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**The Inconsistency of Empiricist Argumentation
Concerning the Problem of the Lawfulness of Nature****

Abstract

The well-known *empiricist apories* of the lawfulness of nature prevent an adequate philosophical interpretation of *empirical science* until this day. Clarification can only be expected through an *immanent refutation* of the empiricist point of view. My argument is that *Hume's* claim, paradigmatic for modern empiricism, is not just inconsequent, but simply *contradictory*: Empiricism denies that a lawlike character of nature can be substantiated. But, as is shown, anyone who claims experience to be the basis of knowledge (as the empiricist naturally does), *has*, in fact, always already presupposed the lawfulness of nature, i.e. has assumed the *ontology of a nature lawful in itself*. If lawfulness is, more closely, understood as *dependency on conditions*, then the *functional* character of the laws of nature is involved with the consequence that *verification* is not to be taken as a mere repetition of measurements but as clarification of the *conditional structure* of the physical process. Furthermore the functionality of the laws of nature also includes a statement on their invariance (relative to certain transformations) and so their lawlikeness. This throws a new light on the *problem of induction*. Seen in this way it is hardly surprising that the notorious neglect of the functional aspect in empiricism has led to fundamental problems with the concept of the law of nature.

For analytical philosophy of science, empiricist argumentation in the form developed in modern times, especially by *Hume*, has remained binding until today.¹ While Hume's conception are of a general epistemological nature, in modern empiricism scientific-theoretical and methodological aspects have been added or even come to the fore. Nevertheless, Hume's central approaches, especially to the concept of causality and the principle of induction, and unfortunately also the difficulties involved with them,

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¹ See e.g. W. Stegmüller, Das Problem der Induktion: Humes Herausforderung und moderne Antworten, Darmstadt 1975; centrally also N. Goodman, Tatsache, Fiktion, Vorhersage, Frankfurt/M. 1975, ch. 3. Goodman's considerations, which mean an intensification of Hume's problem, are not dealt with in the following, since they are to be addressed in a separate study: D. Wandschneider, Das Paradoxe in Goodmans Paradox. Die Vernachlässigung des Funktionscharakters von Naturgesetzen als Grund der Paradoxie, in: Peres, Constanze/ Greimann, Dirk (ed.) Wahrheit – Sein – Struktur. Auseinandersetzungen mit Metaphysik. Hildesheim, Zürich, New York: Olms 2000, 231–245.

have remained decisive for neo-empiricism.² Envisaging here a *refutation of the empiricist argumentation*, especially of its Humeian core, the hope is connected with it that in this way notorious problem complexes of empiricist provenance will be got rid of.

In order to avoid misunderstandings, let me first point out that empiricism and empirical science are trivially not the same thing. Empiricism is a *philosophical* position whose criticism must not be misunderstood as a devaluation of *empirical science*. On the contrary such criticism is determined by the conviction that an empiricist theory of science, contrary to its actual intention, is not able to provide a philosophically satisfying *interpretation* of empirical scientific knowledge. So, as will be shown, empiricism is to be criticized also and especially for the sake of empirical science.

But hasn't that already happened? One can here – in order to historically mark two extremes – think of Kant's transcendental turn against Hume or, in the present, of R. Harré and E.H. Madden's recently developed anti-empiricist view.³ However, the Hume-critics carried out in the present context goes beyond the usual objections, if I see rightly, in that it aims at an *inconsistency prove* and thus not only at negating the empiricist position, but at *destroying* it. This may introductorily be explained in more detail:

I

Since causal connections per se are neither sensually perceptible nor logically provable,⁴ they can, so the well-known argument of Hume, only be based on psychical habituation to empirical regularities.⁵ The phenomenon of habit-forming that is claimed here can, of course, by being based exclusively on past experience, offer no guarantee of future experience. The inductive conclusion from the past to the future is therefore, according to Hume, logically unjustifiable, even though we are constantly drawing it in practice and in science.⁶ It would be conceivable that snow will taste like salt in the future, or that the trees will flower in winter instead of spring.⁷

If these considerations were correct, the possibility of empirical science would be called into question: Causality would me-

² See e.g. W. Stegmüller, *Probleme und Ergebnisse der Wissenschaftstheorie und Analytischen Philosophie I*, Berlin, Heidelberg, New York 1969, 438 ff.; F. v. Kutschera, *Wissenschaftstheorie*, München 1972, 197 ff.

