

# Hronszky, Imre

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*Imre Hronszky (Hungary)*

### VEBLER, SCHELER, BORKENAU ON THE SOCIAL HISTORY OF SCIENTIFIC COGNITION

It is frequently claimed that the social-historical approach to scientific cognition in fact begins with the Marxist Boris Hessen's study on Newton, written in 1931. Scholars committed to the "strong program" of the sociology of science name Durkheim and Mannheim as their precursors. This invitation affords an opportunity to deal with other authors from the fairly rich early history of social-historical approach to scientific cognition, of course in outlines. Veblen wrote down only his basic ideas. Scheler gave theoretical guidelines for detailed research. Borkenau wrote a waste book on the emergence of modern scientific thought. Each of them is important in the history of ideas, due to giving theoretical orientations concerning the social history of scientific cognition.

To begin with, I would mention Thorstein Veblen, a prominent figure in America after the turn of the century. Being an economist, he became famous first of all for his "institutional" sociology and his critique of capitalism put forward in "the theory of leisure class". We are going to deal with his views on the basis of some of his studies, first of all "The Place of Science in Modern Civilisation" and "The Evolution of Modern Scientific Point of View", respectively.<sup>1</sup>

Science in modern civilisation has become a cult, something like a last tribunal, he says and states the question of its emergence, predecessors and validity.<sup>2</sup> Veblen's answer is as follows: Science mainly emerged as the metaphysics of industry, its cultural predecessors are myths and legends, and in science thinking became appropriate to a society based on machine production, appropriate in its content and truth canons. We can see that he develops a

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<sup>1</sup> In Veblen, *The Place of Modern Science in Modern Civilisation and Other Essays*, New York, Russel and Russel, 1961.

<sup>2</sup> See especially the first article mentioned.

cultural-anthropological approach to the problems stated.<sup>3</sup> Let us see how he deduces the answers.

Veblen's starting point is a presumed special "instinct", the "idle curiosity" or "irrelevant attention", as opposed to "pragmatic attention" that manifests itself even in animals. This "instinct" is responsible for an "esoteric knowledge", to be found in each society in history. The "esoteric knowledge" or higher learning" has different forms in different types of society in history, developing from myths to a causal world picture. How did this change take place?

Veblen, by postulating the operation of "idle curiosity", rejects the possibility of an exclusively pragmatist understanding of the history of cognition.<sup>4</sup> But, when explaining the emergence of knowledge systems having no "pragmatic teleology", he does not acknowledge at all the idea of intellectual autonomy. In Veblen's "institutional sociology", there is such an institution in every type of society, which determines the character of the respective society.<sup>5</sup> Thought is determined by life, and the knowledge systems that come into being under the influence of "idle curiosity" will become appropriate to the "institution" prevailing in the given society. Their changes also follow those of the "prevailing institutions", adopting themselves to the latter under the pressure of habituation. The scheme gained in this way will become a discipline. Accordingly, modern science came into being as the process of industry became the decisive "institution" of society.<sup>6</sup> The deeds supposed to have taken place in the phenomena under observation have gone through gradual "disanthropomorphization" in the course of history. For Veblen modern science is dispassionate, impersonal, and hence "matter-of-fact" knowledge.

Her we can see that Veblen's social-anthropological approach is not a full-fledged one. The basic barrier is that he presumes as explanandum the unconditionally objective character of modern scientific knowledge.<sup>7</sup> In essence

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<sup>3</sup> His sociological point of view, i.e., that of cultural anthropology, is clear from his characterization of "esoteric knowledge", the content and truth canons of which are determined by the system of social "institutions", and the owners of which are specialists (e.e., magicians or scientists); further, a given culture ascribes a great inherent value to the given type of this knowledge which, when viewed from the inside, by specialists themselves, appears as a system of fundamental and eternal truths, and its specialists aim at developing it in a basically conservative manner, while they are themselves the products of "group life". See: In Veblen, *The Higher Learning in America*, New York 1957, Sagamore, first chapter. His cultural anthropology is embedded in Darwinian approach. His main categories are: adaptation to the milieu and selection.

