

1



A PRIORI KNOWLEDGE IN HEGEL'S PHILOSOPHY OF NATURE

Bearing in mind the present *misunderstandings and prejudices* in regard to the philosophy of nature, it might seem appropriate to begin by setting out the *true* concept of this science. . . . What we are engaged on here is not a matter of imagination or fantasy; it is a matter of the concept and of reason.

—Hegel, *Philosophy of Nature*

The question of Hegel's a priorism has always lain at the heart of debate over his *Philosophy of Nature*. Critics have regularly accused him of propounding a speculative, a priori, theory of nature that can only be fantastic. The first step toward approaching and evaluating the *Philosophy of Nature* is to ascertain to what extent, and in what sense, Hegel employs a priori reasoning to theorize nature. Unfortunately, his presentation of his substantive theory of nature is so obscure that one cannot hope to derive an interpretation of his method on its basis alone. The interpreter must have recourse to the few explicit remarks on method that he disperses throughout the text, mostly concentrated in its introduction (EN §245–§252).

In these remarks, Hegel repeatedly claims that his method involves some sort of reconciliation between a priori and empirical approaches to nature. Unhappily, these claims are ambiguous and inconsistent, envisaging three disparate forms of reconciliation. Hegel sometimes suggests that he proceeded by first accepting a selection of contemporary scientific accounts of natural phenomena on empirical grounds, subsequently reconstructing these accounts in a priori form. Alternatively, he suggests that he developed his basic theory of nature through

unaided a priori reasoning, thereafter incorporating those scientific results which he could interpret as corroborating his theory. Lastly, he may also be read as suggesting that he constituted his account of nature using those scientific claims that he could interpret as instantiating logical categories.

One aim of this chapter is to show that it is unwise to decide upon any of these interpretations without first acknowledging Hegel's own uncertainty and inconsistency. A reading of the *Philosophy of Nature* which does not arise from confrontation with this inconsistency is unlikely to convince, for it will leave open whether alternative lines of interpretation actually make better sense of the text. To paraphrase Hegel's *Phenomenology*, an interpretation that does not first demonstrate its superiority to others is merely a "bare assurance, just as valid as another" (PhG 71/49). Our initial task is therefore to familiarize ourselves with the ambiguities in Hegel's methodological remarks, setting out all the available interpretations of his approach to nature and eliminating those that are philosophically untenable or exegetically implausible. This is the necessary preliminary to any genuinely plausible interpretation of the *Philosophy of Nature*.

Textual Ambiguities in the *Philosophy of Nature*

Hegel largely confines his discussion of the methodology of his *Philosophy of Nature* to its introduction. Here he emphasizes that his method of theorizing nature is not that of natural science (*Naturwissenschaft*), which he understands to possess three defining characteristics. First, of course, natural science is a form of the study of *nature*—which does not as such distinguish it from the philosophical study of nature. Second, natural science is a *systematic* form of enquiry into nature: it attempts to integrate its discoveries and hypotheses into a comprehensive and unified understanding of the natural world. Again, natural science is no different from philosophy of nature in respect of its systematicity. Third, Hegel sees natural science—traditionally enough—as a specifically *empirical* form of the study of nature; this does divide it from the philosophy of nature.¹

Hegel's usual term for natural science is simply physics (*Physik*), by which he means not the specialized discipline but natural science in all its branches. He frequently calls physics "empirical physics" (*empirische Physik*). According to him, natural science or "physics" is empirical in that it begins with the observation of nature in "perception and experience" (EN 1: 193). However, science is not exclusively observational, for on the basis of observations scientists identify and describe

laws and universal kinds within the multitude of observable natural events and entities. Science is a “*theoretical* and *thinking* consideration of nature . . . [which] aims at comprehending that which is universal in nature . . . forces, laws, genera” (EN §246/1: 196–97). Thus, for Hegel, natural science is “empirical” not because it is exclusively observational but because its theoretical component—the identification of universal genera and laws within perceptible phenomena—is underpinned by its observational component. Unlike philosophical thinking, scientific thinking about nature always starts from and remains informed by observation.²

Hegel is fairly clear that the method of philosophy of nature is not empirical, but his positive characterization of it is more equivocal. In the main paragraph (EN §246) in which he describes his method, he offers two incompatible interpretations of it, one directly following the other. According to his first interpretation, the philosopher of nature theorizes nature by initially learning from empirical science and then rationally reconstructing scientific claims.

Not only must philosophy be in agreement with experience of nature, but the *origin* and *formation* of the philosophical science has empirical physics as its presupposition and condition. The procedure for originating and preparing a science, however, is not the same as the science itself; in this, the former [that is, experience] can no longer appear as the foundation [*als Grundlage*], which, here, should rather be the necessity of the concept. (EN §246R/1: 197)

To insure a proper agreement with empirical scientific findings, the philosopher must “originate” or “prepare” her theory by learning from scientists about the basic forms (the deeper genera, forces, laws, etc.) that organize the perceptible natural world.³ The philosopher’s further task is to provide an additional, nonempirical, justification for these empirically supported scientific claims, in terms of “the necessity of the concept.” A passage from the *Encyclopaedia Logic* (in which Hegel begins the methodological preamble continued in the introduction to the *Philosophy of Nature*) suggests that the philosopher should provide this conceptual justification by working out, through a priori reasoning, why each of the natural forms identified by scientists must exist and have the characteristics it does.

[P]hilosophy does owe its development to the empirical sciences, but it gives to their content the fully essential shape of

the *freedom* of thinking (the *a priori*) as well as the *validation* [*Bewährung*] of *necessity* (instead of the warranting [*Beglaubigung*] of the content because it is simply found to be present and because it is a fact of experience). (EL §12R/37)

More specifically, Hegel hints that the philosopher should produce this proof of the necessity of empirically identified natural forms by showing that they compose an “intrinsically necessary whole” (EN §246A/1: 201). By implication, the task is to situate each form as the necessary consequence of the one before it, thereby establishing that all the forms identified by empirical scientists require one another, so that given knowledge of any one form we can acquire knowledge of all the rest, independently of experience. Philosophers find in nature the same structuring patterns as empirical scientists, but by a different, rational, route.

