

**UNDERSTANDING OUR AGE****PHILOSOPHY AT A TURNING POINT OF THE "TURNS"?**

**-The endless search for the elusive universal.**

1994 Understanding our age. Philosophy at the turning point of the "turns". - The endless search for the elusive universal. **Tydskrif vir Christelike Wetenskap**, jrg. 30, 2de kwartaal, 16 - 31. 1994

**by M. Elaine Botha**  
**Department of Philosophy**  
**PU for CHE**  
**Potchefstroom**

When one takes a closer look at the developments in philosophy of science since the turn of the century one observes that the notion and metaphor of a "turn" in either philosophy or science crops up with monotonous regularity in the literature, viz.: The Logicistic turn is followed by the Linguistic, Historical/Historicistic, Sociological, Hermeneutical and Cognitivist turn. The question I found intriguing was whether these "turns" were representative of fundamental philosophical or epistemological revolutions, gestalt switches, "metaphoric revolutions" in the history and philosophy of science or whether they were in fact no more than manifestations and variations of one overall epistemological rootmetaphor or basic metaphor, characteristic of the epistemology of the twentieth century. All these "turns" seem to be bound in their point of departure to an epistemological position which could best still be described as that of modernity, i.e. anchored in the Enlightenment ideal of the subject-object divide and the belief that objective rational knowledge can be acquired, yet

attempting to approach this rational objective knowledge via the medium of the knowing subject. Posed differently: the backdrop to the question is whether the transition from modernism to post-modernism represents a fundamental epistemological gestalt switch or whether post-modernism is basically a continuation of a trend characteristic of modernity. It seems as if most of the "turns" referred to above revolve around a central axis of the centrality of language and the (history of) the language communities responsible for initiating meaning change.

The **Cognitive-historical approach**, on the other hand, although also part of the cognitivist revolution, represents a significant move towards a more holistic approach to the understanding of scientific revolutions and meaning change of scientific concepts.

Strauss' (1993) thesis that nominalism should be seen as the moulding force of our age is in some way applicable to and can give an account of these more recent developments in philosophy of science and yet the question one is confronted with is whether it was not perhaps possible to identify as many figures, ideas and developments in each one of these "turns" arguing the case for some sort of realism, as there were arguments developed from or based on nominalism. What complicates the issue even more is that most positions operate with diverse versions of nominalism and realism and construe the opposing poles in various ways. So it seems whether one formulates the common denominator as "nominalism" or "realism" the central notion at stake in most of these oppositions is the search for some common denominator or ultimate ground of human knowledge....the search for the

elusive "universal" albeit on the ontological, epistemological or linguistic level. If this is what Strauss means with "nominalism" I would have no argument with him. Strauss (1993) says:

"What is needed is a paradigm that could help us in making meaningful distinctions pertaining to the richness of the diversity in creation while, at the same time, it could help in freeing us from the long-lasting and tempting power of reductionistic 'all'-claims".

I would like to add that the effects of nominalism and/or realism ought not only to be counteracted on the level of an ontological paradigm, but also requires the development of a philosophy of language and a theory of meaning and truth which will give an adequate account of the actual processes of knowledge formation.

Central to the contemporary debates in philosophy of science is the issue of realism and more specifically scientific realism. Although most of the idealist, nominalist and instrumentalist approaches choose a common denominator in the language, community or tradition of the subject, the issue at stake in the various debates pertains to the question whether there is an independent or objective reality that can be approximated or articulated in our scientific theories or our statements about the world. Fundamental to this discussion is often the quest for some "universal" and with it the controversy about the existence or non-existence of natural kinds. In a recent discussion between Leplin, Nersessian et al (1988;1991) the central problem is formulated as pertaining to "essentialism". Leplin (1988:493) writes:

"...the assumption that natural kinds have essences and that it is a goal of science to discover essences are being rejected both as misrepresentations of scientific practice and as misconceptions of the scope of scientific knowledge".

Severe criticism about the existence of universals and natural kinds has cast grave doubts about either the existence of such "entities" or the usefulness of such notions in discussions concerning realism-nominalism. The issue at stake seems to be what the nature of the "reality" is which is presupposed in these discussions. My hypothesis with respect to the prevalent revolving "turns" characteristic of philosophy in general and philosophy of science specifically, is that although they are all attempts at giving some account of the stable/changing order in the world and of our human capacity to know and name this order, they fail to escape the prescriptive parameters of the Cartesian "either/or" because they do not recognize sufficiently that objectivity and certitude can not be anchored in either subject or object, but needs to be anchored in the common universal order conditioning the existence, experience, knowledge and naming of both subject and object. At this point I do not disagree with the basic solution which Strauss suggests for nominalism - his diagnosis of the "malaise of modernity" (to borrow an expression from Charles Taylor). Yet, I do think this diagnosis could be served and clarified by the introduction of some of the distinctions concerning the polarity of debates concerning realism as introduced by Delaney (1985). Moreover, the only way to turn the tables on the dead ends most of the above mentioned turns in philosophy of science seem to lead into, is not only the development of an ontology which acknowledges the conditioning order for reality, but also the development of a broader notion of rationality accompanied by a theory of meaning which recognizes the actual contributive factors at work in the formation of concepts which approximate

the universal conditioning order for reality. This would have to entail a more incisive rejection of the pseudo problems posed by the Aristotelian realist ontology of fixed natural kinds (Arbib & Hesse, 1986a:150) and its correlate double language thesis which inevitably leads to nominalist solutions.

