

Bernays Project: Text No. ??

# Basic Considerations on Epistemology (1937)

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(Grundsätzliche Betrachtungen zur Erkenntnistheorie, 1937)

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Comments:

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<sup>279</sup> The doctrines of knowledge a priori and of exclusive empirism [*ausschließender Empirismus*] oppose each other in the epistemological discussion. The a priori view is characterized by the claim that we are in possession of certain pieces of knowledge, being originally contained in reason although coming to actuality only through stimulation by sensation, that can be expressed in the form of general laws in a final way if having brought to full consciousness. This doctrine furthermore maintains that those a priori knowable general laws contain the principles for exact natural science, and that especially the method of the formation of theories of physics is determined by them in a definite and final way, so that, after having found these principles, there is no further development of speculation in physics in any essential sense.

Thus, according to KANT, classical kinematics forms the necessary framework for all of physics. The principles of NEWTONian dynamics, too, are

regarded by KANT as final principles of physics, and by this the task of research in physics is restricted to finding mechanical models for explaining the different phenomena.

(There are even further restricting conditions which are according to KANT, philosophically deducible: so, e. g., that each fundamental power has to be a central power, and also that there has to be a temporarily immediate long-distance effect.) |<sup>280</sup>

Anyway, in this extreme form the a priori doctrine cannot be brought into harmony with today's physics. If one is willing to keep it, one has either to reject the ideas [*Gedankenbildungen*] of today's physics in principle, or one has to weaken the a priori standpoint by giving such a broadminded interpretation to the principles maintained to be a priori valid that they become compatible with present physics.

The behaviour mentioned in the first place appears to be a dubious dogmatism. The following reasons, however, speak against the other procedure:

1. Even if the formulation of the principles can be kept using by a broadminded way of interpretation, in most cases in doing so, an essential element [*Moment*] what forms the persuasiveness of a principle is lost.

E. g., the principle of the preservation of substance is connected to the idea that substance is that of which a concrete thing consists. If one now interprets this principle in the way that it only expresses the validity of preservation laws, then that intuition is given away, and then the principle has in no way any a priori suggestive power.

We can illustrate this state of affairs with the law of the preservation of electric charge. As a consequence of the idea of substance this law would

have to say that either the positive or the negative charge is preserved each for itself. According to today's physics, however, the law is valid only in that sense that the algebraic sum of positive and negative charge remains constant. This is certainly a preservation law as well, but this has nothing to do with the idea of substance and has by no means any a priori plausibility.

2. The possibility to keep the wording of a principle in face of transformations of physical basic views depends on the special quality of the, at a time, new theories, and |<sup>281</sup> it can hardly be assumed as certain in advance, that in all cases the change of the views has to be such that that possibility of keeping the formulations stands.

In view of this state of affairs one will look for a philosophical opinion that exempts us in a radical way from the necessity of retreats or unsatisfying defenses.

An extreme empirism aiming at completely reducing science to immediate data of sensitivity presents itself as such a radical standpoint. According to this opinion science consists of nothing else than an arrangement and comprehension of sense data following the aspect of the greatest possible clarity if all additions are slipped off which are not necessary and dubious.

It has been argued, however, against this opinion that the simple arrangement of sense data does not without any effort result in objective states of affairs and connections. The mental process which leads from sensual facts to the determination of objective factualities, is no simple one, anyway. This has insistently been asserted by KANT, and we absolutely have to consent with him in this case.

Beside this, that extreme empirism is completely incapable of making

the method of testing scientific claims with the help of new experiments.— Especially the fact that very small effects of observations may possibly cause a revolutionary change in scientific theories shows how far the procedure of natural science is away from simply registering sense perceptions.

A moderate empirism takes these facts into account that speak against extreme empirism<sup>282</sup> into account. On the one hand, it anticipates the kind of objectivity with which we deal in our everyday life, but also in experimenting, and furthermore it acknowledges the essential role of those assumptions by which statements which formally claim general validity are stated by way of trial.<sup>1</sup>

A moderate empirism of this kind leaves open the epistemological questions which concern on the one hand the formation of this everyday view on nature (the “morphological world view”, according to the designation by FRIES and APELT), on the other hand the formation of hypotheses and theories.