Straight after introducing this idea that philosophy of nature involves rationally reconstructing empirical findings, Hegel advances an alternative interpretation of his method which envisages its *a priori* and empirical components as inversely related. The philosopher should first theorize nature through pure reasoning and only afterwards compare this theory with empirical scientific claims.

[I]n the philosophical procedure, not only must the object be given according to its *conceptual determination*, but also the *empirical* appearance that corresponds to [*entspricht*] it must be identified, and it must be shown that it actually corresponds to its concept. However, this is not an appeal to experience [*Erfahrung*] in relation to the necessity of the content. (EN §246R/1: 197)

According to this passage, the philosopher’s first task is to deduce the existence and character of the forms comprising the natural world—to “give objects” rationally, according to “conceptual determinations.” A statement from Hegel’s introduction to his *Philosophy of Mind* indicates that the method through which the philosopher must construct this basic theory of nature is by deriving each natural form as the necessary consequence of its predecessor.

[I]n the empirical sciences, matter is taken up as it is given by experience, from outside . . . in opposition to this, speculative thinking has to demonstrate each of its objects and their development, in their absolute necessity. This happens in that each particular concept is led forth [*abgeleitet*] out of

the self-originating and self-actualising universal concept, or the logical idea. (EM §379A/5)

The “logical idea” is the last category of Hegel's *Logic*, immediately preceding nature. The philosopher has to work out what the logical idea requires as its necessary consequence, and “lead” this forth as the first natural form, thereafter deducing succeeding natural forms from it. (Admittedly, Hegel does not speak explicitly of *Deduktion* in this context, but this is clearly equivalent to his “leading forth” and “conceptual giving”).⁴

Having by a priori reasoning constructed a skeletal vision of nature, the philosopher subsequently asks whether any of the forms independently identified by empirical scientists “correspond to” (*entsprechen*) the forms whose existence she has ascertained rationally. For example, Hegel states: “To prove that space accords with [*gemäß sei*] our concept, we must compare the representation of space with the determination of our concept” (EN §254A/1: 224). Only if an empirical account “accords” or “corresponds” with some element in Hegel's preconstituted a priori theory of nature does that empirical account get incorporated. By supplementing his a priori framework with empirical material in this way, Hegel corroborates and amplifies his initially skeletal account.

However, for this skeletal account of nature to be properly nonempirical, its descriptions of nature's component forms cannot be couched in terms that derive from and so already presuppose the compatibility of empirical claims. Accordingly, Hegel portrays the natural forms that he (on this reading) deduces in unfamiliar language. He begins, for example, with a form called “the universal being-outside-itself [*Außersichsein*] of nature,” which, he then claims, corresponds to space as characterized by empirical scientists. “The primary or immediate determination of nature is the abstract *universality of its being-outside-itself*,—its unmediated indifference, *space*” (EN §254/1: 223). The initially unfamiliar form thereby acquires concrete significance as space. As this illustrates, Hegel's basic a priori theory of nature portrays natural phenomena in *sui generis*—specifically nonscientific—terms. This wholly nonempirical theory then becomes embedded in an overall picture of nature emerging from the subsequent interpolation of empirical materials.

Hegel's two proposed interpretations of his method are incompatible, assigning inversely symmetrical roles to a priori and empirical knowledge.⁵ The two methods can be called, respectively, the “weak” and “strong” a priori methods. Schematically, according to the weak a priori method, we must (1) learn about nature's constituent forms from

scientists, then (2) work out rationally why these forms are as they are, by tracing how they necessitate one another. Conversely, according to the strong a priori method, we must (1) work out rationally what forms nature contains, by tracing how they necessitate one another (given the initial import of the “logical idea”), then we (2) incorporate corresponding empirical claims into the resulting theory. Since Hegel’s two methodological self-interpretations are incompatible, he cannot have assembled his theory of nature through both methods (as he suggests). Which of his self-interpretations is authoritative?

One potential way to decide between these interpretations is to see which receives greater corroboration from the surrounding methodological remarks in the text and in the interconnected introductions to the other volumes of the *Encyclopaedia*. Unfortunately, many of these remarks simply duplicate the inconsistency of EN §246:

[W]e can first say . . . that the philosophy of nature does not need experience; on the one hand, this is true. . . . However we must not envisage the relationship of philosophy to experience as if it did not need experience.⁶

Often, Hegel’s other statements are vague enough to license either of the proposed interpretations of his method. For instance:

The philosophy of nature takes the material which physics has prepared from experience, at the point to which physics has brought it, and reorganises it, without basing itself on experience as the final proof [*Bewährung*]. Physics must therefore work into the hands of philosophy. (EN §246A/1: 201)

This “taking” and “reorganising” seems at first to refer to the initial acceptance and subsequent reconstruction of empirically generated accounts of nature as envisaged by the weak a priori interpretation. But without difficulty one may also read Hegel as referring to the *final* examination of empirical accounts, and incorporation of those that correspond to philosophical claims, as anticipated on the strong a priori interpretation. Elsewhere Hegel states:

[S]peculative science does not leave the empirical content of the other sciences aside, but recognises and uses it, and in the same way recognises and employs the universal of these sciences, the laws, the genera, etc., for its own content; but it also introduces other categories into these universals and gives them validity [*geltend macht*]. (EL §9R/33)

This could mean that philosophers should accept empirical accounts but amend them (“introduce other categories”) so that the forms identified can be recognized as constituting a necessary chain, thereby receiving additional vindication from reason. Or it could mean that philosophers give validity to empirical accounts by identifying them as corresponding to philosophically derived characterizations of natural forms, an identification that “introduces other categories” into those accounts.

