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From the Separateness of Space to the Ideality of Sensation. Thoughts on the Possibilities of Actualizing Hegel's Philosophy of Nature

Dieter Wandschneider

Abstract

The Cartesian concept of nature, which has determined modern thinking until the present time, has become obsolete. It shall be shown that Hegel's objective-idealistic conception of nature discloses, in comparison to that of Descartes, new perspectives for the comprehension of nature and that this, in turn, results in possibilities of actualizing Hegel's philosophy of nature.

If the argumentation concerning philosophy of nature is intended to catch up with the concrete Being-of-nature and to meet it in its concretion, then this is impossible for the finite spirit in a strictly a priori sense — this is the thesis supported here which is not at all close to Hegel. As the argumentation rather has to consider the conditions of realization concerning the Being-of-nature, too, it is compelled to take up empirical elements — concerning the organism, for instance, system-theoretical aspects, physical and chemical features of the nervous system, etc. With that, on the one hand, empirical-scientific premises are assumed (e.g. the lawickness of nature), which on the other hand become (now close to Hegel) discernible, has become obsolete. It shall be shown that Hegel's objective-idealistic conception of nature and that this, in turn, results in possibilities of actualizing Hegel's philosophy of nature.

In the course of the undertaking, the main aspects of the whole Hegelian design concerning the philosophy of nature are considered — space and time, mass and motion, force and law of nature, the organism, the problem of evolution, psychic being — as well as Hegel's basic thesis concerning the philosophy of nature, that therein a tendency towards coherence and idealization manifests itself in the sense of a (categorically) gradually rising succession of nature: from the separateness of space to the ideality of sensation. In the sense of the double strategy of empirical-scientific concretization and objective-idealistic foundation is followed up, which represents the methodical basic principle of the developed considerations.

In this situation it is surely obvious that we must also look into the past to see to what extent traditional philosophical thought can be utilized. In this sense the following investigation links up with Hegel's objective-idealistic concept of nature. The opinion that this is obsolete, useless and eccentric has long been superseded. Doubtless, details are antiquated — in what historical text is this not the case? — but in the following we are concerned more with basic principles in Hegel's thought and its consequences for a new, non-Cartesian concept of nature.

It is decisive that such a conception can be argumentatively developed in a consistent manner. Hegel's own argumentation in his Philosophy of Nature, i.e., in the framework of an 'encyclopedic' presentation of his philosophical conception, is actually so short that it must be "re-created" or reconstructed by interpretation. For the realization of this project I have first made some preliminary remarks: What Hegel himself intends is a comprehending cognition of the Being-of-nature, which as such is "not an appeal to experience" (9.15); what is meant is an a priori-dialectical philosophy of nature. In the present context this a priori aspect can only be intimated in many cases because of the principal difficulty, that a theory of the dialectic of the philosophy of nature has not been available so far. On the other hand, the a priori pretension may not have to be maintained strictly at all in so far as the natural-philosophical argumentation in certain points, as it seems, will in principle not manage without empirical elements. With
regard to Hegel's a priori demand, this conjecture — its legitimacy has to be examined — is unquestionably quite irritating. Here for the moment some brief comments about that:

In this context, I think, it is essential that the re-constructive interpretation mentioned must at last also consider conditions of realization concerning the Being-of-nature and is thereby necessarily dependent on empirical-scientific facts. If an organism, for instance, is to be understood as a real system in a real environment system-theoretical aspects must also be considered, or, on the animal level, basic physiological facts about neural organisation and sensual perception, too. Such empirical borrowings are indeed unavoidable if we are to clarify under what concrete empirical conditions something like 'self-preservation' can be realized in an empirical world. Perhaps it is not at all entirely erroneous to assume that such matter could be fundamentally derivable in an a priori sense, too. But it appears to me that, under the conditions of finite spirit, the argumentation concerning philosophy of nature requires essentially empirical concretization.

To be sure: By accepting empirical elements, the argumentation can no longer claim absolute a priori stringency but in this respect only probability. This actually contradicts Hegel's intention of 'comprehending cognition' (even if he speaks of the fact that "matter ... proves itself to be obstinate against the unity of the idea" (9.539 add.) and, therefore, "contingency ... has its right in the sphere of nature" (9.34)). Yet this loss of a priori stringency is compensated for by a gain of concretion. The object of philosophy of nature is precisely the concrete Being-of-nature. The argumentation of philosophy of nature must catch up with this concrete being and meet it in its concreteation. Besides, this agrees with Hegel's demand for 'concrete thinking' (even if Hegel himself certainly did not have the reversion to empirical facts in mind). In this way the inclusion of empirical aspects may be considered as not only acceptable but even unavoidable in natural-philosophical contexts — but, of course, only then when the subject itself demands it. This form of empirical concretization also appears to be an actualization of Hegel's argumentation by proving itself to have an affinity with the actual science of nature.