<sup>4</sup> Pragmatism at that time rejected the possibility of cognition without practical ends.

<sup>5</sup> We have no place to deal with the peculiarity and rather ambiguous character of the term "institution" in Veblen's writings.

<sup>6</sup> Veblen assumes that moreover, it was the coming to the fore of small trade and then monetary processes—generally the "economic organisation of society"—which transformed thinking.

<sup>7</sup> Veblen did not deal with the problem of constituting experience, with the consequences of the conventionality of language usage. For him, the difference between observation made in the age of savagery or barbarism and in modern science was reduced to the difference between right and

Veblen says that the image of the world in this "factualness" was forced out by the development of industry based on machines.

He claims that in the first stage of industrial development the world was "dramatized" as the relation between the craftsman and his product. So it was interpreted as the relation between the efficient cause necessary to achieve a certain result and its effects. Since the 19th century world has been conceived of as a machine, or—what according to Veblen is just the same—as a causal mechanism, a chain of consecutive changes, corresponding to the pressure exerted by industry on thinking. We have a „machine made point of view“, a "metaphysics of machine based technology". There is a constraint of "hard-headed acknowledgement" of pure facts in life, and this attitude reached its summit and symbol in science.

Veblen claims that the circumstances of experience and tradition to which the classes and members of a community are subject have not been uniform and consonant. There was a "bifurcated system of culture" throughout all history. The work experiences got only a lower place in the hierarchy of society, but in modern life based on industry they have received their right place. The direction of cognitive interest, the scheme of logic of search for knowledge became the "logic of machine processes".

This "hard-headed acknowledgement" of the facts guaranteed a "decisive practical advance" for Western civilization. But Veblen, owing to this specific attitude towards cultural criticism, would put Mr. Choakumchilde, the well-known here of Dickens, into his place.<sup>8</sup> He conclusively denies the view as well which claims that modern science came into being for industry, by means of achieving some direct pragmatic goals of the latter. The correspondence between industry and science is guaranteed by a connection of higher level than that. "While even the scientist's curiosity is as idle as that of the pueblo myth-maker [...] the canons of validity under whose guidance he works are those imposed by the modern technology, through habituation to its requirements; and therefore his results are available for the technological purpose [...] Hence the easy copartnership between the two"<sup>9</sup>. Thus history, we

wrong observation. Due to the fact that he assumes a certain kind of continuity in history (cf. the term "matter-of-fact generalisation"), he rules out in advance any fruitful question concerning the difference between possible correct modes of observation. He defends the idea of a sociology of scientific thought in a limited sense and would reject all idea of a sociology of scientific knowledge in any sense.

<sup>8</sup> Ch. Dickens, *Hard Times*: We think of the problem underlying the notice "Stick to the facts, sir". Like Dickens, Veblen insist on the belief that there is good cause "to be restive under its dominion".

<sup>9</sup> See: *The Place of Science in Modern Civilization*, p. 17. This justification of the principle of technological usefulness appears, e.g. in the light of the "finalization" researches of the Starnberg group, as too general. According to Veblen, the "pragmatic interest" can only be a hindrance in the process of theoretical research. We should think of the difference of the cases of preparadigmatic, paradigmatic and postparadigmatic stage of research. As regards the Middle Ages, Veblen says that the matter-of-fact theories were accepted in the form of technological maxism. Obviously, he does not sense the qualitative difference between the technological knowledge of rules and scientific generalisation.

can say, operates like the List der Vernunft, and in industrial society it is just the "logic of machine process" that ensures the demand of esoteric knowledge for dramatic consistency (and does so necessarily), and the latter ensures the technological applicability of knowledge.

With Veblen we meet a possible basic difficulty of the externalist approach to scientific cognition. Though he does not think that science is an answer given to the direct needs of technology, as some of his contemporaries do, he assumes an immediate effect of "life", industry, and speaks of the effect of industry previously becoming the ruling institution. Science is an epiphenomenon, a mechanistic reaction to "archetypes", a mechanistic reflection.

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It is well known that at the turn of the century in German social sciences and philosophy a wide range of points of view came into being which claimed that society had had some constitutive role in the rise of positive science. Here we can refer to the views of Tönnies, Troeltsch, Simmel, Sombart, or Max Weber, among others.