However, one statement from the *Logic* lends firmer support to the weak a priori interpretation:

It is only an ill-minded prejudice to assume that philosophy stands antithetically opposed to any sensible appreciation of experience . . . These shapes [of consciousness, such as science] are recognised by philosophy, and even justified [*gerechtfertigt*] by it. Rather than opposing them, the thinking mind steepes itself in their basic import; it learns from them and strengthens itself. (EL 5)

Yet other comments in the *Philosophy of Nature* speak equally robustly for the strong a priori interpretation, for instance: “The *first* thing is now the *a priori conceptual determination*; the second is to seek out the way and manner that this conceptual determination exists in our representation” (EN §275A/2: 12). “The immanent philosophical element is here as everywhere the internal necessity of the *conceptual determination*, which must then be shown to be *some* natural existence” (EN §276R/2: 17; see also §247A/1: 206). Examples could be multiplied, but Hegel’s elusiveness and inconsistency recur everywhere. This makes it impossible to decide between his competing self-interpretations by referring to his other methodological statements, for without difficulty these can be so construed as to support either interpretation.

Perhaps decisive textual evidence comes from the substantive account of nature occupying the *Philosophy of Nature*? Unhelpfully, Hegel’s presentation of this substantive account is heavily condensed, often to the point of unintelligibility. In particular, his arguments linking each natural form to its successor are generally too abbreviated and opaque to support either interpretation unequivocally. Admittedly, it is often thought that the overall makeup of this account refutes Hegel’s strong a priori self-interpretation, since he includes résumés of copious quantities of material from the sciences of his time, providing detailed sections on, for instance, geometry, magnetism, electricity, and geology. But this would only tell against the strong a priori interpretation if that method instructed the philosopher wholly to ignore or reject scientific

claims. In fact, it instructs her to thoroughly consider, and frequently endorse, scientific claims as supplements to her basic nonempirical theory of nature. The extensive presence of scientific findings in the *Philosophy of Nature* is quite compatible with strong a prioriism; moreover, most of these findings feature in the additions to Hegel's main paragraphs, which implies that they merely supplement his main argument, as the strong a priori interpretation suggests.

On the other hand, the organization of Hegel's paragraphs does not immediately suggest that he includes empirical claims or concepts only after previously deducing a specifically philosophical form. Almost all the headings demarcating discussions of individual forms are names drawn from empirical science (for example, "sound," "electricity"), implying that his descriptions of those forms originate in that science. Yet on examining the substance of those discussions, one frequently finds that Hegel introduces these empirical names only after first characterizing the relevant natural form in *sui generis* philosophical terms. For example, he claims that there is a type of body characterized by "inner quivering . . . within itself,—*sound*. The existence of this oscillating in itself appears . . . as sound" (EN §299–§299A/2: 69). Similarly, physical bodies "exhibit their *real* selfhood . . . as their light, but a light that is intrinsically *differentiated*,—*electrical* relationship" (§323/2: 165). As a whole, then, the makeup and organization of the *Philosophy of Nature* are too ambiguous to justify conclusively either strong or weak a priori readings of the text.

We hoped for clear signals from Hegel as to the correct understanding of his approach to nature, but surveying the textual evidence has only clarified that neither his general methodological statements nor the general organization of his *Philosophy of Nature* unambiguously support reading the work as either strongly or weakly a priori. This negative conclusion is itself important, because commentators often deny that the strong a priori reading of his account of nature has any textual warrant.⁷ This is because they overlook the fact that strong a prioriism *does* recommend incorporating empirical material into one's philosophical theory of nature. Given this, neither of Hegel's conflicting self-interpretations can be ruled out on textual grounds. This makes it reasonable to choose between them for philosophical reasons, making the charitable assumption that Hegel must have adopted whichever method is more philosophically cogent. Here the prevailing judgment among commentators is that strong a prioriism is less philosophically cogent than weak a prioriism. In the next two sections I will argue that this consensus is misguided, and that strong a prioriism is actually the more philosophically cogent method.

How Cogent Is Strong A Priorism?

Throughout most of the last two centuries, Hegel's theory of nature was widely perceived to use the method that I have called strong a priorism. Strong a priorism has been almost universally agreed to be philosophically untenable: correspondingly, most readers have rejected Hegel's *Philosophy of Nature* as misguided and chimerical. There are two main reasons why strong a priorism has usually been judged untenable. First, it has often been thought to involve outright ignorance or dismissal of scientific information. For instance, Ernan McMullin claims that Hegel's *Philosophy of Nature*

was . . . conceived by its originator not as arising from, nor even as complementary to, the empirical science of his day, but rather as a critique of that science, providing an alternative science of Nature much more basic than any experimental-mathematical method could attain.⁸

Having assumed that Hegel's strong a priorism drives him to reject and dismiss scientific claims, McMullin complains that: "Here we see Romantic philosophy at its most normative and imperious." Similarly, Milic Capek accuses Hegel of "plain and arrogant denials of . . . scientific discoveries which were generally accepted by the scientific community of his own time."⁹ And for Habermas: "It is with Hegel that a fatal misunderstanding arises: the idea that the claim of philosophical reason is equivalent to the usurpation of the legitimacy of independent sciences."¹⁰ This criticism that strong a priorism dismisses or rejects scientific views rests, as I have explained, on a failure to recognize that strong a priorism distinguishes between a basic, nonempirical, theory of nature and an *overall* vision of nature which results when that theory is—as it should be—fleshed out with empirical findings. Although strong a priorism takes no account of scientific material in constructing the basic theory of nature, this method does recognize the need to incorporate scientific material whenever it corresponds to a priori claims.