Methodologically my approach to understanding our age will be argued as follows:

- \* the argument that nominalism can be regarded as the common denominator for the diversity of developments in culture, philosophy and philosophy of science ought to be modified to also take into account the changing realist emphases present in recent developments in philosophy of science

- \* whether the emphasis is placed on a nominalist or realist solution to the problem of the relationship between human language, knowledge and reality, the common problem at stake is the search for some account of and understanding of the order for reality;

- \* that the recognition of an universal conditioning order for reality would certainly be the most basic ontological solution to the problems posed by ontological nominalism, but what is also required is new understanding of rationality and a holistic theory of meaning which could give account of how such an ontology would contribute to a new understanding of truth, meaning and reference that is able to overcome the Cartesian legacy.

Obviously such a hypothesis is far too pretentious a project to accomplish within the limitations of this contribution. I

therefore restrict myself to a bird's eye view of some of the recent developments in Philosophy of Science and concentrate on the introduction of a new development which I think harbours potential to help overcome the impasse brought about by nominalism and its counterpart realism. I shall also provide some brief contours of a possible solution to the problem of the endless search for the elusive universal. Let us start by having a closer look at realism.

**What is really the problem with realism?**

"Realism" and the "real" deployed as terms in argument, take colour from what they are opposed to. This becomes clear in the three emphases discussed by Delaney in his presidential address to the American Catholic Philosophical Association in 1985 titled "Beyond realism and anti-realism". Delaney (1985:1) concedes that arguments for and against "realism" are so prevalent in the history of philosophy that "...it does not seem inappropriate to look at the history of at least Western philosophy through the parameters of this debate". Delaney (1985:1) argues that there is a structural similarity underlying the several disputes revolving around realism in its many guises. He differentiates the three contrasts to realism found in the history of philosophy:

- \* The classic dispute: Realism versus nominalism
- \* Realism versus idealism
- \* Realism versus anti-realism.

The oppositions of these contrasts warrant a closer look.

**The classic dispute**

The nominalist maintained that the only "things" that existed were individuals or particulars, whereas the realist

acknowledged universals as well as particulars among the furniture of the world. The realist maintained that there was a direct mapping of all our true representations to features of the real world and in spite of differences amongst realists they did agree that there were irreducibly different ontological features of the world corresponding to various kinds of human representation.

### **Realism versus idealism**

The issue here seems to be the question whether the objects of the world exist independently of our knowledge or experience of them, or, whether their existence is in some sense dependent on or constituted by cognitive activity. The realist, whether of the perceptual or conceptual variety, argued the case for the justified belief in the mind independent existence of the objects of the world. Idealists, on the other hand, was clear that our direct awareness was of ideas and representations that were of human making. In order to maintain some semblance of objectivity for the knowledge of the world, it was argued that all rational beings experienced the world in the same manner.

### **Realism versus anti-realism**

In current philosophy the opposing pole to realism is anti-realism and the debate has specifically taken a **linguistic turn**. Delaney (1985) refers to Dummett (1978:146) who formulates the issue as follows:

"... a dispute... which represents it as relating, not to a class of entities or a class of terms, but to a class of **statements** ..."

"Realism", Dummett (1978:146) characterizes as

"...the belief that statements of the disputed class

possess an objective truth value, independently of our means of knowing it; they are true or false in virtue of a reality existing independently of us".

The realist feels he is simply articulating a rather commonplace insight. Reality is such that all our statements are either true or false depending on how it is with the world. Statements are false in all cases where the conditions for its truth do not obtain. Every statement thus may be true or false independently of our knowledge.

The anti-realist argues that the analysis of statements in terms of simple truth conditions will have to give way to an analysis in terms of verification-conditions or assertability conditions.

Delaney (1985:10) says:

"These three debates ... are certainly different in tone. The first revolves around the **metaphysical** issue - what there is; the second around the **epistemological** issue - what can be known; and the third around the central issue in the **philosophy of language** - what can be said".

In each debate the same configuration of questions is being addressed from a different perspective. The basic configuration of questions involve the domains of reality, knowledge and meaning in their interrelation, and all are concerned with the conditions on any theory bearing on these domains in their interrelation. The fundamental question basic to all three debates is :

What is to be regarded as **first philosophy** : metaphysics, epistemology or philosophy of language. Obviously such a question becomes redundant tot the extent that the Rortian "after philosophy" thesis or the "transformation of



philosophy" is valid. Foundational to all three debates is the issue concerning the existence of universals and/or natural kinds and the way scientific language attaches to these characteristics of the world.

The basic problem of identifying the fundamental issue at stake in the realism debates become even more acute when one turns to **scientific realism debates**. According to McMullin (1984) the basic claim made by scientific realism is that the long term success of a scientific theory gives reason to believe that something like the entities and structure postulated by the theory actually exists. The opposite pole in this debate is represented by varieties of **instrumentalism** or **anti-realism** which claim that theoretical entities of science ought to be denied ontological status. **General antirealism** denies ontological status to theoretical entities of science generally, while limited **anti-realism** denies it only to certain classes of theoretical entities, such as those that are said to be unobservable in principle (McMullin,1984:25). Giere (1990:7) says **anti-realism** "... is the view that theories are accepted for some nonrepresentational virtues, such as 'problem-solving effectiveness'(Laudan, 1977), or for very limited representational virtues, such as saving the observable phenomena (van Fraassen, 1980)".

It is exactly the preoccupation with scientific change and the obvious instability of scientific concepts that has brought about renewed interest in the relationship of stability and order on the one hand and changing perceptions and concepts on the other (Cf. Collins,1985; Nersessian, 1984;1989).