One more thing: With the inclusion of empirical-scientific arguments the presumptions contained in them are also adopted, which on their part, however, must first be philosophically clarified and legitimized. This philosophically seemingly critical state turns directly into an advantage, however, when it becomes evident that those presumptions especially can be founded on the basis of Hegel's conception. To take an example: Every theory of evolution presumes that nature does not amount to nothing more than its factual being but contains possibility. But this is only justifiable within the framework of an objective-idealistic ontology of nature, for which, in turn, this also means the possibility of actualization.

In this way possibilities of actualizing Hegel's philosophy of nature in the sense of a mutual illumination of empirical-scientific and objective-idealistic arguments are imaginable in principle: on the one hand, in the empirical-scientific concretization of arguments given by Hegel and, on the other hand, through the objective-idealistic founding of empirical-scientific argumentation. This double strategy of concretization and foundation will prove itself, as a methodical basic principle, to be very fruitful in the following. So much for methodological aspects; now it is time to face the content.

Hegel's general determination of nature at this point will be presented only briefly: According to the law of dialectics, to the Logical-ideal, which is demonstrable as unconditional, there also belongs its opposite, the Non-ideal, which for Hegel is nature itself — as an eternal accompanying phenomenon of the Logical. If the Ideal is characterized by conceptual interrelation, then the Non-ideal, that is nature, is determined as separateness. However, as the Non-ideal it remains dialectically connected to the Ideal; in other words: Nature is not the Logical-ideal but the Logical-ideal underlies it. Separateness is the manner in which the Being-of-nature appears, but the essence that underlies it is the Logical-ideal, through which it remains implicitly determined. This discrepancy between appearance and essence is characteristic of the Being-of-nature, according to Hegel.

From this a basic feature of the Being-of-nature becomes clear: While its appearance and essence are not congruent with one another, it is determined by a tension, which, according to Hegel, expresses itself in the tendency to overcome this lack of congruence and which means that there is a trend in the appearance to adapt itself to the underlying ideal essence of nature. Thus nature shows, according to Hegel, a tendency towards coherence, towards the negation of separateness up to the point of the ideality of the Logical underlying it: Accordingly, Ideality is to be understood as the immanent telos of nature, which, however, is only approximately attainable by the latter.

At this point and in the following it must be observed that Hegel certainly does not understand this in the sense of a natural process but categorially, i.e., as a basic characteristic of the conceptual development not of nature, but of the categories of nature and thus of the argumentation of philosophy of nature rather than a temporally-real evolutionary process, whose assumption Hegel considered by the way to be false (although statements can sometimes be found that could suggest such an interpretation).

This view, according to which the Being-of-nature (under a categorial aspect, as has been stated) shows the tendency toward the negation of separateness in the sense of a return to the Ideal — a doubtless highly speculative interpretation of nature — constitutes, as regards content, the basic thesis of the following investigation, i.e., on the one hand, it is to be shown that and how such a tendency towards coherence and idealization is characteristic of the Being-of-nature and, on the other hand, that from this perspective an internal connection of natural phenomena results — from the elementary separateness to the ideality of psychic being in nature. Nature would no longer be, as with Descartes, the strict opposite of the psychic but would include its very possibility — a completely non-Cartesian image of nature that without a doubt deserves attention in view of our contemporary problems with nature. The following deals mainly with this overall perspective of nature that has to be developed in the light of Hegel's thought and the methodical double strategy already characterized of empirical concretization and
idealistic foundation, which in its double structure, as already expounded, itself brings forth possibilities of actualizing Hegel’s philosophy of nature.

2. Space and Time

The first determination of nature in Hegel’s sense leads concerns, on the one hand, the dimensional relationships of space and time and, on the other, succession, always has the character of separateness, but yet precisely a structured and, because nature and of its

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Hegel’s argumentation (cf 9.55ff), or rather a reconstructive interpretation of the same: The explication of the connection between space and time, which is at first only implicit, compels the introduction of the category of motion. Now motion only makes sense relative to a motionless state, i.e., with the category of motion that of rest is also always implied. However, something can only be at rest that is preserved identically in motion and thereby defines a definite single place as a point of reference of motion. Such a Singular, which is identically preserved in motion is then, according to Hegel, mass. The ‘logic’ of the concept of motion in this sense demands the category of mass: mass as a Singular identically preserving itself, whereby ‘place’ is realized as the necessary point of reference for motion, which as such represents non-motion or ‘rest’.

