BEYOND THE TRADITIONAL AND NATURALISTIC PROGRAMMES

DIMITRI GINEV

SUMMARY. Rather than attempting to combine the two meta-methodological programmes for justifying the epistemological study of science, which is the case of Laudan's normative naturalism, this paper aims at presenting a third alternative to the controversy between the traditional normativism and the reductionistic naturalism. The paper is a preliminary move in developing a theory of the autopoietic cognitive organization of science. The underlying assumption of this project calls that science is a self-constructing, self-specifying and homeostatic system. The scrutinizing of these three predicates leads to the view that the epistemological propositions about science cognitive organization are neither normative, nor descriptive, but transcendental ones. The final discussion shows the connection between this project and the theory of group rationality.

Key words: normative epistemology, naturalistic epistemology, autopoietic cognitive organization, transcendental propositions, internal methodology of science.

The question of whether epistemology has an autonomous status takes a central place in contemporary philosophy of science. The programmes of both positions which aim at the resolution of this question were clarified in an interesting recent discussion between Harvey Siegel (1989) and Ronald Giere (1989). In this paper I will summarize the criticism of both positions, and on this ground, will develop a third perspective on the question on the autonomy of epistemology.

The *traditional* philosophers of science argue for the irreducibility of epistemology to science. They claim that epistemology could not be considered a special branch of science (e.g., a special conceptual framework of the theory of evolution, general psychology, or cognitive sciences) because each scientific reflection upon science presupposes some epistemological picture of science. As a consequence they defend the view that there is a body of meta-scientific principles which are untranslatable in any descriptive-explanatory scientific language. These principles reveal the scientific rationality. According to the traditional philosophers of science, who represent the dominant position, the very concept of rationality is a non-natural (i.e. non-scientific), and non-descriptive concept. The epistemological principles reveal scientific rationality as a justificatory base of scientific knowledge (and scientific activity). Thereby, the traditionalists lay the emphasis on the justificatory aspect of epistemology. This aspect distinguishes the epistemology essentially from science. On the other hand, there is no scientific knowledge immune to demand for justification. In other

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words, there is no part of scientific knowledge which could serve as an absolute point of reference for a self-description of this knowledge. The meta-scientific level of justification is indispensible. Siegel resumes this traditional position in the following manner:

> Philosophy of science is obviously not identical with science studies: it is obvious that there are other questions to ask about science besides the epistemological ones. There clearly is place for the scientific study of science. But it is not clear why the scientific study of science should be thought to exhaust the domain either. Philosophy of science is not the whole of the study of science. But neither is the scientific, naturalistic study of science the whole of science studies. (1989, p. 396).

The *naturalist* philosophers of science advocate the thesis that the study of science must itself be a science. They emphasize that epistemology is dependent in some important way upon the disciplines that investigate the mind and brain, and human evolution.[1] They display discontent with those philosophers who insist on the existence of an unconditional (categorical) rationality among scientists. There are many versions of a naturalistic epistemology and it is not my purpose to outline here a taxonomy of them. I only want to point out that with respect to the degree of dependence on cognitive and other sciences one can differentiate three types of naturalistic epistemology. The first one is most clearly represented by Quine's 'naturalistic epistemology'. According to this author, the 'epistemology, or something like it, simply falls into place as a chapter of psychology and hence of natural science. It studies a natural phenomenon, vis., a physical human subject.' (1985, p. 24). The second and more modest type is exemplified by Alvin Goldman's conception that the central epistemological notion of rationality demands appeal to results in cognitive sciences. Goldman develops a framework of normative, epistemic kinds and normative epistemic principles which (framework) is reducible to psychology. Goldman, however, does not postulate that this framework exhausts the contents of epistemology. Therefore, there is no reason to accept that the epistemology is a chapter of psychology.[2] The third type includes all conceptions which claim an intertheoretic reduction of epistemology to any set of cognitive science theories. Here one is trying to show how the theoretical statements of a certain cognitive science supervene on the subject matter of a certain epistemological doctrine. The latter two types fail to defeat the so called 'naturalistic fallacy' because normative epistemological concepts are defined in descriptive terms of cognitive sciences.