³ R. Harré and E.H. Madden, *Causal Powers*, Oxford 1975.

⁴ See D. Hume, *Eine Untersuchung über den menschlichen Verstand*, Leipzig 1928⁹, 37 ff., 54 passim.

⁵ Op. cit. e.g. 55ff.

⁶ Op. cit. 44–51.

⁷ Op. cit. 46.

rely be our subjective interpretation, induction a completely unsecured conclusion from the observed to the unobserved.⁸

Kant, on the other hand, develops a transcendental-philosophical approach to justify the bindingness of empirical knowledge. He carries out a reversal of perspective, according to which subjective conditions of experience are nevertheless of objective relevance, in that the object is supposed to be essentially co-constituted by the subject. Admittedly, Kant's transcendental turn thus initially only has the character of a *counter-concept* to Hume's position, which thus, however, is *by no means refuted*. Kant claims the scientific character of the causal category, Hume denies it. Kant believes that he can refer to the objectivity of natural science as a fact⁹ that Hume doubts, at least epistemologically, in short: As long as no real refutation of the empirical approach has been made, opinion stands against opinion, and the decision for one or the opposite seems to be rather a question of philosophical taste or world view.

The analogical is true for the Hume criticism recently put forward by *R. Harré* and *E. H. Madden*.¹⁰ Hume's assumption of isolated perceptual events is countered here by a thing ontology, according to which things have a dynamic disposition ("nature") by virtue of which they *interact* in a specific way – certainly a thought worthy of consideration, of which, of course, it cannot be claimed that the authors have given a satisfactory explanation. The introductory formulated thesis, that "there can be no doubt that the Humeian conception of causality ... must be wrong"¹¹ basically remains merely reassuring.

In contrast to this, in the following evidence shall be provided that Hume's argumentation is *contradictory* and therefore lapses into self-cancelling – since Socrates still the strongest form of refutation, which alone achieves the real *destruction* of a conception, while one may or may not agree to a mere *alternative position*. Subsequently, it will be examined what consequences result from the destruction of the empiricist conception in ontological and in scientific-theoretical and methodological terms.

II

In the sense of the intended criticism, it should first be pointed out that there is a certain *ambiguity* in Hume: Hume's doubts – in *W. Stegmüller's* formulation – on the justification of "truth-conserving conclusions", concluding from what is observed to what is unobserved,¹² seems to be of undeniable plausibility up to this day. *Stegmüller* calls this the "Hume challenge".¹³ However,

⁸ See *Stegmüller, Probl. d. Ind., op. cit.* 6.

⁹ *Kant, KRV B 20; Prolegomena § 15.*

¹⁰ *Harré/Madden, op. cit.*

¹¹ *Ibid.*

¹² *Stegmüller, Probl. d. Ind., op. cit.* 5; also 6.

¹³ *Op. cit., Title of the 1. section.*

this plausibility suffers from the fact that Hume does not distinguish between natural *processes* and natural *laws*. Hume's argument that the course of nature could change¹⁴ naturally *means* a change of the *laws of nature*,¹⁵ because changes due to processuality trivially permanently take place, *even* if the laws of nature are *preserved unchanged*: In the course of a movement, the place and, in general, also the state of movement of a body changes; interaction processes can result in manifold changes of state, e.g. of the shape of a thing, the color, the force field, etc. In Hume's work, there are repeatedly formulations which are clearly to be understood in *this* sense, but sometimes the other way round, for example, when the occurrence of unexpected events is attributed to altered effects of forces, for instance "hidden" forces or the "secret effectiveness of conflicting causes".¹⁶ But, to be sure, such explanations assume an *objective lawfulness* in the matter itself, which would be incompatible with Hume's subjectivist causal interpretation – a *discrepancy* that is, however, *repairable*, since the formulations mentioned can be abandoned without harm to Hume's actual line of argumentation.