Now, a mass itself can naturally be moved relative to another mass. In this case the relation of motion is symmetrical: Each can equally be looked upon as moved or as at rest. But with that, a principle of the relativity of motion is formulated which says in this form: the motion of mass is equivalent to relative motion.

Now, this connection immediately has the remarkable consequence that the motion of a non-mass is non-relative motion. Such motion indeed refers to a mass, but being non-relative it is independent of the respective instance of reference and, therefore, refers to every mass in the same way. In other words: A non-relative motion has the same velocity in reference to every mass. Besides, such a non-mass can itself — in accordance with its concept — not be at rest but be only moved — a very strange phenomenon, which, however, is empirically realized in the form of the motion of light.

But what is meant by a non-mass? Hegel has given reasons for the fact that something like this must exist in nature and identified it with light and, in fact, attributed an absolute (thus non-relative) character to its motion. (9.111f add.). As already mentioned, this is empirically correct for light and is the circumstance which led Einstein to develop his (Special) Theory of Relativity. It would naturally be absurd to maintain that Hegel anticipated Einstein’s theory, because this is, above all, a complex mathematical theory, whose very achievement consists in the fact that it has shown the mathematical compatibility of relative and non-relative motion. Yet, following Hegel, the basic thoughts of relativity theory can be actually gained from the ‘logic’ of the concept of motion.

At this point impressive possibilities of actualizing the Hegelian type of argumentation (to express myself quite generally) in the philosophy of nature become visible with a remarkable explanatory power in the sense of a philosophy of modern physics: The thoughts developed are to be seen as a contribution to a philosophical penetration of the theory of relativity which have not been achieved in the otherwise extraordinarily sophisticated analyses of E. Cassirer and H. Reichenbach. In this manner it has been shown that a non-relative motion does not only not contradict the principle of the relativity of motion but is, indeed, an implication of the same: This is a necessary, non-trivial consequence of the philosophical interpretation of the principle of relativity presented here.
And furthermore: The fact that light possesses the same state of motion relative to every mass also means, vice versa, that the singular and, therefore, different masses are identical to each other in this respect. In other words: In the phenomenon of the motion of light the inner essential identity of masses now appears explicitly and, in fact, independent of their quantity, and their diversity, which is founded in their singularity, thus proves itself to be an aspect of their exteriority.

4. Dynamic Concepts

On the basis of the category of mass, following Hegel, we further attain dynamic concepts: According to the principle of the relativity of motion, a mass can be observed as either at rest, namely, in reference to itself, or as moved, namely, in reference to another mass (that is moving relative to it). Thus, in principle, a mass can be both at rest or moved. It is, therefore, so Hegel, "indifferent to both" and in this sense inert: "In so far as it is at rest, it rests and does not begin to move by itself; if it is in motion, then it is simply in motion and does not begin to rest by itself" (9.65 add.).

Now, with the collision of two masses this leads to the following situation: Together they both constitute thereby "momentarily ... one body" (66): "As soon as they touch each other they are set in one". Since, however, both have different states of motion, this is at the same time, metaphorically speaking, "the fight for one place" (9.67 add.). Thus, this 'interaction' of masses is characterized by states of motion which are opposed to each other: one at rest and the other as moved, respectively. Such an opposite state of motion in itself can now no longer be kinematically comprehensible (for that would mean: either at rest or moved, according to the instance of reference) and thereby possesses a new kind of structure to be characterized as dynamic — 'dynamic' in so far as something like resistance, change of motion and thus deviation from the inertial behaviour of the masses is involved with it. Physics has introduced for this the concepts of 'force', 'energy', 'momentum' etc.

As Hegel emphasizes, the dynamic is a potentiality existing in mass or matter 16 "as the very essence of matter, an essence which itself, at the same time, belongs to matter's inwardness; therefore, physics passes over to the Reflection-idea of force" (9.68 add.). Indeed, this transition from purely kinematic to dynamic concepts is also compelled — a fact only suggested here — by the character of singularity and thereby the diversity of masses, which in this way can also possess different states of motion, so that their 'interaction', as explained, can no longer be comprehended in a purely kinematic manner.