Obviously, the question of the autonomy of epistemology is essentially related to the question of the peculiarity of scientific rationality. Each naturalistic epistemology denies *per definitionem* such a peculiarity. There is no substantive but only instrumental rationality of science:

> to be instrumentally rational is simply to employ means believed to be conductive to achieving desired goals. It is part of the standard, folk psychological, model of human agents that they are normally rational in this instrumental sense. Actions that do not fit the model are labeled 'irrational'. (Giere, 1989, p. 380).

Of course, the rejection of any peculiarity of scientific rationality is not a privilege of naturalistic epistemology. The epistemological anarchism, cognitive sociology of science, and hermeneutical tradition in philosophy of science are engaged in the same enterprise. It is obvious as well that the traditional epistemologists support the peculiarity of scientific rationality as an implication of their view that the justificatory principles could not be transformed into descriptive knowledge.[3]

A common denominator of both positions is that they fail to defeat the circle argument. In case of the traditional position the argument runs as follows: if one postulates a body of autonomous epistemological principles for justifying science, declaring at the same time their substantive (i.e. non-instrumental) character, one should argue for this character in a certain scientific framework. Only in terms of such a framework (e.g. culture theory, historical sociology, cognitive anthropology and so on) can one explain why scientific rationality is irreducible to the 'folk psychological model' of instrumental rationality. Any attempt at a substantiation of the justificatory epistemological principles without appeal to even minimally scientific premises leads to the so called Fries' trilemma: the epistemological justification of science results either in dogmatism (metaphysical hypostazation of a certain epistemological doctrine), or in an infinite regress of justifying meta-criteria and principles, or in arbitrary ad hoc substantiation. As regards the naturalistic position the circle argument is this: any program making essential use of scientific results in epistemology for the purpose of assessing epistemological theses is circular because it already appeals to epistemological principles in order to select the relevant scientific results.

As I already mentioned, it is not my intention in this paper to develop a complete criticism of both positions. (Besides the circularity, there are many other deficiencies which I shall not comment here.) I intend only to argue that one can defend the autonomy of epistemology without failing to defeat the circle argument. This thesis, however, requires a specific conception of scientific rationality. Accordingly, I wish to touch upon the principal features of this conception.

As compared with the above-considered positions my position could be summarized as follows:

(1) In contrast to the naturalistic position I claim that scientific rationality is more than an instrumental rationality. It possesses a substantive character which cannot be conceptualized by any descriptive model of choice situations (or, model based on the descriptive decision-theory). From a cognitive viewpoint, science is a self-sufficient system: it has proper criteria for truth, completeness, cognitive systematization, conceptual simplicity, factual adequacy, explanatory effectiveness, formalizability etc. These criteria are peculiar only for science and they are not imposed by any extra-scientific authority. For this reason, science as a cognitive system differs essentially from all other cognitive systems in culture. But the cognitive self-sufficiency means not only the existence of proper criteria, standards and norms (i.e.

an internal methodological level). It also means that these criteria, standards and norms are determined by a set of internal (to scientific knowledge) cognitive values and goals.[5] Since the latter constitute the substantive character of scientific rationality, I shall call them fundamental goals and values of science. The consequent naturalistico-instrumentalistic strategy for the elimination of the notion of scientific rationality leaves open the question of the fundamental goals and values of science. The only proposal here consists in the disqualification of the very question as misguided. According to Giere, 'questions about goals become more interesting when asked at a somewhat less general level'. (1989, p. 383). There is no other reason for this conclusion besides the very restrictedness of the naturalistic-instrumentalistic strategy. On the other hand, there are many indices that science possesses its own fundamental cognitive values and its own fundamental goals. Among these indices are: (a) The rise of modern science at the end of 17th century is connected with the establishment of a new cognitive ethos which is entirely different from the goals and values of the other cultural spheres of spiritual life (metaphysics, logic, morality, theology, politics and so on). This ethos contains goals and values and sentiments by means of which science has emancipated itself in an autonomous 'ecological niche' of culture; (b) Any attempt at incorporation of extra-scientific goals and values in the body of scientific knowledge leads to a destruction of the cognitive organization of scientific activity;[6] (c) The social organization of scientific activity is authentic because it reflects the authentic cognitive organization of science which is determined by specific goals and values.