Second, critics often accuse strong a priorism of attempting to deduce the existence of the same forms that scientists have identified and theorized empirically.¹¹ If, for example, Hegel first deduces a form that he calls "universal being-outside-itself" and then assimilates this form to space, then surely he is, indirectly, deducing the very same space that scientists have theorized empirically. As John Findlay comments, strong a priorism appears to involve the attempt to "do the work of science"—to deduce empirical results.¹² It seems highly unlikely that any

philosopher can actually deduce empirical results: we must therefore suspect that Hegel's prior acquaintance with empirical findings covertly informs his supposedly pure a priori theory of nature in the first place. Yet, even if we assume that Hegel does somehow succeed in first theorizing nature a priori and afterwards equating his conclusions with those of empirical scientists, the problem remains that he ends up conferring absolute (deductive) justification upon scientific formulations that actually have only fallible, provisional, status. Strong a priorism, according to critics, seems destined to produce an "absolutization of empirical results soon to be superseded by further research."¹³

Does strong a priorism attempt to deduce and absolutize fallible empirical findings? We must explore what Hegel means by saying that empirically described natural forms may "correspond to" (*entsprechen*) forms that he has deduced a priori. A good place to approach this notion of "correspondence" is Hegel's discussion of the "empirical" conception of light at EN §275–§276. Throughout this discussion Hegel designates himself a strong a priori thinker, stating unusually clearly that he is first deducing a certain natural form and then subsequently equating it with empirically described light.¹⁴ He explains:

The proof [*Beweis*] that this conceptual determination, identity-with-self or the initially abstract self of centrality which has matter in it, this simple ideality that is present, is *light* is, as our introduction said, to be conducted empirically. The immanent philosophical element is here as everywhere the internal necessity of the *conceptual determination*, which must then be shown to be *some* natural existence. (EN §276R/2:17)

The philosopher first deduces a certain form—"identity-with-self," "simple present ideality"—and only afterwards "empirically proves" that it is identical to light as described scientifically. Since scientific and philosophical accounts characterize this form in different terms, the aim is to "prove empirically" that under different descriptions they both refer to the same form.

Hegel constructs his "proof" as follows. First, he fastens on some of the properties that each account attributes to its object and interprets these properties as identical. In this case, Hegel has deduced the existence of a unitary body (empirically, the sun) located at the center of a structured system of bodies, and has reasoned that this body has a homogeneous type of matter that manifests its unitary character. He then equates this with the capacity of empirical light to make everything

manifest: "it is by being in light that everything may be . . . grasped by us" (EN §275A/2:13). As this example shows, ascertaining which empirical and philosophical properties are identical involves *interpretation*: only through an act of interpretation can light's illuminating quality be equated with the disclosing character of the kind of matter that Hegel has deduced. *Qua* interpretive, these judgments of identity between empirically and philosophically described properties cannot be codified in rules, and so remain always liable to contestation and revision. Consequently, Hegel's "proofs" of identity between empirical and philosophical properties can only be fallible and provisional, unlike the deductive argumentation that (on this strong a priori interpretation) constitutes his basic theory of nature.¹⁵

Furthermore, for these interpretations to justify Hegel's inference that the relevant forms—light and "identity-with-self"—are identical as a whole, he has to downplay any properties of light that resist interpretation into philosophical terms. He defends this by suggesting that such properties are comparatively inessential or extrinsic. For instance, he contends that light's finite speed is a merely extrinsic property deriving from its relationship to the atmosphere (EN §276A/2: 20–21). Here, Hegel is beginning to *reformulate* scientific accounts (by redescribing the relations amongst the properties scientists ascribe to forms). These reformulations need not be arbitrary: presumably they will be more or less plausible depending upon how far they stray from the original scientific accounts. But the fact that Hegel's reformulations can be more or less well supported by the content of empirical accounts means that they may always become implausible in the face of scientific change. In this respect, too, Hegel's "proofs" of identity between empirical and philosophical forms constitute a contingent, not a necessary, element of his *Philosophy of Nature*. As scientific knowledge develops, his reformulations of many scientific accounts will become implausible and so his rationale for including them in the *Philosophy of Nature* will disappear. The material that he includes could, in principle, be substituted for quite different material with no effect on his basic theory of nature. Hegel acknowledges this in discussing space:

In that it is our procedure, after establishing the thought that is necessary according to the concept, to ask how this thought looks in our representation, so the further demand [in this context] is that the thought of pure being-outside-itself correspond to the intuition of space. *Even if we made a mistake here, this would not count against the truth of our thought.* In empirical science one adopts the inverse route; in it the empirical intuition

of space is the first, and only then does one come to the thought of space. (EN §254A/1:224; my emphasis)¹⁶

The contingency of Hegel's "proofs" of identity between philosophically and scientifically described forms is doubly important. First, it means that, assuming that his theory is strong a priori, it contains no inherent commitment to endorsing the empirical results accepted in his time. It may always be possible to construe Hegel's theory as corresponding to more recent scientific views: thus, his theory cannot be rejected as obsolete relative to later science.¹⁷ Second, the contingency of these "proofs" confirms that Hegel is not attempting to deduce empirical findings. He incorporates the latter into his *Philosophy of Nature* on a non-deductive, interpretive, and merely provisional basis.¹⁸ Thus, although strong a priorism has often been denounced for attempting to deduce scientific results, when carefully examined it sidesteps this trap of trying to deduce fallible empirical findings and lend them absolute justification.

We can now appreciate more fully the nature of the strong a priori method, according to which we must (1) work out rationally what forms nature contains, by tracing how they necessitate one another, then (2) incorporate "corresponding" empirical claims into the resulting theory—that is, those empirical claims which describe (or can be reformulated to describe) forms in such terms that they can be provisionally interpreted as identical to the forms that have been deduced a priori. By incorporating empirical claims into his theory on this merely provisional, interpretive, basis, Hegel can theorize nature a priori without absolutizing contemporary science. Thus, strong a priorism avoids the fallacies usually laid at its door: it offers a philosophically coherent approach to the study of nature.

How Cogent is Weak A Priorism?