At this point the physical concept of a 'field of force' could, indeed, find its place. Today it is understood as a system of 'field particles', which can transmit energy and momentum through interaction and thereby exert force effects. On the one hand, the aspect of interacting particles is essential here and, on the other hand, that of a spatial-temporal system of such interactions in the sense of a 'field' (which will be explained at once). With Hegel himself the concept of a force field occurs in connection with gravity in its content (if not in its terminology). An important point emphasized by Hegel here is that the body 'qua body ... is inseparably connected with its gravity' (9.69). In the language of modern physics one would say that the gravitational field is 'coupled' to the mass; this is to be understood, so to speak, as the 'source' of the field. The field is bound to the source with which it forms a system — thus, a form of coherence of dynamic states which, at the same time, represents a new level of negation of the separateness of nature. In this sense Hegel interprets especially gravity appearing as the attraction between masses: This striving for the negation of separateness is the "first true inwardness" in nature (9.72 add., also 63 add.).

From the essential coupling of the field of force to its source a further consequence results: Space- and time-concepts have a superficial-contingent character for the field of force. That means now, too, that this is invariant, i.e., independent, e.g., of displacement in space and time. As mathematical physics shows, dynamic quantities, e.g., the total momentum or total energy of a system temporally conserved in such operations, correspond to such invariances. The occurrence of such conservation quantities can be interpreted in a way that the identity of the dynamic system, as it were, appears explicitly therein — as a system with this total energy and this total momentum etc. In the multiplicity and diversity of the field states the system represents in this manner, as already noticed, not only a form of coherence but also essentially an identity comprehending the multiplicity and, in this stronger sense, unity.

The independence of a dynamic system from its positioning in space and time (mathematically its invariance according spatial-temporal displacements and rotations) means, furthermore, that the isolated system always and everywhere acts the same way. In other words: Its behaviour shows a lawlike character. Under a dynamic aspect, therefore, the concept of a universal natural law is implied, which as such is independent of space and time. According to the objective-idealist view, nothing other than the basic logic underlying the Being-of-nature becomes visible therein, which as such can, of course, be comprehended only by thought. On the side of real natural appearance this corresponds, as said, to a behaviour of dynamic systems, which is invariant in a spatial-temporal respect, or, formulated more generally, to something like constancy or uniformity of nature.

The universal law of nature as an expression of the logic underlying nature, or the constancy of nature as its real appearing: Both are the expression of a much stronger form of the negation of nature's separateness on the dynamic level in comparison with the dimensional structure of space-time and the kinematic equivalence of masses: While spatial-temporal separateness shows only a certain order of connection, and masses appear equivalent in their singularity only 'under a kinematic aspect', the dynamic states of the field of force are dependent on one another in reality and constitute in this way a real, comprehensive unity of their multiplicity and diversity — precisely, indeed, a dynamic system.
5. System Formation and Organism

The concept of field of force also implies that something like attraction and repulsion exist\(^\text{17}\) — Hegel himself attributes “repulsion” and “attraction” to mass in a basic sense, namely, in the sense of connecting up with Kant’s *Metaphysic Anfänge der Naturwissenschaft* in which matter possesses singular existence by repulsion, i.e., is exclusive toward other matter, and its internal connection is guaranteed by attraction (9.60f, 62f add.). Hegel’s argumentation has its foundation in the logic of quantity (5.190ff). At this point I would like to let this rest and directly observe the empirical-physical side of the subject in order to pursue the question of how the principal tendency towards coherence and idealization in nature made valid by Hegel represents itself in this perspective:

Quite generally, the conditions for the phenomena of attraction and repulsion are always given on the basis of fields of force. Together both make the formation of complex material systems fundamentally possible,\(^\text{18}\) whereby these are understood as a — also temporally variable — real unity of structure of material elements. This is no longer merely an abstract order of connection, as stated in reference to time and space, or an equivalence relation as in the case of singular masses, and also not merely a system of dynamic states as in the case of the field of force: It is characteristic of all these forms of coherence that they are only implicitly realized, i.e., they must first be made visible through thought, as it were, e.g., in the form of a mathematical expression describing the field of force. It is characteristic of the realized coherence in material systems, on the other hand, that it now appears explicitly, i.e., in material form on its part.