Central to this relationship is the solution of the problem of induction and the understanding of **order** defended by a school

or tradition. It will be argued that in each one of the "turns" in philosophy of science, mentioned above, the quest for order and the perennial search for the elusive "universal" takes on a different shape, yet in all cases this quest is superimposed on the subject-object divide of the Cartesian legacy (Bernstein, 1983:115).

**Changing order<sup>1</sup> or changing concepts and stable order ?**

<sup>2</sup>Reflection on the role of language and language formation in science crops up in most philosophical schools of thought that are involved in giving an account of the nature and structure of science. This has been the case in the central role of formalized and axiomatized language in logical positivism, but also in most philosophical trends that have followed Wittgenstein in some or other way. Central to most of these projects is the concern for a satisfactory account of how changing languages and displaced concepts can give account of the order perceived in and experienced by all in the same common reality. It is the phenomenon of scientific change amidst the uniformities so characteristic of the world, which continue to intrigue philosophers, philosophers of science and of language. Let us briefly look at some of the typical answers found in the historical "turns" alluded to above.

**The Logicistic turn** includes the strong emphases on the use of logical methods in the process of justification of theories and the characterization of rationality and truth.

Representatives would be Russell, Whitehead and Logical Positivism in general. Although the emphasis is on language it is specifically formalized and axiomatic languages which bear the stamp of (symbolic) logic which are at stake here. In **the Linguistic turn** both ideal formalized (axiomatic) languages

and natural or ordinary language have as common ground the notion that "...we can't penetrate through language to non-linguistic data which will guide our choice of languages" (Rorty, 1962:311). This refrain surfaces too in later attempts at modifying the hypothetico-deductive approach to scientific theorizing by introducing the notion of theorizing as "metaphorical redescription of the domain of the explanandum.." (Hesse, 1972:249). What is common to **The Linguistic turn**<sup>3</sup> (or 'language as metaphor for reality and knowledge) can be summarized in Wittgenstein's dictum: the limits of my language means the limits of my world. One can agree with Thompson (1983:24) that in general ordinary language philosophy can be associated with the view that the structure of reality is a projection of the grammar of language, so that the investigation into how words are used is simultaneously an enquiry into ontology. One does not have to look very far to find a statement by Rorty (1989:6) that most of the influential thinkers of our age (those cited by him in his book) have made the linguistic turn and are now facing the question where this turn leads to. Contrary to the answer mainstream philosophical analysis will give to this question (the semantics of ideal or natural languages), Rorty (1989) and his co-authors in **After Philosophy** look at the **pragmatics** of natural languages, i.e. the study of language in use. Rorty says:

".. whatever other differences, there is a widespread (though not universal) agreement among various parties to the debate that the linguistic turn must be more broadly conceived".

(Read quote on 1989:6)

I do not find it difficult to envisage that most of the

representatives of the linguistic turn could be grouped under the heading of **nominalism** , but even Rorty (1989:7,8) has to concede that although most authors that he too includes in the linguistic turn are opponents of the "Platonic conception of truth" and in their belief that "truth is of this world", there is strong disagreement as to whether this immanence is the whole story. Moreover Rorty argues that the representatives of the linguistic turn are in no way bound only to nominalist options, but can choose diverse avenues towards or away from realism.

During the course of the sixties this preoccupation with language has a concomitant "turn" to the history of consecutive language games, forms of life and/or scientific paradigms, the so called **Historicistic turn** (cf. Kisiel, 1974; Shapere, 1966) represented by Hanson, Toulmin, Polanyi, Kuhn, Feyerabend et al. Perhaps the well known discussion between Kuhn and Boyd (1980) about the "joints of nature" exemplifies the way in which especially Kuhn resolved the basic problem concerning the underlying stability and order which makes science possible. Kuhn is not willing to concede the ontological claim entailed by Boyd's position that scientific theories approximate one real world by the accommodation of language to the existing natural kinds in the world (Boyd, 1980:407). On the contrary. Kuhn (1980:418,9) says:

"The view towards which I grope would also be Kantian but without "things in themselves" and with categories of the mind which could change with time as the accommodation of language and experience proceeded. A view of that sort need not,... make the world less real".

The historicist emphasis leads to a recognition of and sociological emphasis on the role of the scientific community as initiator and sanctor of the legitimacy of scientific knowledge and language - **The Sociological turn** <sup>4</sup> (Brown, 1984:3-40) with its variations of inter alia conventionalism

and constructivism . The Historical and Sociological "turns" could be subsumed under the well known typology of Suppes (1974:125-27) "Weltanschauungsanalysen".

The claims of the new cognitive sociologists of knowledge are far stronger than those positions who argue for a division of work between the historian of ideas and the sociologist of knowledge. Laudan could be seen as a representative of such a division of labour position when he defends the so called "arationality principle"

"Essentially, the arationality assumption establishes a division of labour between the historian of ideas and the sociologist of knowledge; saying, in effect, that the historian of ideas, using the machinery available to him, can explain the history of thought insofar as it is rationally well-founded and that the sociologist of knowledge steps in at precisely those points where a rational analysis of the acceptance (or rejection) of an idea fails to square with the actual situation".

(Laudan, 1977).