I think that (a), (b) and (c) contradict any radical naturalistico-instrumentalistic program. *The fundamental cognitive values and goals of science are intranslatable in the axiological language of any other cognitive system in culture.* This thesis follows directly from the view of the cognitive self-sufficiency of science. If we speak about the roots of this self-sufficiency, we should take into account that only in science does one use procedures of idealization, such as constructing ideal ontological models, carrying out of *Gedankenexperimenten* and so on. These procedures 'create' a new cognitive reality which is characterized by a particular rationality.[7]

(2) In contrast to the traditional position, I claim that the very fact of the self-sufficiency of science as a cognitive system speaks in favour of the substantive character of scientific rationality. Thus, one does not need to postulate a body of independent (from science) justificatory, epistemological principles in order to defend the peculiarity (irreducibility) of scientific rationality. I agree with Giere that the aspiration to a meta-scientific justification of science is a residium of the 'Aristotelian conception of justification'. One is not compelled to justify the rationality of science from an *external methodological* position because science as a cognitive system with an *internal methodological* level of self-reflection is a self-justificatory system as well. During its own historical dynamics, science has developed

mechanisms for self-control and self-justification. Hence, I will sum up the difference between my position and the traditionalist one in the following manner: I will lay the emphasis on the self-justificatory functions of the science internal methodology rejecting the necessity of an external methodological justification, whilst the traditionalist treat science as a 'blind' cognitive system which needs an external justification. As we shall see this difference plays a crucial role with respect to the question on the status of epistemology.

It follows from (1) and (2) that the substantive character of scientific rationality is due to the fact that science as a cognitive system is: (i) self-sufficient, (ii) self-determined, and (iii) self-justificatory. These three features correspond to the basic characteristics of what Humberto Maturana calls autopoietic systems. According to him, such a system (as a special kind of self-organisatory system) continuously generates and specifies its own organization through its functioning as a system of production of its own components. The autopoetic system is: (I) self-constructing its space of existence (its parameters construct the topological domain of its realization); (II) self-specifying its own organization and the boundaries of its self-production; and (III) homeostatic (all feedback is internal to it). One can easily establish the correspondence between: (i) and (I), (ii) and (II), (iii) and (III). It is therefore clear that science as a cognitive system is a sort of autopoietic system.

The autopoietic organization preserves the peculiarity (irreducibility) of the system, i.e. it preserves the basic identity of the system. But because this organization is always specified with respect to its components and the network of relations between them, one can distinguish a second, more concrete, kind of identity, viz. the typological identity. This is the identity of the systems as belonging to a particular type of the autopoietic organization. Hence, the respecification of the components and their network of relations within the system's organization should mean the loss of the typological identity and the formation of a new type. Point (II) means that all changes of the autopoietic organization which imply a loss of the typological identity of the system are determined by the very autopoietic organization.

A basic distinction, introduced by Maturana, is that between structure and organization of an autopoietic system. The structure is constituted by all actual components and the actual relations between them. The organization is a set of relations between the components which is a subset of the relations included in the structure. The organization includes only those relations between the components which specify the type of the system. Only the change of the organization can provoke a respecification of the system in a new type.

Let me now concretize this picture with respect to science as an autopoietic cognitive sytem. If one treats this system as a simple unity, i.e. regardless of its components, the system will be defined only by the properties that

characterize it as a system *sui generis*. As mentioned earlier, science is characterized by the usage of procedures of idealization. These procedures qualitatively distinguish the cognitive system of science from all other cognitive systems. Hence, the properties that are determined by the usage of idealization will constitute the cognitive *differentia specifica* of science as a simple unity. These are 'emergent' procedures. In my view, there are four such properties which are obligatory for 'each possible kind of scientific knowledge'. I shall call them: model-ontological determinancy, nomologicity, theoreticity and explanacity. They are cognitive universals of science, and the bottom of scientific rationality.