The aspiration at issue unified the anti-positivistic and anti-scientistic view of science with the criticism upon capitalism from the point of view of alienation. More exactly, they conceived of the development of science as part of the development of capitalism. Their common characteristic is that it was scientific rationality as a social means and not an end in itself that should be the starting point. These inferences, though sometimes only in the form of scattered and occasional remarks, nevertheless with a definite place in the argumentation systems, claimed that the source of positive scientific attitude, i.e., the constitutive social conditions of its coming into being, was to be found in merchants' aspirations at quantification as well as in the fact that machines and their study came to the foreground. They developed a certain "functionalistic" approach to the problem of emergence and functioning of modern science. The function of the scientific attitude was linked with the teleology of bourgeois society, and they held that the scientific attitude has developed in connection with the fact that the respective functions were brought into consciousness.

Nevertheless, in 1925 Max Scheler states rightly that only sporadic remarks can be found concerning this topic, which provided information only at the level of general conjectures while the parts of this book *Die Wissensformen und die Gesellschaft* on the sociology of positive science are an attempt at the systematic elaboration of the issue. "It was not 'pure reason' or the 'absolute spirit' which at the beginning of the modern age sketched out the tremendous program of the comprehensive mechanistic explanation of nature and man but the new will to power over nature and the desire to work upon her on the part of the rising bourgeoisie"—that is how he sums up his views.<sup>10</sup>

<sup>10</sup> M. Scheler, *Die Wissensformen und die Gesellschaft*, Fancke Verlag, Bern—München 1960, originally 1925.

In Scheler's conception, it is the special reversal of *Herrschaftswille* (will to rule, will to power) that stands behind the rise of positive science. Instead of aspiration to rule directly over persons, the coming to the fore of aspirations that strive for "the productive transformation of things" constitutes that "instinct" and ethos which is responsible for the emergence of positive science.<sup>11</sup> The *gemeinschaftliche Lebensform* (community lifeform), which was characteristic of the Middle Ages, was transformed into *gesellschaftliche Lebensform* (societal lifeform), and along with this, the "categorical-biomorph" *Weltanschauung* corresponding to it had to change of necessity, also. It had to give up its place to the mechanistic world picture and to positive science, Scheler says, since the "categorical-biomorph" world view does not afford any conception of nature in which it can be regarded as controllable, as that which can be transformed according to possible technological purposes.

According to Scheler, the process of the rise of positive science can be seen first of all in the extreme restriction of the goal of cognition. It is nothing but a goal restricted to the demand of the regular prediction of natural processes, and that of the soul, a goal which deprives Nature of the objectivity of sensual qualities, which restricts Nature to a mechanism, and which limits itself to the measurable-quantitative aspect of the world and to the spatio-temporal relationships among phenomena, taking them in their *so-und anderssein*, i.e. to that which seems to be seizable as dependent on possible motion-phenomena.

The description of these motion-phenomena in their law-like determination is a correlative of the attempt to develop a possible rule over natural phenomena. Thus conceiving of the world as a mechanism is a point of view which is socially predetermined. The explanandum was viewed by Scheler as *savoir pour prévoir*, he understood science with its system of laws securing this function. In this respect he transformed the Comtean task into the opposite, preserving his basic perspective on science itself. "Die Güter 'Ware' quantifizierende Betrachtung" of the social world serves as explanans.

In Scheler's views, the direct precondition of the coming into being of the cognitive attitude characteristic of positive science was the meeting of two, earlier separated social strata. "Two social strata, which were separated in the beginning, gradually had to penetrate each other, so that a systematically elaborated, methodologically teleologic, cooperative professional knowledge should come into being [...] namely, the stratum of free and contemplative people and that of those people, who gathered experience in work and crafts rationally, and whose most intensive interest was—due to the internal instinct of the increasing social freedom and liberation—to create such pictures and ideas of nature, which renders possible the prediction of and rule over natural phenomena."<sup>12</sup>

<sup>11</sup> This is not the place here to criticise the mode of explanation of history using the naturalistic term "instinct" and the overthrow of this naturalism by postulating the work as an "ethos".