Irreparable, on the other hand, is an argumentation that is not only discrepant, but *logically contradictory*. Such contradictions seem to be contained in Hume's view; there are four points I would like to emphasize in this respect:

(1) Hume interprets the causal connection as a habit-forming process *brought forth by* observed regularities. But that means that he assumes the habit-forming is *caused*, which cause in turn *cannot* be traced back to habit-forming, since it rather is to be underlying that. Hume's formulations initially conceal this; instead of causality, for example, he asserts that an observed regularity "leads to"¹⁷ that a habit is "formed" and that this habit then "creates"¹⁸ an expectation for the future. But this cannot belie the fact that Hume *already presupposes* for his criticism what he *criticizes* – namely a kind of *real* causality, albeit here for inner-psychic processes – and thus becomes logically contradictory on this point.¹⁹

(2) Another inconsistency is concealed in Hume's sceptical standard argument that a change in the seemingly unchanging laws of nature remains conceivable,²⁰ whereby the old idea of an

¹⁴ Hume, op. cit. 46.

¹⁵ E.g. op. cit. 49: "In vain one claims to have learned about the nature of bodies from past experience. Their hidden nature and consequently all their effects and manifestations can change".

¹⁶ Op.cit. 103.

¹⁷ Op. cit. 47.

¹⁸ Op.cit. 113.

¹⁹ The induction conclusion is also implicitly assumed to be valid here; for Hume's theory of habit formation contains *as a theory* the universal statement that observed regularities will *always again* lead to habit formation.

²⁰ Op. cit. e.g. 49.

all-devouring time, which nothing can withstand, is obviously in the background. Now, anyone who assumes that the future can be totally different from the past has in any case also assumed that a *distinction* can be made between past and future and that memory is intact, i.e. that the past can be *retained* as past. Only in this way can the concept of time be used meaningfully. Anyone who argues that nothing can stand up to time has always assumed that the concept of time is meaningful and has thus implicitly assumed that *there is* something that can stand up to time, namely such as memory. The thesis that nothing stands up to time must, in order to be meaningful at all, exclude memory and is therefore not tenable in its general form. The weakening of the thesis that there is *possibly* nothing that stands up to time is of no use in this respect; for this formulation, too, *must* already contain 'time' as a meaningful concept and therefore presuppose a time-bridging memory in *any* case.

(3) What has first been stated here for the memory of the subject can also be transferred into *objective* conditions: So, in order to objectify the concept of time, we use clocks, which must function reliably in the sense of a binding concept of time. The least that could be demanded in the present context is that they correctly indicate the difference between past and future. The concept of an all-devouring time therefore includes in any case the assumption of an *invariant* direction of the clocks – whatever that may mean. Such an opinion must therefore presuppose what it denies – that *there is* something that can stand up to time – and thus likewise proves to be *contradictory*.

(4) Finally, in a very fundamental sense the question arises: Is it even *sensefully conceivable* at all that things do not behave invariably-lawlike, but change at random over time? Now, that this would lead to absurd consequences for the everyday handling of things – our entire world orientation is based on the lawful behaviour of things – cannot be regarded as an argument in this context. However, in the sense of an immanent criticism of empiricism in any case one will be allowed to assume that empiricism as such at least grants the *possibility of experience*. Here an old argument of Popper's becomes important: Even the simple observation: 'There stands a glass of water' contains general terms 'glass', 'water', which as such imply a *lawfully-invariant* behaviour:²¹ How else could I be sure that it is really glass and not plastic, water and not petrol or even hallucinations? We can only speak of 'glass' and 'water' if the substances correspond to the *behavioral laws* of glass and water. As the fulfilment of defining conditions and condition dependencies must be checked by measuring technology, the argumentation can even be extended to the point that empirical science necessarily remains dependent on apparatus that works reliably and that means: lawfully. It would not make much sense to carry out spectroscopic measurements with a

