodynamics (which hold for *all possible physical entities*). In general an *implicit choice* on this level of scientific convictions causes a divergence between special scientists. The question concerning the relationship and coherence between the different aspects of reality (in terms of which we can describe anything) simply cannot be settled with the aid of the positivistic method of (empirical) observation and verification/confirmation – it reflects what could be called a philosophical 'modal skeleton' *inevitably* operative in the special sciences (whether critically accounted for or not).

Summarizing concluding remark

Instead of providing more examples illustrating the foundational role of philosophy for the various disciplines[35] – and thereby underscoring the importance of Christian philosophical reflection in service of a biblically informed teaching within different special sciences – we conclude our overview with a brief concluding remark, reflecting some of the key issues we wanted to communicate.

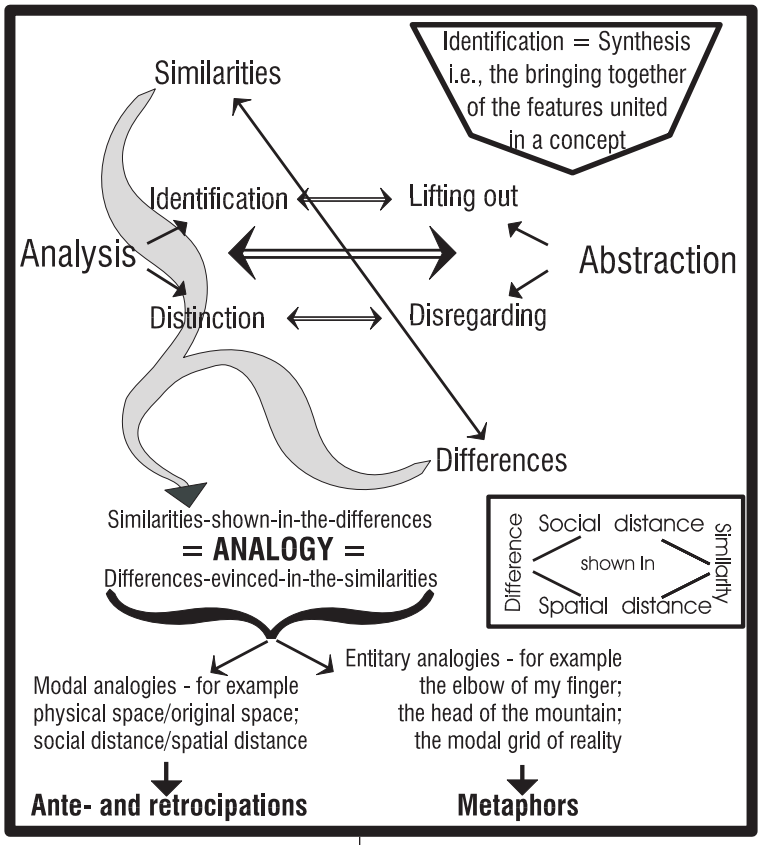
> Don't start with the problem of *faith* and *reason* (*religion* and *science*/*beliefs* and *academic activities*) since it evinces a dualistic starting point, ultimately rooted in the dialectical ground motive of nature and grace.

Distinguishing between the human capacity to function within the logical-analytical aspect and within the certitudinal aspect merely relates to *two branches* of human life. Rather proceed from the life-encompassing *heart-commitment* of being a member of the body of Christ, which lies at the root of the church as an institution and equally at the root of all other walks of life. This starting point would help us in distinguishing between the supra-theoretical *a priori* and the theroretical-philosophical *a priori* of academic endeavors. This is simply synonymous with the distinction between a 'directional' orientation informing a 'structural' response theoretically articulated in a philosophical total-view of created reality.[36]

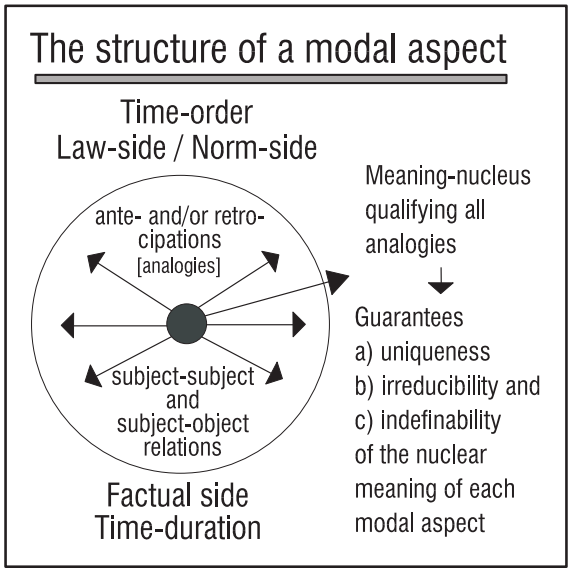
35 Such as a further discussion of normativity and human freedom or an analysis of diverging views of human society.