I cannot discuss here these properties in detail. Such a task requires the elaboration of a logical model of idealization. I shall confine myself only to the following general outlook: Each scientific investigation begins with basic ontological assumptions about what kind of systems the phenomena being investigated build up. The very system constituted through these assumptions are of different sorts: Hamiltonian dynamical systems; ergodic dynamic systems; systems with intrinsic randomness and intrinsic irreversibility; statistical ensembles with dissipative processes; functional non-teleological systems in stable equilibrium and so on. The relevant principles with respect to which each type of system remains invariant, or in other words, the principles of symmetry of a system's logical structure bring out the second constitutive cognitive property of science, viz. the nomologicity. Examples of such principles are: the arbitrary transformations with respect to which the functional differential equations exhibiting a specific relatedness of the research-area events are covariant, i.e. preserve the same form in all space-time reference-systems undergoing these transformations; certain phase transformations with respect to which the equations of field motion admit the existence of stationary states; the functional norms for surviving or maintaining the state of equilibrium of a certain social system, which remain constant in every structure-functional model of this system; the semiotic codes of a certain discursive system studied by means of the structuralistic methods in humanities etc. The construction of a conceptual-mathematical apparatus and its semantic interpretation provides the general form of theoreticity as the next constitutive cognitive property of science. Finally, the operationalization of this apparatus displayed in concrete explanans-explanandum schemes leads to the precise differentiation of possible interpretation or intended applications of the theory.[8]

So much for the properties which characterize science as a simple unity. In order to reconstruct the organization of this unity as an autopoietic system one should recursively apply the operation of distinction to the reality 'created' by the idealization procedures. In so doing one is able to identify the components and the network of relations between them, which underlay the four properties. Apparently, these considerations call into question the status of the propositions that express the outcome of

the recursive application of distinction operation.

Are these propositions empirical, or analytical? Are they descriptive, or prescriptive? Are they naturalistico-scientific, or autonomous meta-scientific? In my view, both proposals in each one of these question-dilemmas are wrong and misleading. Both require attention to the issues of naturalistic-traditionalist controversy. And both exhibit the deficiencies of the respective programmes. My thesis suggests that the propositions about the autopoietic organization of science are *transcendental propositions*. They are neither empirical nor analytical, but bot synthetic and apriori and yielding knowledge. Each one of them discloses a certain aprioristic condition for scientific knowledge. The validity of this condition is universal (with respect to all types of scientific knowledge), but its content has synthetic (empirical) character, although, the content does not admit a derivation from experience. The transcendental propositions are not conditional, but – as a consequence of their universal validity – categorical (apodeictic). As propositions that express the conditions for the 'possibility of scientific knowledge', they possess descriptive as well as normative moments. The aprioristic (obligatory) condition which the respective propositions stipulate is not prescribed, but follows from the very cognitive constitution of science. There is an interplay between 'ought' and 'is'. Finally, the transcendental propositions are not autonomous and meta-scientific, because they only *explicate* the proper cognitive organization of science. They, however, are not identical with the scientific propositions, because they explicate the internal conditions for the possibility of the scientific propositions. Let me give some examples of transcendental propositions:

(1) The boundaries and the integrity of each research area are determined by an ideal ontological model;

(2) The semantics of the theoretical terms of each scientific theory is ideal-ontologically determined;

(3) Each criteria for ad hocness of the theoretical statements depends on ideal-ontological model;

(4) The possibility for a proliferation of each scientific theory in new domains (of a certain research area) is determined by an ideal-ontological model;

(5) The construction of each scientific theory presupposes a class of symmetry principles;

(6) The scope of the possible epistemic operations with the entities, thematized by any scientific theory, is determined by a class of symmetry principles;

(7) Each scientific theory fulfills an explanatory function;

(8) Each scientific theory serves as an instrument for prediction of new facts;

(9) For each scientific theory there is a certain degree of internal coherence between its formalism and its conceptual apparatus.