Critics of strong a priorism have tended to assume that Hegel's proposed weak a priori method is the more cogent approach to nature. This assumption, I want to suggest, is mistaken, as weak a priorism as Hegel presents it has a serious problem. Although subsequent scholars have reformulated weak a priorism to avoid this problem, their reformulations succumb to difficulties in turn—difficulties which necessitate further revisions of weak a priorism, and, ultimately, its transformation into a somewhat different method, which I will call "a posteriorism." This "a posteriori" method *is* cogent, but weak a priorism as such—with which Hegel initially presents us—does not seem to admit of cogent restatement.

Weak a priorism's problem is very simple: with few exceptions, the scientific accounts that (on this reading) Hegel uses for the basic fabric of his theory of nature have been shown by subsequent science either to be false or to give a merely truncated or distorted characterization of natural forms. By seeking rational necessity in the forms described by contemporary empirical scientists, Hegel really *is* doomed to absolutize fallible results. There are two main ways in which he might respond to this objection. First, he could respond that he mistakenly took soon-to-be-superseded scientific claims to have been conclusively justified through the observational methods of science. Although scientists maintained that those claims had empirical support, in reality they reached these claims through fallacious metaphysical reasoning. Hegel levies this charge against scientists in his *Logic*: "The fundamental illusion in scientific empiricism is always that it uses . . . metaphysical categories . . . and it goes on to draw *conclusions*, guided by categories of this sort" (EL §38R/77–78). Scientists themselves are generally unconscious of using metaphysical categories, and this unself-consciousness makes their reasoning more likely to be invalid while causing them to portray their claims as empirically supported—and so misleading the philosopher into accepting those claims and trying to fit the natural forms described into her rational chain. This possible Hegelian response seems to presuppose that philosophers have limited capacities to spot claims with imperfect empirical support, and will typically be led astray by misguided scientific consensus. Tacitly, then, this possible Hegelian response admits the need for continual reconsideration and revision of philosophers' rational reconstructions as scientific progress exposes past errors. This effectively concedes that the arguments of Hegel's *Philosophy of Nature*—and those of any determinate philosophical rearrangement of science—are likely to be uninterestingly misguided.

Second, Hegel might respond that his rational reconstruction is valid and that this reveals that it is subsequent scientists' refutations of the claims he has reconstructed which are mistaken—that it must be those refutations which lack empirical warrant. This entails the falsity of any significantly new scientific claims produced after 1830. Yet this stipulation that only pre-1830 scientific claims can be true seems arbitrary, and this dissolves the credibility of the reasoning by which (on this reading) Hegel reconstructs those claims. So this second possible response to the problem of scientific change again implies that the actual arguments of the *Philosophy of Nature* are unreliable.

The weak a priori method, then, leaves Hegel in a dilemma: he can either deny fallibility to patently fallible empirical claims or embrace fallibility but admit the unreliability of any particular philosophical

reconstruction of science. However, we should not immediately conclude that the weak a priori interpretation of the *Philosophy of Nature* should be rejected, for weak a priorism can be reformulated in ways that make it compatible with recognizing the fallibility of scientific claims. Michael Petry has advanced one such reformulation, introducing his 1970 English translation of the text.¹⁹ Petry's important idea is that Hegel is not trying to ascertain which of the forms described by science are necessary, but is only reorganizing scientific concepts and claims in a systematic arrangement congruent with the architectonic of his logic. According to Petry, Hegel

was fully persuaded that the systematic exposition of the various sciences . . . had its own validity, and whatever we may think of this distinction between contingent content and general principle, empirical material and philosophic form, it is essential that we should not overlook it.²⁰

A properly systematic arrangement of scientific concepts and claims ranks them in a hierarchy of levels of complexity, corresponding to the levels of categorial complexity outlined in Hegel's *Logic*. According to Petry, Hegel believes that philosophers can rightly criticize empirical scientists when they misrecognize the level of complexity at which their own discourse operates and therefore generate theories that threaten to confuse the systematic organization. Brigitte Falkenburg independently provides a helpful articulation of the kind of approach that Petry attributes to Hegel:

The systematic order of organizing the concepts of physics into a system of natural kinds is prescribed by the systematic order of conceptual types of structure as expounded in the *Logic*, starting from the most abstract (or structurally poor) concepts and ending up at the most complex (or structurally complete) concepts.²¹

The method that Petry attributes to Hegel is still weak a priori, insofar as it rearranges scientific materials into an order governed by the a priori structure of logical categories. But Petry's reconstruction of weak a priorism overcomes the defect of Hegel's initial formulation, for according to Petry Hegel does not attempt to ascertain which scientifically described forms are necessary, but tries, more modestly, to ascertain how far scientific descriptions of these forms can be arranged into a structure compatible with a priori logical principles. So reinterpreted,

Hegel turns out to be furthering the development of science in the modest way befitting a philosopher: he directs scientists away from false paths onto which they intermittently stray through lack of grasp of logical principles and completes their work by recasting it within a conceptually well-ordered framework.

Petry's promising reformulation of weak a priorism still has a difficulty. He believes that logical or systematic considerations guide Hegel's *reorganization* of scientific material, but not his *interpretation* of that material (hence Petry's contrast between systematic form and empirical content). Generally, though, when Hegel incorporates empirical results into his *Philosophy of Nature*, he does not take them up just as he finds them, but translates them into his own terms (for example, we have already encountered his seemingly idiosyncratic description of light as "pure manifestation" and "universal self-identity," terms that recur whenever he discusses light). Gerd Buchdahl offers a reading of the *Philosophy of Nature* which recognizes that Hegel does not merely reorganize scientific material with reference to his logic, but thoroughly reinterprets scientific concepts and hypotheses in terms of logical categories. Buchdahl stresses how this project descends from Kant's inquiry into the conditions of possibility of scientific concepts (in his 1786 *Metaphysical Foundations of Natural Science*). But whereas Kant took given scientific results and showed their connection with basic logical categories that give them intelligibility, Hegel completely reinterprets scientific concepts in light of logical categories. For example, he reinterprets the contemporary scientific concepts of "attraction" and "repulsion" through his logical categories of "one" and "many."²²