The Strong Programme of Sociology of Knowledge of the Edinburgh School, on the other hand argues that sociology does not only always step in when there is a deviance from the norm of rationality, but that social causes are always present and are determining factors in the production of knowledge. The sociologists refuse to presuppose that scientific beliefs, if compared to beliefs within other human communities or 'tribes', have any special relation to reason, truth or reality. This position which argues that 'epistemic factors are actually social factors', exemplified by Bloor, is qualified as "extreme externalism" by Niiniluoto (1991:139). Harry Collins (1985) constructivism or so called **Empirical Programme of Relativism** could be regarded as an extreme example of this position. Collins claims:

"It is not the regularity of the world that imposes itself on our senses but the regularity of our institutionalized beliefs that imposes itself on the world "

"The locus of order is society".

(Collins, 1985:148)

He argues the natural world has small or nonexistent role in the construction of scientific knowledge, but concludes that because of the fact that there are groups, societies and cultures, therefore there must be large scale uniformities of perception and meaning (1985:5). He wants to develop his EPR as a sociological solution to the problem of induction (1985:6). Collins' position is a Wittgensteinian one in which he anchors rules in language games and language games in social forms of life and ultimately concludes that habitual perceptions are wholly a matter of convention. Collins' thesis is that scientific consensus is in principle indistinguishable from any other sort of persuasion of people to believe in a political, ideological or religious system, or even to believe for purposes of their own class or personal or professional advancement.

Now it is interesting that Mary Hesse (1986 a & b) who certainly does not have too much sympathy with the realist position (she often calls herself a 'moderate realist', when accused of being 'anti-realist', counteracts this position of Collins with an appeal to the regularities of the psycho-social natural world. She says:

"There is a perfectly good explanation of why science exhibits order, namely that it reflects something of the order of the natural world".

(Hesse, 1986b).

In her exposition of the family resemblances and the way in

which the recognition and learning of these resemblances takes place she appeals to notions such as "the same experience...", "shared assumptions", "the same physiology", "the same cultural expectations", "irreducible perceptions" that are a function of "our physiology and its commerce with the world". Elsewhere (1988:113) she talks about the "...objective order in the psycho-social-natural world in which we all live (which) is more various and multifaceted than our culture recognizes -*more* various, but not *infinitely* various so that any old classification will do for any given social purposes". In spite of her recognition of these "objective realities" to which language is related she opts for a "moderate" realist position. Her motivation is clearly the fact that our knowledge of these objective realities is limited, seldom definitive and always open to correction. By and large this is an assumption usually shared by anti-realist thinkers, yet it would be possible to subscribe to this same fact and still be sympathetic to a realist position. McMullin (1984: 35) e.g., maintains such a position. She settles for a weaker form of realism (some would argue, for **anti-realism**) when she says that meanings of predicates in scientific language grow in dynamic interaction with culture and experience; terms do not correspond to universals, Hesse claims.

In her discussion concerning the changes in the boundaries between the literal and the metaphorical through the process of interaction, she argues for the recognition of the **context** and its role in the determination of what is literal and metaphorical. She contends that the threat posed by various forms of relativism following the work of Kuhn and Feyerabend, has led to the undermining of the belief in the reality of

laws of nature and their corresponding universals. She says: "Radical revolutions of theoretical language call into question the possibility of reaching or even converging upon the ideal theory-language with its "correct" classification of universals and hence laws, and if there is no convergence, may this not be because there are no ideal natural types?" (1984b: 6). Elsewhere she does acknowledge the fact that the social habits acquired by scientists do reflect the order in the world. She (1988) argues for a socialized epistemology with a reconciliation of various philosophical positions within four "irenic points", but is not willing to agree with Collins that all inductive regularities are purely conventional.

**The cognitive turn**<sup>5</sup> on the other hand seeks to understand scientific knowledge by concentrating on the cognitive processes by which scientific knowledge is formed. It is closely related to the developments in Psychology where Cognitive Science has had its greatest impact. Cognitive science is the study of intelligence and intelligent systems, with particular reference to intelligent behaviour as computation" (Simon & Kaplan, 1989:1). The principal contributing disciplines to this development has been psychology, artificial intelligence, linguistics, philosophy and neuroscience. Within the parameters of this "turn" there is a very intriguing development which has combined the resources of the history of science and insights into the nature of cognition to propose a **Cognitive Historical** (Nersessian, 1984; 1987) approach to the understanding of the formation of scientific theories, concepts and meaning of scientific terms.



The cognitive turn approaches the understanding of science through some inspiration from cognitive sociology and cognitive science. The pivotal term in this new debate is **cognitivism** and the question central to this debate is: "Is there something special about the cognitive processes of scientists, that is, in large part, responsible for the special sort of knowledge that science produces? (Fuller, et al. 1989:xi). The cognitive sciences provide an account of the causal mechanisms operative within individual scientists engaged in the activity of doing science (Giere, 1990:7). These approaches are characterized by the fact that they assume that understanding or simulation of brain functions either through artificial intelligence or the use of computational models provides the key to the understanding of human knowledge formation and to some extent even the nature and structure of the world. With respect to the issue at hand, i.e. **nominalism versus realism**, Giere (1990:8) argues that cognitive science would have to be grouped under the rubric of **naturalistic realism**. (Here he also includes figures like Boyd, 1981 and Churchland). **Naturalism** (Giere, 1990:7) says, "....is the claim that theories come to be accepted (or not) through a natural process involving both individual judgment and social interaction. No appeal to rational principles of theory choice is involved". There already exists a wide range of publications in this area (cf. Giere, 1990). One development in this field is of significance because it proposes an integrated and holistic theory of meaning which it claims will make it possible to develop a more adequate understanding of the nature of science.