Without going into further detail I would like to turn to a class of material systems of special interest, namely, organisms. If we consult first Hegel’s philosophy of nature on this, organisms are characterized by possessing the character of subject (9.337, 339ff add.), and for Hegel that means more precisely the structure of the concept (339 add.). The earthworm is, as it were, a concept which is winding its way through the soil. It is decisive for this viewpoint that the organism shows self-preservation in the sense that it attempts to preserve itself actively as this kind of system, i.e., in its universality of species. The life process of the fly is also the continual striving for the preservation of the ‘flyness’ realized in it, exactly because the organism, Hegel argues, is in its essence something universal, which attempts to preserve itself as identical in its particularities: and so, in fact, is precisely subject — something like a concept having become active. The concept, which, according to the objective-idealistic view, underlies the Being-of-nature in total, appears itself in the organism in real form, as it were; “what was merely perception up to now, has now come into existence” (340 add.). “Here nature has thus reached the existence of the concept” (336 add.); “life is the concept that has attained its manifestation” (37 add.).

It is important to see that thereby a new, higher status of the coherence of nature’s separateness is reached: This coherence has just conceptual and thus already ideal character, though still in the form of a material system. In Hegel’s interpretation the organism is, as it were, an existing ideal in material form.

At this point we must ask to what extent empirical conditions of realization can, in fact, be given for this ‘speculative’ point of view. A basic answer is possible within the framework of system theory: An organism can only be a self-preserving system in this way if it contains an instance of control which controls and regulates the function of the system in the sense of self-preservation\(^\text{19}\) — and thus, as it were, is a representative of itself, a self-instance. As we know today, these processes are ultimately determined by the gene information underlying the system. It represents the structural and functional plan of the system, thereby its ‘norm’ or universal and, in fact, in this manner has an ideal character. At the same time a determined identity is thereby actually defined, which becomes immediately clear in comparison with non-organic systems: The division of a pebble results in two pebbles; the division of a fly, by contrast, destroys it, precisely because the specific identity of its species, the universality of its species, is thereby destroyed. In a literal sense it is, therefore, an ‘in-dividual’, ‘indivisible’;\(^\text{20}\) this is the case because it is at the same time a universal. Hegel’s interpretation of an organism as an existing concept is in this way, indeed, reconstructable in system theory and can thereby also be actualized in this sense.

6. Evolution

From the point of view of the tendency toward coherence and idealization of nature put forward by Hegel the organism has obviously progressed the furthest. Now, can this progression be understood as a result of an evolution of nature? Generally, nature is, so Hegel argues, “to be seen as a system of levels, out of which one necessarily emerges from the other”. However, this is not to say “that one is naturally born of the other” (9.31); in other words: Hegel himself rejects the idea of a real evolution of the forms of nature, which for us at present is in no way to be doubted. This verdict is founded on the ‘categorial’ view of development already mentioned, according to which development concerns only the ‘concept’, namely as making explicit that “which in itself is already there” (8.308 f add.), while in the sphere of being there exists only a transition into another. The only exception is the individual organism, precisely because, as already presented, it is to be understood as a real existing concept. According to Hegel, to assume a real development of species is, by contrast, ruled out. Thus, for him ‘development’ in reference to nature can always only have the character of a conceptual development of the categories of nature.

In spite of this, I have shown in another analysis\(^\text{21}\) that right within the framework of Hegel’s ontology of nature one can argue for a temporally-real process of upward gradation of nature, as I would like to express it, without needing Hegel’s concept of development (in the sense of a conceptual development). In content we can designate this as ‘evolution’ as we understand it today. To outline this briefly (whereby I shall not consider cosmogonical processes):
Under the supposition of a so-called ‘abiotic’ evolution (i.e., the origin of life from inorganic matter) a *biotic* evolution can take place, i.e., the formation of life out of life and, furthermore, the successive further development of life in nature. From an empirical-scientific point of view one can in principle argue in a ‘Darwinistic’ manner for such an evolution: ‘Mutations’ in the genome can lead to advantages in the struggle for survival. These mutations can be inherited and, in the competition of individuals, can lead to the ‘selection’ of new varieties. This connection between mutation, selection and inheritance in principle offers a theoretically satisfying explanation for the empirically observed ‘Origin of the Species’ — so the title of Darwin’s epoch-making book published in 1859 — which is at the same time a higher development in the sense of higher complexity and organization.

Darwinian arguments for the process of upgrading can also be found by following this line of argumentation: Because land exists, land animals must arise out of aquatic animals (more exactly: on the basis of a population living first in water a selection pressure arises, which — in the long run — works in the direction of the development of land animals); because air exists, birds must also arise. In the long run, there arises a successive occupation of the potential environments already existing. Now, in analogy to that one can also argue for the idea of the *generation of new* environments: If there are single-cell organisms then multiple-cell organisms can also arise; if there are plants, then herbivores can also arise; if there are herbivores, then carnivores can arise. In this way evolution itself brings forth environments: The condition just realized at the same time forms the basis of new possibilities of life and in this sense we can in fact speak of an evolutionary process of upgrading.