Buchdahl's reading of Hegel also has a problem, as he himself highlights. According to Buchdahl's reading, Hegel thinks that Kant links the categories to empirical results so loosely that they confer no additional credibility upon those results. Hegel wants instead to enhance the credibility of empirical findings by thoroughly reinterpreting them through logical categories. But "if the connection between the metaphysical basis and the empirical results [becomes] very close, one runs the risk that changes in scientific theory will overturn the whole enterprise."²³ In other words, according to Buchdahl, Hegel integrates contemporary scientific results so firmly together with logical categories as to entail that no other results could achieve the same level of logical intelligibility—which once again has the effect of raising fallible scientific claims to absolute status. By thoroughly reinterpreting scientific concepts so that they instantiate logical categories, Hegel turns out to be denying that any other scientific concepts can achieve equivalent logical intelligibility.

The problem, then, is that weak a priorism as Hegel initially presents it cannot readily accommodate the fallibility of scientific findings. In Petry's reformulation, weak a priorism avoids this problem, since it seeks only to organize (variable and fallible) scientific results in conformity to logical categories. Yet Petry's reformulation of weak a priorism appears problematic as a reading of Hegel, since Hegel engages in a much more thoroughgoing reinterpretation of scientific claims in light of his *Logic*. Acknowledging this, however, returns us to the initial problem: by closely reinterpreting scientific claims in light of logical categories, weak a priorism once again threatens to deny fallibility and corrigibility to those claims.

In *Real Process: How Logic and Chemistry Combine in Hegel's Philosophy of Nature* (1996), John Burbidge offers a further reinterpretation of Hegel which avoids this problem. According to Burbidge, Hegel identifies scientific concepts as *imperfectly* instantiating logical categories, thereby allowing both present and future scientific claims to attain equal degrees of—imperfect—logical intelligibility. Burbidge's reading of Hegel can therefore be regarded as the most sustained attempt yet to defend the idea that Hegel organizes and reinterprets scientific findings in light of logical categories. It is worth examining Burbidge's impressively careful, detailed, reading of Hegel in some depth: this will help us to see whether weak a priorism can be reformulated in a philosophically cogent form.

Burbidge tends to assume that scientific descriptions and explanations largely capture the reality of the world: he therefore speaks indifferently of Hegel as assessing how far scientific claims exemplify his logic and how far empirical phenomena exemplify that logic.²⁴ Burbidge holds, essentially, that Hegel finds that empirical phenomena (or their scientific descriptions) only ever instantiate logical categories imperfectly. Burbidge supports this claim with a detailed study of the relation between Hegel's discussions of "chemism" (*Chemismus*) in the *Logic* and of "chemical process" (*chemische Prozeß*) in the *Philosophy of Nature*. The logical category of chemism arises, according to Burbidge, when we start to think of objects as chemical, that is, as separate but inherently oriented towards one another.²⁵ This obliges us to think of these objects as being capable of realizing their orientation to one another by coming together within a neutral "medium." However, in thinking this we lose our initial idea that separation is essential to chemical objects. This drives us on to reconceive chemical objects again. After a series of such reconceptions, we come to reflect back on the whole succession, reaching the general conclusion that objects are amenable to being classified in systematically interrelated ways. This sparks our move to the entirely

new category of teleology, embracing the idea that objects are so constituted as to be amenable to our thinking about them.²⁶ All these developments concern only the *logic* of our thinking about chemical processes, throughout which, as Burbidge emphasizes: "There is no need to refer . . . to actual chemical bodies . . . Hegel's discussion of chemism involves a systematic development that is logical on its own account."²⁷

In the *Philosophy of Nature*, Burbidge continues, Hegel introduces his discussion of chemical processes by laying out again the logical category of the chemical object (as separate but oriented to an other). Unlike in the *Logic*, though, we then move on to explore how this category is exemplified in empirical phenomena. We find that nature in its rich diversity exceeds the framework provided by the logical category of the chemical.²⁸

The contingencies of nature disrupt the systematic coherence of the logical argument [so that] for all the value of the logical analysis in providing ways of characterizing chemical phenomena, there is no one-to-one correlation. Experience alone can show what phenomena actually occur, and logic does its best to sort that confusion of data into a coherent framework.²⁹

For instance, the initial empirical form of the chemical process ("galvanism") involves objects (metals) that are not strictly chemical, as they do not perfectly exhibit the characteristic of orientation toward one another. Similarly, all empirical chemical processes prove to unite the processes of "combination" and "separation," which are logically conceived as separate. Thus, the characteristics of logical chemism are exhibited (at best) incompletely in empirical material. Burbidge concludes, in general, that "the logic is not instantiated directly; investigation must find what corresponds in nature to the logical pattern, though in a quite dispersed and incomplete way."³⁰ After all, as he points out, if nature instantiated logical chemism perfectly then Hegel would need no separate discussion of natural chemical processes, which could simply be mentioned as a footnote to the *Logic*.