By this we are led back to our last problem: to look for a philosophical position concerning knowledge by experience which fundamentally excludes the conflicts with the progressive scientific formations of ideas in which we are led by the KANTian theory of a knowledge a priori. Soon, we want to formulate the question in a more distinct way: Is a radical dissolution from such restrictions for the methodology of science following from KANT’s apriorism compatible with perpetuating essential thoughts of the KANTian

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<sup>1</sup>Most scientifically oriented philosophers stand today for a moderate empiricism. RUDOLF CARNAP, as well, who had maintained an extreme empirism in the beginning, has recently turned towards a moderate empiricism.

criticism of reason?

This kind of question suggests to us to distinguish two essential marks [*Momente*] in the conception of the KANTian theory of experience: the idea to look upon our knowledge from experience not as a mainly receptive procedure and also not as an immediate view [*Schauen*], but as a product of our mind stimulated by sense impression, and on the other hand the assumption that in this product of the mind everything essential is determined by invariable marks of the nature of the mind. |<sup>283</sup>

This last assumption comes from the fact that Kant was led in the conception of his theory by the following consideration: The principles of exact sciences are knowledge a priori. As such they are, however, only understandable, if they express conditions of the possibility of experience. Here is on the one hand the conviction of the a priori epistemological character of the principles of geometry and mechanics effective, i. e., exactly that mark [*Moment*] that we had considered as problematic, and furthermore the opinion that there is no knowledge a priori of things independent of us, as they are “in itself” [*an sich*], the same argument which forms the “formal idealism” named that way and criticized by FRIES. This FRIESEan criticism gets through. Regardless of it, however, FRIES maintains the essentials of the KANTian theory, he even almost strengthened the subjective turn in epistemology. Like KANT, he was concerned with understanding the standpoint of classical mechanics, which he also took for the final scientific view on nature as philosophically necessary, and at the same time to differentiate it in its competence from the religious world view. Both seemed to be realized most successfully by KANT’s procedure of the “Copernicanian move” of

approaching.

If we now do not use the principles of NEWTONian mechanics as a priori knowledge any more, we get rid of that KANT-FRIESian form of the problem, and we will—while keeping the idea of the productive part of mental activity in the knowledge of nature—substitute the extreme position according to which “intellect [*Verstand*] prescribes nature its laws”, by a more natural one.

Such a more natural position seems to be given in the first place given through the doctrine of mathematical knowledge and its relation to physics.—It is obvious that the laws of geometry go |<sup>284</sup> beyond what can be determined by observations or inferred from observations. On the other hand an opinion cannot be satisfying in which the essential role played by our experiences concerning the mobility of rigid bodies for stating the basic laws of geometry—as it was shown especially by von HELMHOLTZ— is completely ignored. We can absolutely do justice to the special character of the intuitive (i. e., guided by intuition) formation of ideas, without excluding by this the very plausible opinion that this geometrical formation of ideas is done in connection with the mental treatment of fundamental observations, given by handling with rigid bodies. Furthermore: It has to be absolutely accepted that the idea of space, and the more, the idea of time constitutes forms of our intuition, and that they cannot be reduced to sensations and concept formations. Accepting this state of affairs does by no means force us to assume that physical spacehood and timehood is given only through our forms of intuition and that their laws are determined by these forms of intuition.

In freeing us from this presupposition, physics wins a good lot of specula-

tive freedom; the narrow framework of mechanistics is replaced by the one of the mathematical as such. Accordingly we can put the task of physics generally as inquiring into the state of affairs of nature according to the question how far mathematical laws can be discovered and how far a homogeneous understanding of the connections will be possible by this.

In a certain sense we come back with it to the old program of the Pythagoreans. Admittedly we have to keep away from hyostasizing the mathematical in a mystical way—as those supposedly did. According to its nature the mathematical cannot <sup>285</sup> be the real itself, but only something connected to the real.