<sup>12</sup> *Op. cit.*, p. 92.

In connection with the reversal from the “categorical-biomorph” outlook to the mechanistic approach, we only would like to touch upon some of Scheler’s thoughts, which seem to be of current interest, as regards the philosophical foundations of the present-day ideas on the value crisis concerning the scientific exploration of Nature. He states rightly that the separation of the intellectual and emotional functions of mind—which was expressed in the separation of existential problems (*Seinsprobleme*) on the one hand, and of value problems (*Sollenprobleme*) on the other—also belonged to the conditions of the emergence of positive science. The *Wertfreiheit des objektiv Daseienden* (the value-freedom of objectively existing things) was a necessary theoretical presupposition for the conception of the world as the territory object of possible rule “[...] To conceive of the world on the basis of value-freedom is a task which is set for purpose of some value: for the purpose of the vital value of the rule and command of things.”<sup>13</sup>

But in the course of the historical development, “the onesided system of categories of the *gesellschaftlichen* way of thinking is gradually being put aside—naturally far from turning back to the *lebensgemeinschaftliche* way of thinking of the Middle Ages [...] but by superseding this contradiction between the mechanical and teleological dependence, with the help of a new synthesis of conceptions concerning the world and the science, by means of the cognition of a comprehensive basic form of laws (*durch Erkenntnis einer übergreifenden Grundform der Gesetzmässigkeit*) which is neither mechanical nor teleological; by such a conception which, in terms of sociology, finds it correlative in the connection with a new form of essence, in which *Lebensgemeinschaft* (community) and *Gesellschaft* (society) begin to supersede each other, in other words: in the solidar-personal grouping of insubstitutable individuals.”<sup>14</sup>

Though we do not agree with Scheler as regards the content of his assertions that values must also be regarded as objective (as he understands the term objective)—because being Marxist, we have in mind rather the levelling off of value and material knowledge in practice of special type—we think that his thought mentioned above, is exemplary, that is were the change of the relation as a whole to Nature is connected with the change of certain basic types of society, having ruling over things as its goal.

According to Scheler, all knowledge is “social” in nature, but this does not imply that he sociologizes natural scientific knowledge. In his view, it is only the operation of definite social conditions opening sluice-gates and that form of mental act by which knowledge is gained that can render positive science a reality from an eternal possibility—this is conditioned of necessity by society,

<sup>13</sup> *Op. cit.*, p. 101.

<sup>14</sup> *Op. cit.*, p. 112. This emphasis laid on the emergence of new historical social factors is common in all early sociological approaches to the development of scientific cognition. But only Scheler and the Marxists expressed their ideas concerning the future.

but not the content and validity of knowledge. The knowledge gained by means of the mechanistic outlook is real but restricted knowledge of a partial field. Society only restricts the focus of interest, and knowledge so gained will be true knowledge within this restriction.

Scheler, the conservative thinker on the one hand is opposed to the liberal defence of capitalism and the positivistic scientism that pays lip service to it—more generally, intellectualism, on the other hand, he polemicizes with the defenders of socialism that has become a real possibility (more exactly with trends he thinks to be defenders of it), who, considered from the point of view of epistemology, are the adherents of what he calls the purely “pragmatist” conceptions.

In his explanatory system in which two independent variables are postulated in history, the self-development of mind, which becomes a reality as a result of the effect of the correlation of certain “real factors”, is an attempt at superseding both conceptions.

To illustrate the operation of Scheler's view of the sociology of scientific knowledge we can make only two remarks. His conception leads him to deny that science came into being in the course of any continuous internal development leading from the Middle Ages to Modern Times. Such a way of looking at science—he says—is searching for antecedents without asking why it occurred just at that given time and in the way it did; that is this way of looking at things is widening mental predecessors—e.g. the spreading of neo-Platonism—into a necessary condition. Scheler lays stress on the defence of the thesis that, once it has come into being the functioning of scientific method can be guaranteed exclusively by its operation according to its inherent laws. Legitimated by its social function of predictive capacity science develops autonomously. He gives an answer to the question of the relation between science and technology in the light of this. Both being the result of the same *Trieb* (instinct) and ethos, therefore their connection is guaranteed structurally. At the same time this connection is historically changing. In the course of history the development of the same one has proceeded that of the other just as many times as it happened *vice versa*. “The new science is not conditioned by technology (as it was one-sidedly supposed to be the case by Spengler), neither does the new science condition technological advance and capitalism (cf. A. Comte)—but the logical system of categories is founded on the bourgeois species, in his new structure of instincts and new ethos as well as the original technological driving force to rule nature.”<sup>15</sup>