The development in the past twenty years of the interdisciplinary field of Cognitive Science has opened up the possibility of concentrating on those aspects of scientific development pertaining to cognition in general and more specifically to the processes of concept formation and changes in the course of the history of a discipline. Whether Cognitive Science will indeed prove to be the discipline equipped to deal with analyses of wider scope of the nature of scientific knowledge, which will take into account the role of religious factors in scientific theorizing, time will have to show.

Cognitive Science employs experimental techniques and computer modelling in investigations of how knowledge is produced and represented in the mind (Nersessian,1991a). The central assumption of the strong reductionist version of Cognitive Science is that the same information processes can be implemented in computer hardware and in biological "wetware", i.e. the brain. The weaker version of Cognitive Science holds that it is possible to simulate hypotheses about human reasoning via computer modelling in much the same way that astrophysics use computer simulations to investigate cosmological models. In both instances, computer modelling based on empiricist investigations carried out in cognitive psychology and, for connectionists, in neuroscience, becomes a tool through which to explore and experiment with theories of human reasoning. Cognitive neuroscience, cognitive psychology and artificial intelligence constitute the core disciplines and the three levels of analysis in cognitive science. Nersessian (1991a) acknowledges that much of what is researched in this new area is of no direct import to

cognitive-historical analysis, inter alia because a fully adequate theory of human cognition must supply an account of what it means to be a human thinker acting in the world. This includes an understanding of the effects of social influences and interaction on both individual and collective cognitions. Nersessian (1991a:95) says that the areas within cognitive psychology holding the most promise for productive cognitive-historical analysis are those which focus on cognitive development and conceptual change and those which focus on problem solving and reasoning, specifically areas of analogical problem solving, expert/novice reasoning, qualitative reasoning, and mental modelling.

To some extent Nancy Nersessian can not be regarded as being representative of main stream cognitive science, but her hands on approach to the history of science and her very convincing application of the cognitive historical approach to historical case studies, proves that this approach provides empirical backing for its claim that scientific concept formation should not only be understood in linguistic or logical terms alone. This approach is already implicit in Kuhn (1962; 1974) and Arbib and Hesse (1986a) also develop a cognitive approach to the understanding of **The construction of reality**. Let me trace the development of the argument of Nersessian (1984a &b).

### **A Cognitive-historical approach to scientific meaning change**

The creation and articulation of concepts to comprehend, structure and communicate about physical phenomena constitutes much of the scientific enterprise. Concepts play a central role in the construction and testing of the laws and principles of a theory. The introduction of new concepts

and/or alteration of existing concepts is a crucial step in most changes of theory. In many scientific controversies, what is at stake is the disagreement over the interpretation of fundamental concepts, i.e. the problem of **meaning and meaning change** in scientific concepts. Both Putnam (1975. "The meaning of 'meaning'" in **Mind, Language and Reality**. Cambridge: Cambridge University Press) and Nersessian (1987:164) point to the fact that accounts of meaning and meaning-change in scientific theories have left out actual scientific practices and the human beings who invent them. To rectify this, Nersessian (1987:164) makes a methodological proposal to fully incorporate the dimension of discovery in the philosophical analysis. This she claims will provide the basis for a realistic conception of the nature of meaning (Nersessian, 1984:211). She (1987) advocates a 'cognitive-historical' approach to meaning which will include both the history of science and the science of cognition and will thus as a multi-disciplinary approach be able to provide a more comprehensive understanding of the nature of concept formation and change in science. Cognitive-historical analysis has as its primary aim to explain how the representational resources that are part of the scientist's culture - whether these be derived from a community of scientists, such as Cambridge mathematical scientists, or from a wider Weltanschauung, such as Victorian England - produce scientific representations (Nersessian, 1991a: 107).

In the standard account of scientific theorizing observation and theory are sharply distinguished and differentiated, and in the initial development of this distinction in positivism, "interpretation" was seen as predominantly characteristic of

the theoretical level. This view, which is actually a more sophisticated version of the "given-conceptual" juxtaposition, historically undergoes a progressive development and modification and is replaced by the 'theoretical-conceptual' juxtaposition, which in turn is modified by other refinements (Nersessian, 1982; 1984a). Nersessian (1991a) rejects the idea that theories of meaning developed in the philosophy of language can be directly transferred to science. She (Nersessian, 1991b) also rejects a theory of reference such as the "Causal Theory of Reference" of Leplin (1988), because it argues an essentialist position which she claims is required by the traditional theory of meaning and traditional philosophy of language, whereas she would like to depart in her understanding of the nature of scientific concept formation from the actual practice of science by scientists. In the standard view of meaning and its modified versions, the relationship between theory and observation, the duality of theory on the one hand and conceptual articulation of observations of the given on the other, still required theoretical constructs (concepts, entities, etc.) which were imbued with **meaning** by virtue of their relationship to the **empirical observation**, data and language. The "reductionist theory of meaning" maintains that concepts in different theories can be compared by 'reducing' their content to shared theory-neutral observation sentences, whereas adherents of the "double language thesis" resolved the problem of the relationship between the two levels and the meaning of the theoretical concepts in two different directions; either by declaring the observation level as the primary source of meaning or else declaring the theory level as the primary

source of meaning. Meaning could thus be seen either as that which is transferred from the empirical observations to the theoretical level (as in the standard account of scientific theories) or else as the radical theory-ladenness of all observation (as in the case of the radical relativist meaning-variance positions, such as *inter alia* held by Feyerabend). In the former case the observational level provides the meaning to the theoretical entities, terms and concepts, in the latter case it is the theory which provides the observational level with meaning. The problems generated by both approaches are by now well known in the relevant literature. The so called "radical view" of meaning which gives rise to the problem of incommensurability tacitly assumes that the reductionist theory of meaning is the only one possible (Nersessian, 1984a). Nersessian (1982:217) regards incommensurability as a pseudo problem. She (Nersessian, 1982:206) says:

"'Incommensurability' is only a problem given certain philosophical presuppositions: those of the reductionist theory of meaning, which requires the unit of common measure between comprehensive theories to be a theory-neutral language".