At the same time it is clear that these new possibilities of life mean a More of complexity and, therefore, in principle demand more complex living beings. Let us look at the transition from plants to herbivores as an example: Plants are autotrophic, i.e., they can themselves produce organic substances from the dissolved material in the ground in which they are located. Animals, on the other hand, are heterotrophic, i.e., they need organic substances produced from other living beings — here plants. At first sight this seemingly unimportant condition has decisive consequences for the organization of animals (which, by the way, Hegel has already pointed out, cf. 9.§ 350ff): Not only does it have to be equipped with a suitable set of teeth to take in food, and — to process it further — with a complex digestive system; above all, it must first be able to find food. To do this it must be able to move and to orient itself in its environment. This demands an organization of senses, a nervous system and, basically, a central regulation- and control-instance, a brain, to process the sensory data as well as for the coordination and supervision of the vitally necessary activities, while plants are simply concerned with the biochemical regulation of their internal functions. In other words: Animal organization is necessarily more complex than that of plants, i.e., the evolutionary process of upgrading is simultaneously a step toward higher complexity. In this way, something new continually arises in the course of biological evolution — how is that to be understood ontologically concerning nature?
and regulates the self-preservation of the organism or expressed with a traditional concept, a self-instance or Self. Now, this is the case with both plants and animals, but with a different structure: For the autotrophic plant it is only a matter of the self-regulation of biochemical functions; in this sense I would like to speak of a functional self. In addition to that, the heterotrophic animal must — on the basis of neural and sensual organization — also perform the control and coordination of actions and accordingly possesses not only a functional self but also an actional self, as I call it. Consequently, in the perspective of system theory such a double structure of a functional self and an actional self is characteristic of the animal subject.

Such a ‘doubled self’ is also held to be true by Hegel as well, remarkably enough. In contrast to plants, Hegel says, a “doubling of subjectivity” in its “unity” is characteristic of the animal (9.430 add.), a “self-self” (432 add.), that means a “self that exists for the self” (430 add., also 432 add., 465 add.); in other words: The self has “itself as its object” (432 add.). This “Finding-of-the-self-in-itself” of the subject is, according to Hegel, “sensation” (342 add., italics by D. W., also 432 add.).

However, the subjective double structure itself thus underlying the sensation is not proved more closely by Hegel. In the system-theoretical reconstruction, on the other hand, it is directly evident; in this way the structure of sensation is also comprehensible through system-theoretical considerations: It is obviously essential for the characterized duality of the functional and actional self that both cooperate for the self-preservation of the organism. The functional self thereby stands for the state of the organism, which the norm also prescribes to the activity of regulation of the actional self. This is especially true for perception by the actional self, which is thereby always oriented toward ‘two sides’: On the one hand, it is perception of the outward but, on the other hand, it must always contain perception of the self, as well, i.e., perception of the organism’s own condition. For instance, the perception of temperature at the same time contains information concerning to what extent the sensed temperature is comfortable for the organism itself; or by feeling an object I feel myself at the same time (cf. 9.466 add.). Animal perception thus basically includes a subjective element — indeed, increasingly with the higher stages of development; it is a subjectivized perception and thereby a finding of itself in itself of the subject or sensation, the elementary form of the psychic in nature.

Characteristic qualities of the psychic, such as its placelessness (9.431 add.), inwardsness (9.377 add., also 10.20 add.), self-identity (“Being-for-self”) (9.430 add., 10.97 add.) and ideality (9.465 add.), to which Hegel also calls our attention, are also explained within the framework of the system-theoretical model: When the psychic, as presented, constitutes itself in the fusion of external perception and internal perception of itself, it cannot be localized at a specific place of the body, but is equally present in all sensations; the placelessness of the psychic is really its omnipresence as the same simple subjectivity in the multiplicity and diversity of sensations. That means, furthermore, that in the performance of external perception, at the same time, a subjective internal horizon of perception is spread out, a private sphere of ‘inwardsness’ only accessible to the subject itself. And finally: In this inwardsness the subject is, in the diversity of sensations, continually in itself; it not only doesn’t lose itself in the changing sensations and preserves its identity therein, but also has the sensation of this identity, thus identity for itself, self-identity.