According to Scheler, the spirit of change is bourgeoisie, thirst for power, which makes a world picture, in a theoretical form, of the restricted view of Nature that has its origin in work.

After Veblen, whose ideological stance is characterized by special “socialist”-technocratic conception of one sort of industrial society, and

<sup>15</sup> *Op. cit.*, p. 125.



Scheler, who is a conservative critic of capitalism, let us turn now to Franz Borkenau. During the time of writing his book he was yet a prominent theoretician of a fundamental trend within Marxism. With this contention, we have touched upon an essential problem. Marxist historians of science in socialist countries, as well as authors of superficial non-Marxist reflections on the history of Marxist history of science, frequently regard Boris Hessen's Newton study as the expression *par excellence* of the "authentic" Marxist conception of the history of science. But a closer analysis will reveal a more realistic picture of the matter: we should recognize that in terms of the social history of science two basic lines of interpretation of society have come into being—eventually on the base of different political stances. One was the "leftish" position, whose most characteristic, albeit essentially different, theoretical systems were elaborated by Bogdanow and in Lukács's theory of reification, respectively. According to these, "bourgeois science", that is not only the form of organization, the institutions, but knowledge and methodology as well as the whole of the bourgeois society, is separated from the new society by a sharp gap. As Lukács states, "bourgeois science" is constituted by the domination of "formal rationality" corresponding to reification and being a constitutive part of it. Science as developed in bourgeois society is the application of the "formal", calculative rationality to Nature.<sup>16</sup> Its method allows the advance of knowledge within this framework. But the emergence of a new type of society will change the methodology of research, Lukács says in *History and Class Consciousness* (1923), but without describing in details his ideas about this problem.

A very different variant of "leftish" understanding of science was worked out by Bogdanow. It was also based on the conception that different classes have different cognitive positions. But in his conceptualisation the bourgeoisie needs knowledge for the purposes of control, while workers need knowledge to be able to change the things. (We have no place here even to sketch the important differences between Lukács's and Bogdanow's conceptions.)

Just opposite to this "leftish" understanding was a technocratic-economistic one. It maintained that the moving forces of the development of science are to be found in the development of the forces of production; however, the development of these forces was in general extremely restricted by the development of the means of production and often even by that of the working tools. Science was thus regarded as either the theory of the operation of machines, or immediately objective knowledge of Nature, and positivistic,

<sup>16</sup> We would like to remind the reader that in Max Weber's view, in history there operates an unstoppable process of rationalization (disenchantment) which brings along a new form of subordination. Lukács in his *History and Class Consciousness* tried to find an answer to (among others) this question too, regarding the bourgeois form of rationalization described by Weber merely as a half-way stage which should and could be surpassed. We should keep in mind that the view claiming the formal rationality of the scientific cognition of their time was common to Lukács and Max Weber, they differed in the manner of the "externalist" way of looking at science.

scientific objectivism was taken over and used as the epistemological basis. From here originates the view that for the enforcement of the scientific way of thinking we should get rid of all the "ideologies" hindering it, and that in line with the reductionistic view of society, the positive condition of the former lies in the improvement of the forces of production and of correct philosophy as ideology, or more precisely, in the demands that manifest themselves in the development of technology. On the basis of this scheme, demands are motivating factors and technology gives rise to tasks to be solved. A comprehensive survey of the latter calls for finding their theoretical foundations, that is how scientific theories are created.