### **Contextually conditioned meaning variance**

Nersessian (1982; 1984a) approaches the problem of meaning from a more integrated perspective of human cognition and appeals to the type of insights provided by modern cognitive science. She (1984a) argues that the problem of incommensurability posed by the collapse of the theory-observation distinction cannot be resolved by a theory of meaning which deals only with language. The creation of meaning by means of conceptualizing 'the world', she says, is a major aspect of the scientific enterprise. Understanding this process of meaning formation via scientific concept

formation is an important problem to be undertaken by philosophers. Attempting to clarify this only in terms of language - the so called "linguistic turn" in philosophy, she maintains, is a wrong approach (Nersessian, 1984a:28).

"The real 'truth' of the matter is that the nature of meaning in scientific theories must be seen in the context of **the network of beliefs** (theoretical, methodological, metaphysical, common sense) and **problems** (theoretical, experimental, metaphysical) which is part of the making of meaning in scientific practice - of the introduction and development of the concepts and terminology of theories" (Nersessian, 1984a:29).

Nersessian emphasizes the need to attend to the actual practice of scientific concept formation in order to see how they acquire theoretical meaning. This she then illustrates by discussing the development of the field concept from Faraday to Einstein (1984). Nersessian's 'hands-on' approach is also done by Tweney (1989a and b) in an interesting analysis of scientific meaning construction in the development of Michael Faraday's thought. This case history provides interesting material to analyze the interaction between various levels in theorizing; moreover the gradual meaning change and unfolding of meaning of the concept of "field" poses the challenge of defining the criteria for determining when one "has a concept", as Nersessian points out. She asks: "What does it mean to 'have' a concept?" She claims that at least some concepts of different theories have a minimal shared meaning, a minimal core concept which remains invariant from theory to theory (Nersessian, 1982:216). She does not subscribe to any form of essentialism, which most probably bring her closer to the realist camp (Nersessian, 1984; 1991b; Leplin, 1988:494). The need for the recognition of some stable core concept

(meaning) betrays the fact that her theory of meaning is also dependent on some hard and fast ontological basis.

Nersessian's plea for a new theory of meaning to some extent echoes the refrain found elsewhere. Both Nersessian (1984a;1987) and Hesse (1984a & b) are contemporary historians and philosophers of science who have argued for a new theory of meaning in order to understand the process of meaning construction in scientific theories. Mary B. Hesse (1984a & b) also develops an alternative network theory of meaning in order to give account of the significant meaning shifts that take place when new metaphorical accounts of reality are developed. Although her emphasis is on the meaning of language, her account also provides pointers to a more comprehensive theory of meaning.

What have we gained in terms of our original set of questions by introducing the cognitive-historical project? It is clear that Nersessian's proposal is a turn away from the "linguistic turn". Philosophy of language theories of meaning, she argues are just not adequate to capture the full orbit of factors at work in the process of conceptual change. Moreover, incommensurability is a pseudo problem which is generated by a reductionist theory of meaning. "Minimal core concepts" are a significant pointer in the direction of the recognition of stable and orderly aspects of the world.

I believe that these approaches provide interesting new perspectives for the development of a theory of the meaning of scientific concepts which could also be amenable to a more holistic theory of meaning in which the role of religious factors is not excluded. Most probably one of the basic reasons why most modern and post-modern philosophies of



science shy away from the recognition of any form of "essentialism" is the fact that traditionally it has been faced with severe criticism and has proved not to be too helpful in the process of understanding how science operates. What seems to be required is a rethinking of the whole problem concerning the existence and role of universals and natural kinds. In stead of arguing the case for a position between realism and nominalism, which is the position I would want to defend, I want to briefly deal with some developments in two areas which point very clearly to the fact that science is conditioned by the experiential contexts of reality which seem to correlate with our mental schemata in terms of which we try to give account of these gestalts mediated by the use of language. For this purpose I shall make use of some of the recent insights of Cognitive Science, more specifically **cognitive schemata** theory (Rumelhart, et al., 1980) and the significant insights developed in metaphor theory. The notion of schemata has strong idealistic and Kantian overtones and will because of its lack of ontological grounding, have only restricted use in a more encompassing theory of meaning.

### **Rethinking universals**

The term "schema" comes from psychology. It is derived from Kant's use of the term (Rumelhart, 1980:34). Most authors who use this term, see it as the building blocks of cognition. Rumelhart defines a schema as follows:

"A schema ... is a data structure for representing the generic concepts stored in memory. There are schemata representing our knowledge about all concepts: those underlying objects, situations, events, sequences of events, actions and sequences of actions. A schema contains, as part of its

specification, the network of interrelationships that is believed to normally hold among the constituents of the concept in question. A schema theory embodies a **prototype** theory of meaning. That is, inasmuch as a schema underlying a concept stored in memory corresponds to the **meaning** of that concept, meanings are encoded in terms of the typical or normal situations or events that instantiate that concept."

Schemata are instantiated when a particular configuration of values is bound to a particular configuration of variables at a particular moment in time. The central function of schemata is in the construction of an interpretation of an event, object, or situation - that is, in the process of comprehension. Rumelhart (1980:37) says:

"...it is useful to think of a schema as a kind of informal, private, unarticulated theory about the nature of the events, objects, or situations that we face. The total set of schemata we have available for interpreting our world in a sense constitutes our private theory of the nature of reality."