²¹ See K. Popper, *Logik der Forschung*, Tübingen ⁵1973, 61, 76, 378.

dubious spectroscope – the data obtained can only be relevant if the measuring instrument works reliably.²²

In short: Insofar as empiricism obviously always already presupposes the possibility of experience empiricism has always already *presupposed a lawfully-invariant behaviour* of things and measuring devices, which it as empiricism in turn essentially questions. Such an argumentation is vitiously circular, i.e. logically contradictory and thus not a philosophically tenable position. Even those who admit already most primitive forms of experience of nature (like the empiricist) thereby have always already assumed the laws of nature, which must be regarded as an inescapable prerequisite of all empirical recognition and therefore cannot be consistently disputed by empiricism.²³

III

With the general assumption of a lawful nature at all, of course, knowledge of the *specific laws of nature in each case* is not already claimed. The explanation of these laws is a matter of empirical research, whereby in the sense of the *general* natural lawfulness to be assumed necessarily, it is to be supposed that with the possibility of empirical error also the possibility of *error correction* exists, in other words: As little knowledge of experience can claim absolute character due to its finiteness, so much is certain that the occurrence of unexpected deviations in the behaviour of an object *basically cannot be interpreted as a miracle*. If the object does not show the expected behaviour, this is rather to be seen as a compelling hint to still hidden dependencies, which can be tracked down by systematic variation of the experimental conditions: This is guaranteed by that general natural lawfulness, the assumption of which, as explained, becomes inevitable as soon as experience is accepted as source of knowledge. Since this is self-evident for every empirical science, it cannot avoid the assumption of a nature that is lawful in itself.

From this point of view, light falls on the *problem of the empirical basis* of natural science, too: According to Popper's well known opinion, a lawfulness statement of the kind 'all swans are white' cannot be verified (since all swans of the past, present and future cannot be verified in principle), but it can be falsified, namely by a basic sentence of the kind 'there is a black swan'. Admittedly I must be sure that the facts formulated in a basic sen-

²² It goes without saying that its mode of operation must also be known if the measured data are to be *interpretable* at all; i.e. the device must not only be reliable, but a *theory* of it is needed, too, that explains what is measured at all – a prerequisite that was already recognized by P. Duhem and later pointed out as the *theory ladenness* of experience; see P. Duhem, *Ziel und Struktur der physikalischen Theorien*, Hamburg 1978, 188ff. The facts found by science, Popper says quite in this sense, are therefore always facts in the light of theories (Popper, op. cit. 378, 76).

²³ See D. Wandschneider, *Die Möglichkeit von Wissenschaft. Ontologische Aspekte der Naturforschung*, in: *Philosophia Naturalis*, Bd. 22, Meisenheim/Glan 1985, 200–213.

tence really exist and are not just hallucinated or, methodologically speaking, that it is a *reproducible effect*.²⁴ But 'reproducible' can only be a *lawlike* phenomenon. Thus the basic sentence already implies lawfulness which, as Popper admits, must itself be "corroborated".²⁵ 'Corroboration', however, is nothing else but a *preliminary verification* (which tries to avoid the verification problem in the indicated form by this weakening). This makes clear that even for the *falsification* of a lawfulness statement one has to refer back to an already verified lawfulness statement, or in other words: Without positively secured data, not even the negative business of falsification is possible. Falsification requires verification; *claiming the possibility of falsification and denying the possibility of verification is contradictory*.