That logical categories are instantiated only imperfectly in nature has dramatic implications for how Hegel's account of nature is systematic, as Burbidge shows. Whenever we think logically, we must proceed by elaborating successive conceptions of something before we grasp these as a unity, and likewise in thinking about nature we must first examine all the aspects of empirical chemical processes and then grasp them in an overall perspective. Grasping all these aspects together leads

us to conclude that bodies and substances are only evanescent moments of an overarching process, which is grasped through the new category of *life* as a self-organizing process that specifies its own members. As in the *Logic*, this is a *conceptual* transition, from one way of thinking about nature to another. However, in the *Logic*, this final “act of reflective synthesis”³¹ resulted in the category of *teleology*, not that of life. The *Philosophy of Nature*, then, “does not just follow the logic, but goes its own way.”³² Because philosophical thought about nature has to organize contingent empirical materials, it generates a series of categories which may well *diverge* from logical categories.³³ These “natural” categories are derived from reflection on empirical results and are justified insofar as they allow us to grasp these results as a unity. The natural categories are therefore *a posteriori*: Burbidge explicitly states that “those reflections that initiated the section on chemical process . . . are generated a posteriori from reflection on earlier experience.”³⁴ This contrasts with strictly logical categories, which are always reached a priori. Accordingly, Burbidge concludes that, unlike the *Logic*, the *Philosophy of Nature* is “radically empirical,” or practices a “thoroughgoing empirical approach.”³⁵

Burbidge’s analysis of the *Philosophy of Nature* is important because it shows that, once we recognize that empirical phenomena instantiate logical categories only imperfectly, we must acknowledge that the successive categories through which we apprehend those phenomena cannot be simply the a priori categories of the *Logic*: they must compose an *additional* framework of specifically “natural” categories which organize the contingent findings of empirical science, and which must, therefore, be a posteriori. Let me clarify, at a more general level, why this framework of “natural” categories is necessarily a posteriori. After all, one might suppose that Hegel treats each empirical phenomenon as the imperfect instantiation of a preestablished logical category (so that, for example, space imperfectly instantiates the logical category of “being,” time imperfectly instantiates the logical category of “nothingness,” and so forth). Burbidge shows that such a reading would be inadmissible, because Hegel’s *Logic* does not outline a fixed set of categories anyway. Instead, it articulates a *process* undergone by thinking activity, which generates each successive logical category in order to grasp as a whole its successive formulations of the preceding category. Properly philosophical thought about nature can be no less processual than logical thought in general. We cannot think philosophically about nature by approaching it in terms of a fixed set of categories; we must generate the appropriate categories in actively thinking through the complexity of empirical phenomena. The legitimate categories for thinking

nature are therefore those that we generate in order to unify a specific range of complex empirical materials—categories that must, therefore, be a posteriori (derived from reflection on the empirical). The a posteriori justification of natural categories makes them fallible, since they must be rethought as empirical knowledge advances (a rethinking in which, Burbidge shows, Hegel continually engaged). Thus, the fact that variable empirical materials exceed logical categories implies, given Hegel's dynamic understanding of categorial thought, that the appropriate categories for thinking nature must be a posteriori.

I have expounded Burbidge's reading of Hegel at length to see whether his work can be considered to recast weak a priorism in a tenable form. As I have explained, previous scholars—notably Petry and Buchdahl—have plausibly argued that a tenable version of the weak a priori method must investigate not which scientifically described forms are rationally necessary, but how far scientific accounts can be reorganized or reinterpreted in light of a priori logical categories. Yet Burbidge's arguments show that this reconstructive method can only accommodate the contingency and diversity of empirical findings by organizing them not through a priori logical categories but through a distinct set of “natural” categories that are a posteriori. In this way, the interpretive effort to reformulate weak a priorism has transformed it into a significantly different method, which can be called “a posteriorism.” It cannot therefore be said that Petry, Buchdahl, or Burbidge have rendered weak a priorism, as such, cogent: this method remains problematic. However, Burbidge's work develops an alternative, a posteriori, interpretation of the *Philosophy of Nature* which is philosophically viable. Just as strong a priorism involves neither the dismissal nor the fallacious absolutization of scientific claims, likewise the a posteriori method allows Hegel to learn from science while acknowledging the fallibility of its claims. So, at the end of this inquiry, we seem, disappointingly, to be as far as ever from a conclusion as to the best interpretation of the *Philosophy of Nature*.

Metaphysical Disputes in the Interpretation of the *Philosophy of Nature*

The dispute over whether Hegel's theory of nature should be construed as a posteriori or strong a priori is not narrowly relevant to the understanding of the *Philosophy of Nature*, but it raises broader issues in Hegel interpretation. When closely examined, this dispute between the two interpretations can be seen fundamentally to concern Hegel's *metaphysics*. Thus, this dispute bears significantly upon how we should interpret

Hegel's philosophical outlook as a whole, and specifically upon whether, and in what sense, we should construe Hegel as a metaphysical thinker. Essentially, the strong a priori reading of the *Philosophy of Nature* presupposes that Hegel is presenting a metaphysical theory of nature, according to which nature is structured by successive forms that comprise a necessary chain. On the other hand, the a posteriori reading implicitly presupposes that Hegel's theory of nature is nonmetaphysical and that the basic categories composing this theory follow one another merely contingently. Let me expand on this schematic comparison.

According to strong a priorism, the philosopher of nature must first describe—in *sui generis*, nonscientific, terms—a sequence of objectively existing natural forms, each deriving from the preceding one. Next, the philosopher must appraise how far forms described by scientists can be interpreted as identical to these *sui generis* natural forms. According to the strong a priori interpretation, then, the *Philosophy of Nature* is essentially a metaphysical theory, in the sense that it purports to *describe* really existing structures which are presumed to organize the natural world. These structures are initially characterized under specifically nonscientific descriptions, which are subsequently compared against the descriptions that scientists have given of those structures. Moreover, according to Hegel's basic theory, each objectively existing natural structure or form supplants its predecessor with *necessity*. He refers to the “conceptually generated necessity” of nature's “patterns” (*Gebilde*) (EN §250/1: 215), each of these patterns constituting a “stage” (*Stufe*) which “proceeds of necessity out of” its predecessor (“*aus der andern notwendig hervorgeht*”) (§249/1: 212). In other words, each form is the necessary consequence of the one preceding it (in a sense of “necessity” that remains to be explained: see chapter 3).