Placelessness, inwardsness and self-identity are, however, only different sides of one and the same fact, which, according to Hegel, can be characterized totally with the concept of ideality. In the changing sensations the same subjectivity is always contained: a feature they have in common, a universal. Thus, sensations have, as it were, conceptual status, and so indeed the character of ideality (16.876, 9.432 add.).

In this way, I think, a system-theoretical reconstruction of Hegel’s interpretation of sensation is possible and thereby an empirical-scientific concretization of Hegel’s conception. The psychic is thus explicable as a phenomenon of emergence, and, at the same time, the tendency towards idealization in nature appears, at this point, with maximum clarity: In the placelessness, inwardsness, self-identity and thereby the ideality of psychic being, as well, it is obvious that the Being-of-nature does not amount to nothing more than dull materiality but in fact always contains the possibility of ideality.

If the psychic in this sense is reconstructed as an emergent phenomenon of matter, this is in no way to be seen as an argument for a materialistic interpretation. Let us once again visualize the connection of arguments: For emergence-theoretical argumentation it is essential that matter is determined by laws of nature; only in this way can system formation exist and so organic systems and especially animal structures of organization with perception, self-perception, and sensation. However, laws of nature that determine the behaviour of matter are for their part — as logical-conceptual structures — of immaterial nature. In this respect matter itself has transcended materialism, as it were, which cannot itself explain the existence of laws of nature. This can only be expected of an objective-idealistic concept of nature. The fact that nature brings forth the psychic besides, i.e., a form of ideal being, is not surprising in this perspective and confirms the relevance of an objective-idealistic ontology of nature.

8. Possibilities of Actualizing Hegel’s Philosophy of nature

In its reconstructive interpretation Hegel’s philosophy of nature conveys an impressive total picture of nature: a continuous connection of natural phenomena in the form of a gradual succession which shows a tendency toward increasing coherence and ideality — from elementary separateness to the ideality of the psychic. Hegel’s concept of nature is thus worlds apart from Descartes’, who conceived nature as pure extension and thereby as the strict contrary of the psychic. According to Hegel’s conception, the Being-of-nature, as emphasized, does not amount to nothing more than the factualness of material matter, but fundamentally contains possibility, especially the possibility of the psychic, which in this way no longer appears as a secluded beyond of the physical. This character of an essential unity of nature makes this picture of nature so fascinating — a picture which thereby presents itself as an attractive, up-to-date alternative to the Cartesian conception.
Materialism, or in scientific vocabulary, physicalism, also has such a unified picture of nature in mind. Yet one grave difference becomes clear here: These positions are, as already mentioned, of a limited range concerning the philosophy of nature, because they do not have an adequate ontology of nature at their disposal; for they are not in the position to explain laws of nature which, on their part, they must necessarily assume. This only becomes possible within the framework of an objective-idealistic ontology of nature, which offers good reasons on its part.

First of all, the possibility of an a priori development of the categories of nature is essential for this, which, according to an objective-idealistic understanding, makes the logic underlying the Being-of-nature comprehensible. Hegel himself assumes that such a development of categories is feasible in principle. It cannot be maintained, however, that this pretension is generally fulfilled by Hegel's text, even if Hegel's accomplishments earn admiration.

In addition, as was pointed out in the introduction, such argumentation — even if it had really been carried out — obviously always has to be complemented by arguments in reference to the conditions of realization of natural phenomena: In so far as they belong to the real world, the aspect of the possibility of realization cannot be shaded out absolutely, and in this sense the inclusion of empirical-scientific arguments becomes unavoidable. This point of view already formulated at the beginning has been illustrated, for instance, by the system-theoretical considerations presented. Hegel himself offers an example for this: He explains sensation, as has been shown, by the self-self-structure of animal subjectivity without, however, proving the double structure peculiar to it. At the same time, even he already points out the empirical conditions for animal existence (auto-motion, continual food intake, nervous system, etc., cf. 9.350ff). The system-theoretical considerations developed here take up this line of argumentation and continue it consistently.

In fact, it is also of philosophical interest to clarify, if at all, to what extent and in what manner this 'self-self-structure' is possible in reality and what consequences result from it. One of these consequences is the system-theoretical possibility of reconstruction of sensation, or, expressed more generally: the evidence of the emergence of the psychic out of the physical. In fact, only this confirmation can really serve as an answer to the philosophical question posed by the mind-body-problem; everything else would remain — as it is — merely assurance. To this extent, it appears to me that Hegel's argumentation concerning the philosophy of nature not only allows an actualization in the sense of the empirical conditions of realization, but also needs such an actualization. The argumentation of philosophy of nature not only can integrate empirical-scientific views but, indeed, must integrate them.