Schemata consist of subschemata each of which, in turn, is specified as a configuration of its subschemata, and so on. Just like in the case of computers, Rumelhart says, schemata and the subschemata embedded in them, at some point come to rest in the most elementary and most primitive schemata. The examples Rumelhart provides of schemata are concrete events, objects and actions, such as buying, the oil crisis, etc. They function in perception, learning, discourse, remembering, etc. Schemata are embedded in human experience and facilitate understanding of the world and of experience. At the basis of human experience the "primitive" experiential schemata provide

the semantic categories which link experience to the structure of the world. This linkage takes place through various cognitive mechanisms of which metaphorical meaning transfer and meaning extension is one of the most significant. Arbib and Hesse (1986) also deal with this theory of mental schemata in their work **The Construction of reality**.

As stated above, this account strongly emphasizes the cognitive (mental) nature of the schemata, sees the schemata as cognitive building blocks but lacks an ontological grounding of these schemata. It seems that although this approach is helpful, an adequate theory of meaning requires more when applied to the problem of meaning variance in scientific cognition. A more comprehensive account of the nature of such schemata and their relationship to the development of the meaning of concepts is required. An analysis that is helpful in this respect is an interesting work by Lakoff and Johnson (1980:17-19).

### **Experiential gestalts**

The authors develop a thesis that "... no metaphor can ever be comprehended or even adequately represented independently of its experiential basis" (1980:19). One of their conclusions is the statement that a

"basic domain of experience, "...is a structured whole within our experience that is conceptualized as ... an **experiential gestalt**. Such gestalts are **experientially basic** because they characterize structured wholes within recurrent human experiences. They represent coherent organizations of our experiences in terms of natural dimensions... Domains of experience that are organized as gestalts in terms of such natural dimensions seem to us to be **natural kinds of experience**" (Lakoff and Johnson, 1980: 117, 118;1981; 1982:193ff).

These kinds of experiences or experiential gestalts are **natural** in the sense that they are the products of human nature, and form multidimensional structural wholes. Some may be universal, while others will vary from culture to culture. The types of experience they analyze include inter alia, spatial, physiological, psychological, mental, social, political, economic and religious experiences. They suggest that the concepts which appear in metaphorical definitions are those that correspond to these natural kinds of experience. They say: "The kind of conceptual system we have is a product of the kind of beings we are and the way we interact with our physical and our cultural environments" (Lakoff and Johnson, 1980:119). They reject the idea of the grounding of the conceptual system within the framework of a so called "building block" theory in which all meaningful utterances are constructed from certain unanalysable semantic units. Instead they identify emergent categories and concepts that are best understood as experiential gestalts, which, though decomposable into other elements are yet basic and irreducible in terms of grounding our conceptual system (1981:314-5). An adequate theory of metaphor must give account of the basic domains of experience and their interrelationship, but will also have to explain the basis for the distinction between inherent and interactive properties which function in definition of concepts and metaphorical language use. The context determines both the literal and metaphorical nature of the specific concept. Literal meaning is as much context bound as metaphorical meaning, although the context is generally so much part of our background beliefs that we fail to recognize it as context (Kittay, 1984a: 7,9). Such a

differentiation at least requires some guidelines for the identification of contexts and the determination of "improper" context-crossing (sort crossing) or context mistakes (category mistakes). This emphasizes the need for a philosophical ontology which should give account of the main contexts of experience and the way in which these contexts are interrelated. Hart's (1984) exposition of Dooyeweerd's ontology and his appropriation of Vollenhoven's notion of universality is very helpful in the clarification of these issues. <sup>6</sup>

### **Conclusion**

The pivotal issue at the centre of the "turns" in philosophy of science appears to be diverse articulations of the locus of order. Most authors shy away from postulating some accessible independent conditioning universal order because of the problems surrounding the traditional view of linguistic or ontological universals and essentialism. The argument seems to run as follows: The only access one has to this reality is language and the communities that form and change languages, therefore, although such a reality might exist, science can have no real access to it. But the paradox is that in each historical turn some or other aspect of reality or entity is declared ultimate and the final locus of order, whereas the issue of the nature and existence of such order is often either taken for granted or not given account of.

## **Bibliography**

Arbib, M.A. & Hesse, M.B. 1986a. **The Construction of reality.** Cambridge: University of Cambridge.

Brown, J.R. (ed.) 1984. **Scientific rationality: The Sociological Turn.** Dordrecht: Reidel.

Bergman, G. 1964. **Logic and reality.** Madison: The University of Wisconsin Press.

Bernstein, Richard J. 1983. **Beyond Objectivism and Relativism. Science, Hermeneutics and Praxis.** Philadelphia: University of Pennsylvania Press.

Boyd, Richard, 1980. Metaphor and theory change: What is "Metaphor" a metaphor for? In: Ortony, A. (ed.) **Metaphor and thought.** Cambridge: Cambridge University Press.

Collins, H.M. 1985. **Changing order. Replication and induction in scientific practice.** Chicago: University of Chicago Press.

Delaney, C.F. 1985. Presidential Address: Beyond realism and anti-realism. Proceedings of the American Catholic Philosophical Association. Notre Dame.

Dummett, M. 1978. (Kontroleer delaney)

Fuller, Steve, De Mey, Marc, Shinn, Terry and Woolgar, Steve (eds.) 1989. **The Cognitive Turn.** Sociological and Psychological perspectives on Science. Sociology of the Sciences yearbook, 1989. Dordrecht: Kluwer.