Popper notices the problem, but reacts to it in a basically *conventionalist* way: Basic sentences should ultimately only apply by fixing them and be *recognized* as such by the scientific community²⁶ – whereby already Kuhn-Feyerabendian premonitions are conjured up. Popper's dissociation from conventionalism has in this context rather verbal character: The here made subsidiary argument that by such determinations is disposed only of singular, not of universal propositions²⁷ falls behind Popper's own insight, already apostrophized in the previous chapter (see II), that also singular propositions contain universals, which as such imply a lawful behaviour and thus universal lawfulness statements. But exactly this is the *reason* for the fact that, as explained, falsification already presupposes verification or, ontologically turned, the assumption of an inherently lawful nature is indeed inevitable as soon as only the possibility of the most primitive forms of experience-knowledge is asserted.

IV

That the condition of a lawful nature belongs constitutively to the possibility of empirical knowledge can be understood more concretely in the sense that only in this way there is the possibility to prevent or correct the immediate *sensory illusion* which has repeatedly discredited experience philosophically. The perception of the rod broken in water is corrected and explained by the *law* of refraction and thus, instead of being a mere subjective sensory illusion, it can now also be understood as an objective natural phenomenon. Indeed, experience can only have *cognitive* character on the basis of a previously established natural law, without which it would not at all be binding.

This may sound well Kantian, but it should be noted that it has been developed here completely independent of a theory of transcendental object constitution à la Kant. Basically, less than

²⁴ Popper, op. cit. 19, 54, 153, 156ff.

²⁵ Op. cit. 55.

²⁶ Op. cit., sect. 29, 30.

²⁷ Op. cit. 74.

is claimed by Kant – not the categorical formula: 'Nature *is* lawful', but only the hypothetical one: 'He who considers experience knowledge possible has thereby also taken over the ontology of a nature that is lawful by itself'. *Whether* on the other hand experiential knowledge is possible in any form, however, remains undecided here.

However, one might ask whether the possibility of empirical knowledge *can* ultimately be denied at all: For every *denial* implies communication and communication partner with physical organization, whose normal, and that means again: *lawful* function must be presupposed for this. Seen in this light, it would indeed be inconsistent to want to deny the knowledge of experience and natural law, since such denial already presupposes the very thing it denies. Even those who attempt to doubt in linguistic form the regularity of nature or the possibility of experience will be lying to themselves, inasmuch as they already claim that what they doubt for their linguistic accomplishments and even for their acts of thought, which also have a natural side. From this point of view, there is a lot to be said for accepting the assumption of an inherently lawful nature in a categorical sense. The impossibility of consistently denying such an assumption thus refers – which would have to be clarified in more detail in a separate investigation – to an *inescapable ontological structure* and thus the basic constitution of nature itself.²⁸

V

But can such a general principle as the lawfulness of nature have *concrete consequences* at all? First of all, it is necessary to remember what was said in section II, according to which unexpected deviations in an object process cannot be interpreted as miracle and therefore motivate the search for hidden conditions of such anomalies. The principle of the lawfulness of nature thus has an initial and at least pragmatic function for the process of scientific research. At the same time, it suggests a view that lawfulness is to be understood more closely as the *dependence of a process on 'conditions'*. At this point, a systematic explanation must be dispensed with.²⁹ Instead, reference is made to the factual procedure of natural science, which aims at the formulation of (quantitative) *functional laws*. Why? Obviously because with the help of the mathematical concept of function conditional depen-

²⁸ See also Wandschneider, op. cit. The above argumentation represents, as it were, a parallel to a more principled consideration, according to which the one who denies the binding nature of reason must, however, argue rationally (if he wants to be taken seriously) and, in this respect, always presupposes reason. The insight into this *fundamental undeceivability of reason* is also the basis of the argument for an 'ultimate grounding' of ethics as asserted by K. O. Apel; see, for example, K.O. Apel, Transformation der Philosophie II, Frankfurt/M. 1973, 402 ff. Wandschneider, Ethics between Genetics and Metaphysics, in: Universitas Jahrg. 38 (1983).