On the other hand, and I thereby return to the starting-point of these methodological considerations: If the transition from the physical to the psychic level of being is explained as a phenomenon of emergence, then certain questions become pressing: How can the psychic emerge or 'arise' on the basis of the physical? Where does it come from? Is it already 'contained' in the physical and, if so, in what form? Questions of this type, as already emphasized, can only be answered within the framework of a Hegelian type of ontology of nature, according to which the being underlying physical being is of ideal nature and thus in essential affinity to psychical being. Only under this condition is empirical system-theoretical argumentation adaptable to philosophy of nature. In this sense the empirical arguments require an idealistic-ontological foundation by themselves. A form of actualization of the Hegelian philosophy of nature is thereby given, which complements the one previously stated: Within the framework of an objective-idealistic ontology of nature empirical arguments can be ontologically founded, and in this manner, and only in this manner, can they be integrated into a total picture of nature.

Seen in total, the considerations developed, as already anticipated in the introduction, result in possibilities of actualizing Hegel's philosophy of nature in a twofold respect: first of all, as an empirical-scientific concretization of Hegelian arguments, i.e., with respect to the conditions of realization of the same; secondly, in the sense of an ontological founding of empirical-scientific argumentation on the basis of an objective-idealistic ontology of nature. In this mutual crossing-over and elucidation of scientific and idealistic-ontological trains of thought concerning nature, in total, an astonishing actuality of Hegel's philosophy of nature becomes recognizable, not only in single points but, above all, in principle, too, i.e., in the sense of a contemporary concept of nature.

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1 Translated from the German by Edward Kummert, edited in association with Timo Klein.
5 References of this kind refer here and in the following to: Hegel, G.W.F., Werke, eds. E. Moldenhauer/ K.M. Michel, Frankfurt/M. 1969 ff, here especially vol. 9, p. 15; ‘add.’ refers to the inserted ‘additions’.
In my book, Wandschneider, D. (1995) Grundzüge einer Theorie der Dialektik: Rekonstruktion und Revision dialektischer Kategorienentwicklung in Hegels 'Wissenschaft der Logik' (Stuttgart 1995), I have worked out elements of a dialectical logic. Attempts according to dialectics concerning the categories of nature can be found in my paper Wandschneider, D. (1993) "Natur und Naturdialektik im objektiven Idealismus Hegels," in: Gloy, K./Burger, P. (ed. 1993) Die Naturphilosophie im Deutschen Idealismus, Stuttgart 1993. An example for this is also, for instance, Kant's thesis on the impossibility of a 'Newton of the blade of grass': Kant gives reasons for this by demonstrating that life itself is characterized by self-preservation and therefore by 'inner teleology' ('innere Zweckmäßigkeit'), that is, the total interchangeability ('Wechselseitigkeit') of means and end (Kant, Kritik der Urteilskraft (KU), quoted from the third original edition, Berlin 1799, § 63 ff. § 82). However, according to Kant, something like this cannot be realized causally, because it would require (a) the reversibility of cause and effect, and (b) an aim-directed causality. But in fact, from Kant's point of view, causal processes are irreversible (directed from cause to effect) (KU 289), and furthermore 'blind' (KU 270, 326) and therefore not aim-directed. Nowadays we know that both conditions indeed can be realized technically, namely in the form of a 'feedback' of the effect to the cause, mediated and controlled by a 'norm value'. If the 'technical inspiration' in Kant's lifetime had been able to imagine conditions of realization of 'inner teleology', Kant's 'Kritik der Urteilskraft' would have had another result: not just a subjective 'as-if-teleology', but the view of an objective teleology of nature. (For details see Wandschneider, D. (1988) "Kants Problem der Realisierungsbedingungen organischer Zweckmäßigkeit und seine systemtheoretische Auflösung," in: Zeitschrift für allgemeine Wissenschaftstheorie, XIX (1988)).


The additional seven (or eight) dimensions postulated by the 'superstring-theory' of physics, which, however, are to be 'wrapped up', have hypothetical status within the framework of a theoretical model, for which furthermore there is much need of explanation.


'Mass' and 'matter' are used here quite generally and therefore synonymously; by 'mass' Hegel understands more precisely a quantum of matter (cf. 9.64).

Physically: due to various energy states in space.

Physically: due to the possibility of dynamic states of stability, e. g., in the form of relative minima of the potential energy in a field of force.