On the other hand we are not prevented from accepting that this element [*Moment*] of the mathematical can be found in reality even independently of our cognitive disposition. Therefore we also need not give the doctrine of a “division of truth in different world views” (according to an expression by APELT) the sense of a diminution of the significance of physical knowledge. Such diminution of validity is unavoidable if mechanistical physics is taken as a basis, because of the claims of exclusiveness and completeness being inherent to the mechanistic view on nature. For our view on physics, however, in which only the mathematical form of concept formation and of the connections is valid as a general characteristic mark, but not the realization of a specific view on nature as basis, that demand becomes invalid.

It results as a further consequence of this opinion that the naive view on

things—we will briefly call it our “common view on nature”<sup>2</sup>—gains importance. In the KANTian philosophy and also in FRIES it appears as a simple preliminary stage of the scientific view. In dropping the assumption of a specific view of physics on nature our common view on nature obtains the role of a fixed starting point to which even theoretical research has to recur again and again in experimentally motivating its concept formations and assumptions. In particular this common view on nature has the following characteristics:

1. In it the complete constitution of the idea of objects is already carried out; it contains therefore also the intuitive<sup>286</sup> geometrical representation and the intuitive “construction” of the spatial order of objects as well as also everything that is necessary for handling the things in experiments.
2. It contains all those concept formations for describing the external and internal world being put down in the common colloquial language. In particular fundamental concepts like matter, the living, consciousness, cause, chance, etc. find here an unproblematical application.
3. There are neither reductions in it (e. g. from the qualitative to the non-qualitative), nor isolations of domains of objects. Everything given is regarded in connection. The heterogeneity of the material and the spiritual does not lead to detrimental effects, because connections are

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<sup>2</sup>The expression “morphological world view” is a bit misleading because it evokes the understanding that the characteristic mark of this standpoint can be found in its restriction to shapes.



followed only insofar as they present themselves empirically. The relation of sensual qualities to perception as well, and the fallacies arising from it do not cause principal problems for this view; everywhere [*allenthalben*] the concept formation and the language adapts itself to circumstances found. (We say, e. g., “this dress looks yellow in daylight”, or: “this piece of cloth feels soft”.)

A considerable part of empirical science, in particular of physics, fits well into the domain of the common view on nature. Some philosophers do not grant transcending our common view on nature by physics anyway. In this sense, e. g., ERNST MACH opposed against atomistic.

The tendency of such a restriction to the framework of our common view on nature is very understandable in respect to its advantages of intuitivity and internal coherence being due to this view on nature. On the other hand we have to realize that that coherence, be it as important for <sup>287</sup> our acting living and for our emotional attitude towards the world as it is, has nevertheless a perspectival nature, comparable with the homogeneity of a landscape. And we have furthermore to accept that the procedure adopted by speculative physics going beyond the common view on nature is a consequent continuation of the methods by which we also got already the knowledge of causal connections within the formation of the common view on nature. We shall demand for a philosophical conception of the view on nature that it deals with all aspects of this fundamental methodical conformity of the process of physics in its early stages and that of the newer speculative physics.

If we look for a suitable epistemological standpoint in respect to this task, the following aspects supplementing each other show themselves on the base

of the former considerations:

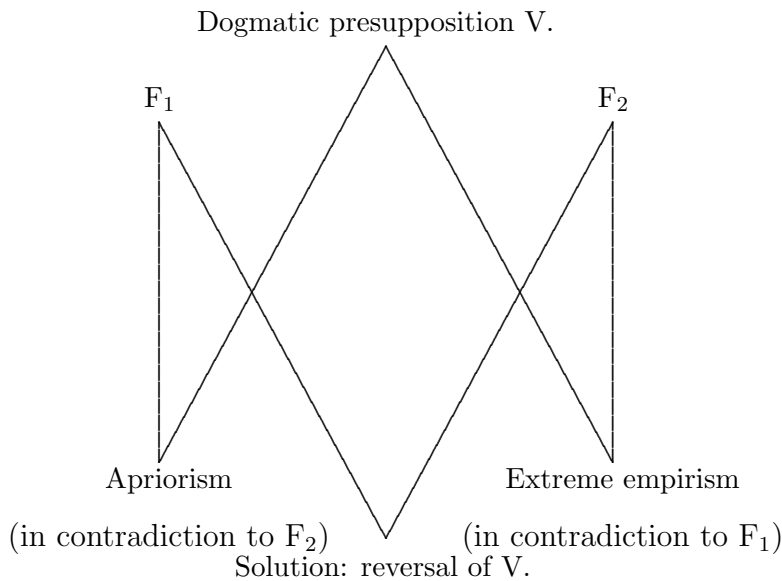
1. The standpoint has to be chosen such that it gives research the necessary speculative freedom. The activity of research may not be regarded as a mere application of a schema fixed in advance, but as a continually renewed mental production.
2. On the other hand the speculative freedom must not be understood as arbitrariness; the rational element in research has to be acknowledged which presents itself to us in the ready, fully developed parts of physics. The formation of a new physical view has to be understood as an interpretation with the help of which reason so to say reacts on a given situation of experience,—where in each case the interpretations derived in earlier stages of research appear as something belonging to the situation, as far as have proved to be successful and as far as they have fixed themselves.

According to such an opinion we are admittedly not in the position to determine the part of reason in knowledge based on experience in the form of a priori principles. At most it may be successful to describe it by formulating regulative maxims of research; but this is doubtful as well.

In any case, however, we consider the element of a rational interpretation as an essential part in the development of the science of experience being before us—of course not in these, in a bad sense rationalistic and by MACH justly criticized apparent proofs with the help of which deductions are obtained by devious means in cases where experimental experience is needed, but in the heuristic methods of consideration, and wherever new interpret-

ing general concepts are introduced, and with this the ground for new types of understanding is prepared: such as, e. g., in the idea of atomistic, in the method of explaining lawfulness with the help of the concept of probability, in the modification of the concept of matter with the help of the concept of field, in the introduction and application of the concept of energy, and furthermore in those ideas allowing the integration of different fields to a unified theory: the integration of the phenomena of gravity and astronomical processes of motion, the integration of optics and electrodynamics, the integration of geometrical relations of measure [*geometrische Maßverhältnisse*] and phenomena of inertia with gravity, and finally the latest view of wave and the corpuscular process as two aspects of one and the same reality.

If we compare the view presented with the two antagonistic opinions of pure apriorism and pure empirism described in the beginning we find that they differ from these opinions by dropping a presupposition common to both, namely the presupposition that reason, as far as it is important for knowledge by experience, would have to make itself felt [*geltend machen*] through knowledge a priori. We <sup>[289]</sup> can represent this connection with the help of a logical schema in the way, LEONARD NELSON was used to do it:



Dogmatic presupposition V: If reason is essential for knowledge in physics, it has to make itself felt through principles recognizable a priori.

Assessment  $F_1$ : The rational element is dispensable in research in physics.

Assessment  $F_2$ : There are no a priori determined principles in physics.

A priori consequence from  $F_1$  and V: We have a priori recognizable principles of physics.

Empiristic consequence from  $F_2$  and V: The rational element is dispensable for physics.

Solution: Reason makes itself felt in research in physics not through principles a priori, but in the progress of concept formation and the methods of explanation. <sup>290</sup>

The abandonment of traditional rationalism resulting in this way, proves in a closer view to be not only compatible with the acknowledgement of the significance of the rational, but also as favourable for it. The KANTIAN

philosophy resulted in a devaluation of the scientific view on nature in respect to its method and its validity due its restriction of natural research.

“On the theoretical field there is nothing more to find,” SCHILLER jokingly sums up the KANTian opinion. We will do justice to the significance of the rational in a better way, if we do not intend to finally fix a temporal stance of the view on nature, but rather take the nature of the development into account which is specific to the process of the mental confrontation of the creature with the environment as well as to all living beings.