²⁹ See also the remarks on this subject in: Wandschneider, Mögl. v. Wiss., op. cit. section III.

dencies can be represented. The functional relationship of the law of gravity, for example, shows directly that and how the force of attraction depends on the distance of the gravitating masses. The functionality of a physical system reveals its specific condition structure and thus the underlying lawfulness, which only becomes concretely graspable in the functional condition dependence.

Now this has direct consequences for the *verification problem*. If lawfulness is understood essentially as *condition dependence*, then the *sense* of verification of lawfulness statements is also affected:

Of course, to want to ensure the validity of a law of nature for *all* places and times through empirical testing is a hopeless undertaking. If this were the purpose of verification, as empiricism suggests, verification would indeed be impossible. The space-time-spanning generality of lawlike statements then inevitably involves, in view of the finiteness of all experience, the induction problem – a scandalon of empiricism,³⁰ which repeatedly presents its efforts to provide a rational reconstruction of empirical science as doomed to failure.

The *conditional character* of the lawfulness of nature, on the other hand, suggests a *more essential sense of verification*, which is, in general, in accordance with the concrete practice of scientific research. If lawfulness is understood as condition dependence, then verification would accordingly be understood as a check of assumed dependency relationships, e.g. the distance dependence in the law of gravity by systematically varying the distances of gravitating masses and determining the respective gravitational force.

One might object that even the examination of dependency relationships can never be complete. This seems to be important in so far as many points of a curve do not uniquely define the corresponding function, i.e. with many measurements the functionality of a system remains strictly speaking indeterminate, so that in this respect there seems to be an analogy to the induction problem: Instead of the time aspect there is a structural aspect. An important *difference*, however, is that structural uncertainties can be *arbitrarily limited* with corresponding effort by more densely laying the measurements.

It may be further objected that for relevant measurements, as already explained above,³¹ the proper functioning of the measuring instruments used must always be demanded: Must not *their* condition structures already be completely known? – which of course can only be the case approximately, too. But this does not result in a fundamental problem, but only in a technical one: Dubious measurement results can be checked with similar measuring instruments and the functioning of the instruments themselves can be tested with the help of other devices, etc. The closer

³⁰ See Stegmüller, *Probl. d. Ind.*, op. cit. 1, where the induction problem with C.D. Board is described as "the ignominy of philosophy".

³¹ Section II.

the network of such tests is woven, the more reliably the conditional connection of a natural phenomenon becomes comprehensible and controllable, in short: All empirical procedures remain, to speak with Popper, in principle the object of criticism, but the criticizability can be reduced more and more and the certainty of empirical knowledge can be increased almost arbitrarily. Top technical achievements bear eloquent witness to this.

It should be noted that the possibility of initially hidden conditions does not constitute a fundamental objection either. Certainly: It is possible that a parameter that is constant here and now will only become visible when changing location or at a later time. It could be that a certain effect depends, for example, on the latitude or the phase of the moon. But that is naturally verifiable. That is why experiments are repeated at different places and at different times: they must be *reproducible* identically; if they are not, the conclusion of hidden dependencies is obvious.

Altogether: If the lawful character of nature is generally presupposed – and just this presupposition cannot, as has been shown, be consistently disputed – and if the laws of nature are more concretely conceived as dependence on conditions, verification no longer has the absurd sense of continued measurements of the same issue, but amounts to the examination of objective dependencies on conditions.³² Only in this way is the immanent structure and functionality of the object itself taken into account. The difficulties that can occur here are of technical, not fundamental nature. They do not question the general lawfulness character of natural being, but rather confirm it: For ignorance of conditions is not the same as absence of conditions and thus of natural lawfulness, i.e. also 'hidden' conditions are in any case conditions of lawful behavior. Moreover, the explication of lawfulness as condition dependence finds practical verification in the fact that just in the most highly developed natural sciences functional laws are of central importance.³³

VI

All the more surprising is the fact that the functional character of laws of nature has received practically no attention in analytical philosophy of science, at least not with regard to possible philosophical implications.³⁴ Instead, the problem of natural laws is tirelessly discussed using the example of *qualitative* sta-

³² See also D. Wandschneider, *Formale Sprache und Erfahrung*, Stuttgart 1975, ch. M 6.