Of course, this list represents only a small subset of the whole set of

transcendental propositions about scientific knowledge. Since these propositions are neither a part of the usual scientific statements about the world nor justificatory principles they belong neither to any particular scientific branch nor to the external methodology. But, on the other hand, since they are not meta-scientific propositions and possess normative moments, *they are the only propositions by means of which one can express the internal methodology of science.* In the preceding discussion, however, I have reached the conclusion that they explicate the proper cognitive organization of science. This putative ambiguity vanishes as soon as one takes into account that *the internal methodology is the very cognitive organization as it is internalized and implemented by the scientists.* The internal methodology is the subjective correlatum of the objective cognitive organization, i.e. the organization without knowing subject.

By reaching this conclusion, the question of the relevant epistemological theory of scientific rationality arises. Who is the bearer of the internal methodology? By no means the Kantian 'transcendental unity of apperception', because the conditions for the 'possibility of scientific knowledge' require an intersubjective base of this knowledge. The autopoietic cognitive organization of science cannot be internalized and implemented as an internal methodology by a single and isolated individual. *The bearer of the internal methodology could be only the scientific community.* Hence, the latter is the subject of scientific rationality. This thesis coincides with the basic presumption of the so called 'theory of group rationality', which is opposed to any justificatory (monistic or pluralistic) epistemology, claiming that the scientific activity of all members of a certain scientific community ought to be guided by the norms of a single external methodology.[9] According to the 'theory of group rationality', a scientific community acts rationally not when it is guided by such externally prescribed methodology but when it is split by several subgroups, each specifying in its own fashion the internal methodology, but aiming at shared goals. Thus, the prime concern of the theory of group rationality is the investigation of the autopoietic organization specification during the process of the internalization of this organization as internal methodology by the different subgroups of a certain scientific community.[10]

Let me conclude with a brief summary. Epistemology cannot be reduced to a combination of naturalistic studies. First, its phenomenal domain (the autopoietic cognitive organization of science) is characterized as a simple unity by properties which are inexpressible in any naturalistic scientific language. And second, the propositions of epistemology (the transcendental propositions) have an autonomous logico-epistemological satus.[11] At the same time the epistemological investigation of the autopoietic cognitive organization is completely different as compared with the traditional epistemological enterprise of justification because all justificatory control and regulation is immanent to the network of relations between the components of the autopoietic organization. This is why epistemology

cannot be a normative discipline.

I realize that the elaboration of epistemology as an autonomous transcendental-constructivistic conceptual framework is work that is yet to be done.

NOTES

[1] The thesis on the reducibility of epistemology to a particular scientific study must be distinguished from the thesis on the 'scientification' of epistemology, i.e. the growing applicability of scientific methodics, techniques, methods, theories and other constructions in the domain of epistemological investigation of science. (See Ginev and Polikarov, 1988.) The crucial difference betrween both theses concerns *the interpretation of the epistemological problems*. According to the 'scientification' conception, the usage of scientific tools in epistemology does not transform the epistemological problems into scientific ones. Each naturalistic epistemologists would reject this statement.

[2] See Goldman (1986), pp. 63–100.

[3] There is no point to point parallellism between the claim for autonomy and the thesis for the peculiarity of scientific rationality. The same is valid as regards the parallelism between the conception of the principal eliminability of all meta-scientific epistemological principles and the rejection of the peculiarity of scientific rationality. Besides these two 'non-strong' parallelisms there are exemplifications of the other two combinations. Thus, the German constructivistic tradition (P. Lorenzen, J. Mittelstrass, P. Janich, K. Lorenz, F. Kambartel and others) represents a view that is a specific combination between the holding of the autonomy of epistemology and the rejection of any hypostatized cognitive peculiarity of science, because all rational constructions of science should be derived in a stepwise manner from the extra-scientific praxis (the so called principle of methodical order). On the other hand, the analytical tradition represents the combination between the rejection of the autonomy of epistemology (an implication of the Wittgenstenian dictum that philosophy has not a body of autonomous knowledge) and the claim for the peculiarity of scientific rationality.

[4] See, Murphy and Hendrick (1984) and Ginev (1988).

[5] One does not need to interpret the interrelations between the levels of: (a) the theoretical constructions; (b) the methodological criteria, standards and norms; and (c) the fundamental cognitive values and goals as a hierarchical subordination. More adequate rather, is Laudan's 'reticulated model' in which levels (a) and (b) are partially underdetermined by level (c). See, Laudan (1984).