36 Or, phrased in more philosophical parlance: between *ground-motive* and transcendental *ground-idea*.

Sketch 1



Sketch 2



Quotations concerning presuppositions in scholarly endevors

Daniël F.M. Strauss

(The Quest for Christian Scholarship)

Concerning the self-insufficiency of theoretical thought

1) Karl Popper advanced the penetrating critical insight that *faith* in the rationality of reason is not itself *rational* – he speaks about 'an irrational faith in reason' (Popper, *The Open Society and its Enemies*, Vol.I & II, London 1966-II:231).
2) "A self-assurance of human thought is excluded, wherever one may consider it. One can never reach a positive result without pre-suppositions. One has to believe in something in order to justify something else" (Stegmüller, W.: *Metaphysik, Skepsis, Wissenschaft*, 2nd edition, New York 1969:314).

Concerning the opposition of 'reason' and 'faith':

1) Stegmüller reacts sharply to this: "A person does not have to set aside knowledge in order to make room for faith. Much rather one already has to believe something if he wants to speak of knowing and science at all" ["Man muss nicht das Wissen beseitigen, um den Glauben Platz zu machen. Vielmehr muss mann bereits etwas glauben, um überhaupt von Wissen und Wissenschaft reden zu können" (1969:33 – *Neue Einleitung*).]
2) He furthermore asserts that an ultimate certainty is required, for without it would be impossible even to start. ["Irgendein absolutes Wissen muß es geben; ohne dieses könnten wir überhaupt nicht beginnen"; "Absolute Evidenz müssen wir schon 'haben', d.h. wir müssen an sie bereits glauben, ..." (1969:194). "Some form of an absolute knowledge must exist; without it we would not have been able to begin"; "We must already 'possess' absolute evidence, that is we must already believe in it".]
3) Finally: "... in science one believes, in religion one knows (or: one claims to know)" (Stegmüller, *Metaphysik, Skepsis, Wissenschaft*, 1969:212)! ("... in der Wissenschaft wird geglaubt, in der Religion weiss man (oder: behauptet man, zu wissen)").

Concerning the necessity of a theoretical (philosophical) paradigm

1) Morris Kline wrote a book dealing with the way in which the classical ideal of mathematics as an *exact* science with *certainty* as its *guiding star* was undermined. He remarks: "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 metamathematics 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, M.: *Mathematics*, *The Loss of Certainty*, New York 1980:275-276)
2) Carl Friedrich von Weizsäcker, commenting on the presuppositions of modern natural scientific thought, says that "it is an empirical fact that virtually all leading physicists of our time philosophize" (Von Weiszäcker, C.F.: *Voraussetzungen des naturwissenschaftlichen Denkens*, Herderbücherei, Band 415, 1972:42).
3) Concerning phylogenetic trees in paleontology Schwartz remarks: "Sophisticated technology does not provide more accurate phylogenies than conventional means. Phylogenetic interpretation is ultimately a reflection of the theoretical predisposition of the investigator" (*Toward a synthetic analysis of Hominid Phylogeny*, in Tobias, P.V. (editor) (1985): *Hominid Evolution*, New York 1985:268).
4) The anthropologist, A. Gehlen, also points out that a total view on human beings functions as the guiding philosophical view-point in his research – and this total-view cannot be deduced from the view-point of any special science (Gehlen, A.: *Der Mensch, Seine Natur und seine Stellung in der Welt*, 9th impression, Frankfurt am Main 1971:13). In one of his earlier works, P. Overhage displays a similar sensitivity: "To reduce the whole question about the human origins simply to the biotical-bodily (morphological-anatomical) facet, witnesses an astonishingly one-sided approach and imply a radical simplification of the total abysmal nature of the problem" (Overhage, P.: *Das Problem der Abstammung des Menschen*, in: Das Stammesgeschichtliche Werden der Organismen und des Menschen, Vol.I, Vienna 1959:5).
5) Sorokin, for example, strikingly reacts to the transgressions of the humanistic science-ideal as they manifested themselves in the cast of mechanistic, materialistic and behavioralistic forms: "Hence the general tendency of the sensate mentality to regard the world – even man, his culture, and consciousness itself – materialistically, mechanistically, behavioristically. Man becomes, in sensate scientific definitions, a 'complex of electrons and protons', an animal organism, a reflex mechanism, a variety of stimulus-response relationships, or a psychoanalytical 'bag' filled with physiological libido. 'Consciousness' is declared to be an inaccurate and subjective term for physiological reflexes and

overt actions of a certain kind" (Sorokin, P.: *The Crisis of our Age*, 10th edition, New York 1946:93-94).

6) Approximating the idea of abstracting an aspect (i.e., *modal abstraction*) Berger writes: "The sociologist finds his subject matter present in all human activities, but not all aspects of those activities constitute this subject matter. Social interaction is not some specialized sector of what men do with each other. It is rather a certain aspect of all these doings. Another way of putting this is by saying that the sociologist carries a special sort of abstraction" (Berger, *The social construction of reality*, *A treatise in the sociology of knowledge*, Anchor Books, New York 1982:39-40).

7) "The problem is that most of these contemporary debates ignore the most general nonempirical level of all. I will call this the level of presuppositions. ... By presuppositions, I refer to the most general assumptions that every sociologist makes – what he 'presupposes' – when he encounters reality" (Alexander, J.: *Sociological Theory since World War II*, *Twenty Lectures*, Columbia University Press, New York 1987:10).