Giere, Ronald N. 1990. **Explaining Science. A Cognitive Approach.** Chicago: University of Chicago Press.

Hart, H. 1984. **Understanding our World.** Lanham: University Press of America.

Hesse, M.B. 1972. The explanatory function of metaphor. In: Bar-Hillel, Yehoshua. **Logic, Methodology and Philosophy of Science.** Proceedings of the 1964 International Congress..... Amsterdam.

Hesse, M.B. 1986b. Changing concepts and stable order. Review of Collins, 1985. **Social Studies of Science**. Vol. 16, 714 - 726.

Hesse, M.B. 1988. Socializing epistemology. In: McMullin, Ernan (ed.) **Construction and constraint**. The shaping of scientific rationality. Notre Dame:University of Notre Dame Press.

Hekman, S.J. 1986. **Hermeneutics and the Sociology of Knowledge**. Notre Dame: University of Notre Dame.

Kisiel, Theodore, 1974. New Philosophies of Science in the USA. **Zeitschrift fur Allgemeine Wissenschaftstheorie**, 5(1).

Kuhn, T.S. 1980. Metaphor in science. In: Ortony, A. (ed.) **Metaphor and thought**. Cambridge: Cambridge University Press.

Laudan, L. 1977. **Progress and its problems**. Berkeley: University of California Press.

Leplin, Jarret, 1988. Is essentialism unscientific? **Philosophy of Science**, December, 55:4, 493 - 510.

McMullin, E. 1984. The rational and the social in the history of science. In: Brown, J.R. (ed.) **Scientific rationality. The Sociological Turn**. Dordrecht:Reidel, 127 -164.

Nersessian, Nancy J. 1982. Why is 'incommensurability' a problem? **Acta Biotheoretica**, 31, 205 -218.

Nersessian, Nancy J. 1984. Aether/or: The creation of scientific concepts. **Studies in the History and Philosophy of Science**, 15:3, 175 -212.

Nersessian, Nancy J. 1987. A Cognitive-historical approach to meaning in scientific theories. In: Nersessian, Nancy J. (ed.) 1987. **The Process of Science. Contemporary Philosophical Approaches to Understanding Scientific Practice**. Dordrecht: Marthinus Nijhoff.

Nersessian, Nancy J. 1989. Conceptual change in science and science education. **Synthese**, 80:163 -183.

Nersessian, Nancy J. 1991a. The cognitive sciences and the history of science. In: **Critical Problems and Research frontiers in History of Science and History of Technology**, 30 October - 3 November 1991, Madison, Wisconsin, 92 -115.

Nersessian, Nancy J. 1991b. Discussion: The method to "meaning": A Reply to Leplin. **Philosophy of Science** , 58:4, 678 -686.

Niiniluoto, I. 1991. Realism, relativism and constructivism. **Synthese**, 89: 135 -162.

Rorty, J.R. 1962. Realism, categories and the "Linguistic Turn". **International Philosophical Quarterly** , vol II:2, 307 - 322.

Rorty, J.R. (ed.).1967. **The Linguistic Turn, Recent essays in Philosophical method**. Chicago: University of Chicago Press.  
Rorty, J.R. 1989. **After philosophy. End or transformation**. Cambridge: MIT Press.

Rumelhart, David E. 1980. Schemata, the building blocks of cognition. In: Spiro, Rand J., Bruce, Bertram C., Brewer, William F. (eds.). **Theoretical issues in Reading Comprehension. Perspectives from Cognitive Psychology, Linguistics, Artificial Intelligence and Education**. New Jersey: Lawrence Erlbaum.

Shapere, D. Meaning and scientific change. In: Colodny, Robert G.(Ed) **Mind and cosmos. Essays in contemporary science and philosophy**. University of Pittsburgh Press.

Simon, Herbert A. & Kaplan, Craig A. 1989. Foundations of Cognitive Science. In: Posner, Michael I.(ed). **Foundations of Cognitive Science**. Cambridge: MIT Press.

Strauss, D.F.M. 1993. Nominalism: A major force moulding our age. **Tydskrif vir Christelike Wetenskap**, jrg. 29, 2de kwartaal.

Suppes,Frederick. 1974. **The Structure of scientific theories**. Urbana: University of Illinois Press.

Taylor, Charles. 1991. **The Malaise of Modernity**. Concord:



House of Anansi press.

Thompson, J.B. 1983. **Critical Hermeneutics. A Study in the thought of Paul Ricoeur and Jurgen Habermas.** Cambridge: Cambridge University Press.

Toulmin, S. 1990. **Cosmopolis. The hidden agenda of modernity.** Chicago: University of Chicago Press.

---

**1.From the title of the book by H.M. Collins . 1985. Changing order. Replication and induction in scientific practice.** Chicago: University of Chicago Press.

From the title of Hesse's (1986) review of Collin's book.

The phrase "the linguistic turn was coined by Bergman (1964).

4. Cf. Brown, J.R. (ed) Scientific rationality: The Sociological Turn. Dordrecht: Reidel.

5.Cf. the title of the Sociology of the Sciences Yearbook, 1989: "The Cognitive Turn. Sociological and Psychological Perspectives on science" edited by Steve Fuller et al. Dordrecht: Kluwer.

6. The significance of such an ontology for the solution of problems concerning the relationship between metaphorical models and scientific realism has been dealt with elsewhere, cf. Proceedings of the Tenth Biennial meeting of the Philosophy of Science Association, USA, vol. 1, 1986.