At this point two remarks should be made. First, on this view the whole range of problems of epistemology and social theory, of the emergence of the modern scientific attitude qua an attitude has been eliminated. Second, we should recognize that Boris Hessen, who is often considered to be the "father" of so called externalism (it can be surprising enough) presupposed the autonomy of the development of scientific thought, according to its inherent and timeless laws, just as any other positivist. He only further supposed that the needs of technology exert a fundamental influence, being the strongest motive force for the acceleration of the elaboration of the theories. He was representative of an externalist internalism as an eclectic view.

It should not be surprising, even as regards the starting point of political stance, that the "leftish" position in the epistemological foundation of the history of science brought to the fore the emergence of scientific cognition as an attitude and its justification in terms of social history.

"Nature and its form of acquisition are social categories", Lukács repeats this often emphasized thesis in the *History and Class Consciousness* in his review of Wittfogel's book: and he goes on to say that the historical relation between natural science and bourgeois society is to be discussed as part of the reification of consciousness, itself being a consequence of becoming ruled by the developed commodity production in society. Just this is the thesis which Borkenau (himself a committed "leftish" thinker yet) discusses as guideline in his book titled *Der Übergang vom feudalen zum bürgerlichen Weltbild*.<sup>17</sup>

His starting point was provided by Cassirer's conclusion, who, purely descriptively, pointed to the emergence of the system of categories common to modern natural science and mechanistic philosophy, a conceptual structure that determines the changed manner of experience together with the emergence and rise of an epistemological critical attitude. Borkenau sets himself the aim of explaining the emergence of this conceptual structure in terms of some sort of Marxist social ontology. In his hypothesis, it is the transformation of the way of work organization, i.e. the substantiation of manufacture based on mechanical division of labour, which serves as the starting point. In this type of

<sup>17</sup> F. Borkenau, *Der Übergang vom feudalen zum bürgerlichen Weltbild*. Studien zur Geschichte der Philosophie der Manufakturperiode.

working process matter is reduced to “pure matter”—he asserts—to pure quantity having exclusively only spatio-temporal movement. But this outlook could become a world picture only in connection with those social struggles, in which the isolated individual appeared, getting into a mechanical relation with the given society. The new world picture and world view fitted in the social practice as a whole integratively and functionally, since it unified the bourgeois interest in the rationalization of production and the transformation of social conditions, and it supported such a science, which guaranteed scientific knowledge corresponding to the new form of production and at the same time could function as an ideology.

The direct fate of Borkenau's hypothesis is rather well-known. Here we have in mind Henryk Grossmann's answer (at that time also a member of the Frankfurt School, both of them having nothing in common with the later Critical Theory approach), in which he tried to point out with regard to all the essential issues, that Borkenau's picture of natural science as the logic of the new world organization and the development of society in the early modern age is untenable.<sup>18</sup> Grossmann pointed out rightly that at the beginning of the 17th century, organic manufacture simply did not exist yet, thus the explanation of the emergence of the modern scientific attitude and world picture in terms of it is pure fiction. Grossmann, as the representative of the economist-technologist Marxist view of the development of society, wanted to lay stress on the role of machines, which however was held by some contemporary non-Marxist authors, too.

Borkenau set out to defend the “final decisive role” of the development of the forces of production, and in line with this thesis connected the acceptance of science as an objective system of knowledge with an empiricist-inductivist epistemology. In his analysis, it was first in the development of early capitalism where the systematic application of machines took place increasingly, and experimenting with them which became more and more regular had lead as early as the age of Leonardo to the recognition of fundamental mechanical laws as well as to the fact that the mechanical outlook became a world picture. As regards Descartes, the achievement gained by means of studying machines is summed up.

The history of reflections on Borkenau's hypothesis falls into two periods, relating to the publication and republication of the respective work. In the 30s a historian like Lefèbvre pronounced in favour of it. In his selective reception he is speaking of Borkenau with praise as he asserts a point of view in which the development of science is embedded in the development of society, without reducing it to a pure epiphenomenon. Lefèbvre is right, when stating, that Borkenau, who was operating with intrinsic contradictions appearing necessarily in social life, succeeded in evolving a synthetic outlook. Really,

<sup>18</sup> “Die gesellschaftlichen Grundlagen der Mechanistischen Philosophie und die Manufaktur”, Alcan, Paris 1935, in *Zeitung für Soziale Forschungen*, IV.