[6] A special case of 'non-destructive' incorporation of extra-scientific goals and values in science is the so called 'finalization of science'. See, for example, Böhme, van den Daele, and Krohn (1978).

[7] This is the reason why a task of prime importance for the diachronic rational reconstruction of science is the clarification of the historical process of emancipation of the thinking, based on the idealization procedures.

[8] This network is independent from the extra-scientific culture-historical dynamics, i.e. it is not determined by any extra-scientific system. Science as an autopoietic cognitive system should be defined through the interactions and transformations of the components of its organization, which continuously generate new cognitive elements. It deserves mentioning that although the culture-historical dynamics do not determine the specification of the autopoietic cognitive organization of science, some configurations of extra-scientific systems play a triggering role in changing of this organization. Thereby, they trigger the processes of formation of new types of scientific rationality. (See Ginev, 1989)

[9] Here I am referring not to the original version of this theory, which preserves some justificatory elements (Sarkar, 1983), but to its revised version. (See, Stefanov and Ginev, 1985.)

[10] In Stefanov and Ginev (1985) we have explained this specification as a result of a characteristic

subordination of the parametes of the ideal for an optimum theory.

[11] It remains an interesting perspective to develop the epistemology of science as a constructivistic theory in analogy of the other theories of self-organisatory systems (e.g., Eigen's theory of hypercycle). (See, Krohn and Küppers, 1989.) In contrast to the traditional, descriptive, naturalistic theories, the constructivistic ones do not refer to the existing reality as the only possible one. They focus on the constructive mechanisms of self-organization and treat existing reality as an 'accidental solution' among the diversity of many other theoretical solutions. Thus, if the descriptive, naturalistic theories are theories of the actual world, the constructive theories could be qualified as theories of the possible worlds.

REFERENCES

Böhme, G., van den Daele, W., and Krohn, W.: 1978, 'The "Scientification" of Technology', in *The Dynamics of Science and Technology*, W. Krohn, E. Layton and P. Weingart (eds.), Vol. II (Dordrecht: Reidel), pp. 111-148.

Giere, R.: 1989, 'Scientific Rationality as Instrumental Rationality', *Studies in History and Philosophy of Science* **20**, 377–384.

Ginev, D.: 1988, 'Scientific Progress and the Hermeneutic Circle', *Studies in History and Philosophy of Science* **19**, 391–395.

Ginev, D.: 1990, 'Towards a New Image of Science: Science Teaching and Non-Analytical Philosophy of Science', *Studies in Philosophy and Education* **16**, 63–71.

Ginev, D. and Polikarov, A.: 1988, 'The Scientification of Methodology of Science', *Zeitschrift für allgemeine Wissenschaftstheorie* **XX**, 18–27.

Goldman, A.: 1986, *Epistemology and Cognition* (Harvard University Press: Cambridge, Mass.).

Krohn, W. and Küppers, G.: 1989, *Die Selbstorganisation der Wissenschaft* (Suhrkamp: Frankfurt/M.).

Laudan, L.: 1984, *Science and Values* (University of California Press: Berkeley).

Murphy, A. and Hendrick, R.: 1984, 'Lakatos, Laudan and the Hermeneutic Circle', *Studies in History and Philosophy of Science* **15**, 120–131.

Quine, W.: 1985, 'Epistemology Naturalized', in *Naturalizing Epistemology*, H. Kornblith (ed.) (Bradford Books: Cambridge, Mass.), 15–29.

Sarkar, H.: 1983, *A Theory of Method* (University of California Press).

Siegel, H.: 1989, 'Philosophy of Science Naturalized? Some Problems with Giere's Naturalism', *Studies in History and Philosophy of Science* **20**, 367–375.

Stefanov, A. and Ginev, D.: 1985, 'One Dimension of the Scientific Type of Rationality [A Reflection upon the Theory of Group Rationality]', *Studies in History and Philosophy of Science* **16**, 101–111.

University of Sofia
Ruski 15 St.
Center for Culturology
Sofia, 1000, Bulgaria