³³ The predominance of the concept of function over the concept of substance was rightly established by E. Cassirer ('Substanzbegriff und Funktionsbegriff', Darmstadt ³1969) as a characteristic of modern science.

³⁴ One example for many is the voluminous work of E. Nagel, *The Structure of Science*, New York, Chicago, San Francisco, Atlanta 1961, which provides a broad discussion of the scientific concept of law, but only states the functional character of natural laws without philosophically problematizing it (e.g. 77 f.).

tements of the kind: 'All swans are white', 'All metals are conductive', etc. It is not astonishing that verification could only be understood as an infinite sequence of cases of realization. Since the conditional character of natural laws thus remained concealed, there was also no formation of a concept of verification in the sense outlined above.³⁵ To what extent also the notorious *induction problem*, i.e. the problem of justification of invariance of natural laws spanning space and time, is to be understood as a consequence of the scientific-theoretical neglect of the functional character of natural laws, is to be finally only hinted at.

Let us again take the law of gravity as an example: The force with which two given masses attract each other is known to depend solely on their distance. However, what only depends on the distance is independent of *where* such a dependence takes place, since the determination of distance as a pure *difference* quantity does not depend on the region of the world, but has invariant meaning,³⁶ in other words: The distance dependence of the law of gravity *contains always also* the statement that it is *invariant* to displacements in space. The same applies to function laws that depend on time differences.³⁷

This simple formal mathematical relationship reveals a principle-theoretical highly significant connection: *Functionality* and *invariance* are obviously not independent views. Rather, *the functionality of the lawfulness of nature already latently contains a statement regarding its invariance*. This may be surprising at first, but is explained by the fact that the description of the function of a thing, as explained, reveals its *condition structure*. The conditioned, however, together with its conditions: this both together is then no longer a conditioned, but in sum an invariant un-conditioned in itself. This, it seems to me, is the actual *reason* for the constitutive connection between functionality and invariance in the concept of natural law.

Popper's argument, which has been repeatedly referred to here, that the identification of a thing with respect to its functionality always implies a lawful behaviour, finds its justification at all only in the shown connection of functionality and invariance.³⁸ The statement of a *functional connection* justifies at the same time what scientific practice, following its instinct of reason, has always assumed: the *invariance* of natural laws, and that

³⁵ This neglect of the conditional character has, by the way, also hindered the development of an appropriate concept of natural *possibility*, which makes understandable the considerable difficulties of the theory of science with the *concept of disposition*; see Wandschneider, Mögl. von Wiss., op. cit.

³⁶ In the general theory of relativity a more general determination of distance is defined, which in turn has an invariant character as distance determination; see e.g. F. Hund, Grundbegriffe der Physik, Mannheim 1969, 109.

³⁷ See op. cit. 71.

³⁸ This also applies to the initially mentioned conception of Harré and Madden, also based on Popper's argument, according to which things have a specific 'nature' that determines their characteristic behavior.

means, too: an lawfulness knowledge *exceeding the empirical situation*. The empiricist problem of induction thus ultimately proves to be a conundrum, an illusory problem due to a deficient concept of the law of nature that misappropriates the functional character of objects: Anyone who knows the functionality of a thing has identified it, and that means that he has recognized it in terms of its *invariant* behaviour. Whoever does *not* know the functionality of a thing, on the other hand, does not know the thing and can therefore not be sure of its behavior in any way. The character of invariance is constitutively bound to the character of function, in so far as this character represents the conditions of a thing, and it is therefore not surprising that the *neglect* of the functional aspect in the context of empiricist philosophy of science has led to fundamental difficulties concerning the concept of natural law.