Borkenau did not try to understand the social determination of cognition as a mechanistic reflective process.

At the same time, on the part of the professional historians of science, Borkenau's hypothesis was in general rejected. I think there were two reasons, one is factual, the other ideological closely connected with each other.

The factual one is as follows: the early conceptions of social history of science in general did not do anything like that "conceptual analysis"—as it was called later by I. B. Cohen—which was developed later on by Koyré and reached artistic heights. They remained silent as regards conceptual analysis, first because, in line with their reductionistic approach, they either did not feel the jump leading from *du monde de l'a peu-près à l'univers de l'exactitude* (Grossmann for example) or they remained content with the examination of presumed external conditions of scientific knowledge (Hessen) or examined the emergence of the modern scientific attitude as world view and ideology only in very general terms (Borkenau).

Besides, rejection had an ideological reason as well. In the circumstances of the mid-thirties, the thesis of the autonomy of mind and that of science seemed for the liberal outlook ever more to be a part of the defence of human freedom. There followed the age of Mertonian norms and of the Popper's *Logik der Forschung*, of Koyré's conceptual analysis, of Hall's history of ballistics and of Society for Freedom of Science delimiting the fundamental outlines of how to conceive science and its history. It is characteristic that the belief in the autonomy of scientific development (at least as a part of the autonomous development of mind) not only belonged to the self-identification of a historian or a philosopher of science, but it has been defended in a rather aggressive way after the Second World War.

The changed atmosphere of the 60s and 70s gave place again to the socio-historical conceptions of the development of scientific cognition, too. Within Marxism, for example, in its Western versions, there is some sort of renaissance for Borkenau's thoughts as a theoretical orientation.<sup>19</sup> This trend at the same time sets the task that now relying for example on Koyré's achievements as the basis, the defence of the materialist epistemological stance should be unified with the socio-historical explanation of the rise and development of scientific knowledge in a differentiated reflection.

In the light of the theses of under-determination and theory-ladenness respectively, and in that of the problems raised by present-day trends in the sociology of knowledge, works on the social history of scientific cognition of the period ranging up to the 30s shared a mistake common to all of the cited authors. Namely, they presumed—for this or that reason—that scientific cognition does have some autonomous and consequently closed law of

<sup>19</sup> We have no place here to praise the excellent article of J-P. Chrétien-Gonie and Christian Lazzeri ("L'esprit du mecanisme, science et société chez Franz Borkenau", 1985, Paris, CBRS) that we could read in the last moment before lecturing in Berkeley.

development when already emerged. With this assumption they ruled out in advance the possibility of putting the question in terms of "micro-sociology", allowing that scientific cognition advances by evolving alternatives and that the decision among them could be decided on the basis of the microsocial atmosphere. In other words, not thinking of that possibility they excluded too early the possible social history of scientific cognition in the level of the fine structure. All the same, they are distinguished positively from present-day "microsociological" trends by the acknowledgement that social macrosystems have an impact on the development of scientific cognition as attitude. So they cannot be accused, like some "microsociological" analyses today, that they wanted to explain such very general transformation of scientific thinking as that of the new epistemological attitude behind the emerging quantum mechanics by reducing the social structure for local factors exclusively.

For the positivists, science only needed the cessation of social hindrances because the scientific attitude was seen as natural one. For Scheler just as for Veblen society was a necessary positive condition of the emergence of the modern scientific cognitive attitude which was not a natural one, though understood as the objective one.<sup>20</sup> Because such early writers as they were not disturbed yet by those serious problems like the discontinuous change of ontologies, the possibility of different correct experiences, the production of alternatives within scientific cognition, they only saw their task as explaining the emergence of the positivistically understood scientific objectivity, and trying to find the positive social conditions of the cognition processes so understood.

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<sup>20</sup> R. Morton (1938) looked for these positive conditions when, besides technology's direct needs, he attached importance to Puritan ethics, to previously accepted values in society. But in opposition to Scheler, he was convinced that the most important factor in the emergence of modern scientific thinking was the internal development of itself.