On the other hand, according to the a posteriori method, the philosopher must trace out a series of categories, each of which provides a perspective for grasping a determinate range of empirical phenomena. In each case the philosopher must assess how these categories are contingently instantiated in the relevant range of empirical phenomena, then reflect on this whole range of phenomena to formulate—a posteriori—the next category in the series. On this a posteriori reading, the basic framework of Hegel's *Philosophy of Nature* is no longer a series of descriptions of objectively existing structures; it is now a set of categories for thinking about empirical phenomena. These categories are “nonmetaphysical”: they do not purport to correspond, descriptively, to natural forms or structures that really exist. Rather, these categories specify how we must think about empirical phenomena, articulating the key stages in the process by which we render those phe-

nomena intelligible to ourselves. Burbidge himself confirms that his a posteriori reading implies that the *Philosophy of Nature* is essentially nonmetaphysical. In his earlier book, *On Hegel's Logic*, Burbidge interprets the *Logic* as articulating the basic categories that crystallize “the operations of pure thought.”³⁶ In this Burbidge deliberately discards Hegel's (in)famous claim that his logic is a metaphysics (made, for example, at EL §24/56), arguing instead that “pure thought” unfolds without “any contact with an external reality.”³⁷ The confrontation with external reality marks the transition from *Logic* to *Philosophy of Nature*, at which point thought begins to assess how far its categories apply in the phenomenal domain. The basic framework of the *Philosophy of Nature* thus consists in categories devised, a posteriori, in the encounter with phenomenal reality, just as the *Logic* centers on categories devised, a priori, through thought's entirely self-contained reflections upon its own processes. Furthermore, these “natural” categories constituting Hegel's basic theory of nature compose a contingent series: any revisions in empirical knowledge demand the derivation of new, different, categories.

Through their implicit divergence over Hegel's metaphysics, the two readings of the *Philosophy of Nature* broadly align with opposed positions that have emerged from the extensive debate among Hegel scholars over whether his philosophy should be read “metaphysically” or “nonmetaphysically.” Broadly, “metaphysical” readings contend that his philosophical system sets out to describe the structures of the world as it really is.³⁸ By contrast, “nonmetaphysical” readings hold that Hegel's system explicates a set of categories through which we must confer intelligibility upon our experience.³⁹ These categories do not purport to correspond to really existing structures within the world, but only to specify how we must represent things, or how they must appear to us given the constraints of our mode of representation (what Henry Allison calls our “epistemic conditions”).⁴⁰ Some prominent nonmetaphysical interpreters, such as Robert Pippin, give this a Fichtean inflection, whereby the categories that Hegel explicates must constrain our thought in virtue of being necessary conditions for the possibility of self-conscious subjectivity.⁴¹ Broadly, then, the strong a priori construal of the *Philosophy of Nature* aligns with the metaphysical interpretation of Hegel, whereas the a posteriori construal is—as Burbidge suggests—closer to the nonmetaphysical school of interpretation. This gives the interpretive dispute surrounding the *Philosophy of Nature* wider importance and relevance for understanding Hegel's entire philosophical outlook.

The distinction between “metaphysical” and “nonmetaphysical” readings of Hegel could, to some extent, be reframed as a distinction

between “realist” and “nonrealist” readings (although this nomenclature does not fully capture the complexity of either position). On metaphysical readings, Hegel is a realist: he believes that the world has, objectively, a determinate structure, which we can know about as it really is. Admittedly, it might sound odd to call Hegel a “realist,” when he famously styles himself an “absolute idealist.”⁴² But, as he clarifies, absolute idealism is the view that things “hav[e] the ground of their being not in themselves but in the universal divine idea” (EL §45A). Here, the “idea” is understood as a comprehensive ontological structure that is not merely “subjective”—not merely a function of human thought—but in some sense exists objectively too. Confusingly, then, the metaphysical position that Hegel calls “absolute idealism” is *not* idealism in the usual sense where “idealism” denotes the view that the world either exists—as for Berkeley—or acquires determinate character—as for Kant—only through the mind’s constituting activity. Ironically, “absolute idealism” is a form of realism, on which all reality is structured by the “idea.”

Nonmetaphysical readings deny that Hegel is a realist, for on these readings Hegel’s system articulates a series of categories rather than attempting to describe any objectively existing structures. One might wonder whether this line of interpretation positions Hegel as someone who holds (with Kant) that reality cannot have in itself the character or structure that we represent it as having (since this character is solely a function of our representing activity), and hence that we cannot know about reality as it is independently of us. Such an interpretation would seem to overlook Hegel’s adverse comparison of what he calls Kant’s “subjective idealism” with his own “absolute idealism” (EL §45A/88–89). In fact, though, nonmetaphysical interpretations avoid construing Hegel’s idealism as merely “subjective” by arguing that, for him, even the concept of reality as it is “in itself,” independently of us, is a category that we adopt—a self-contradictory category, in fact, which must be transcended. Thus, the nonmetaphysical Hegel can consistently hold both that our categories do not correspond to any real structures and that these categories are absolutely valid (rather than being merely “subjective” vis-à-vis “reality-in-itself”).

The metaphysical reading of Hegel is widely repudiated by contemporary scholars, which might seem to tell, simultaneously, against the strong a priori reading of the *Philosophy of Nature*. Often, though, scholars reject the metaphysical view because they associate it with a particular reading of Hegel promoted by Charles Taylor. For Taylor, Hegel sees the whole universe as the creation and expression of *Geist* or God, a macrocosmic subject which seeks to know itself by creating

a natural world that embodies and reflects it. *Geist* also creates finite human subjects who can come to recognize *Geist*'s presence in nature, so that through them *Geist* attains full self-consciousness. The Hegel who issues from Taylor's reading is a "metaphysical" thinker in that he endeavors to describe the universe as it really is: a complex ensemble of relations between *Geist*, nature, and human subjects. Many commentators—especially those predominantly concerned with Hegel's sociopolitical thought—presume that Taylor's reading exhausts the possibilities for metaphysical interpretation of Hegel. For example, Alan Patten assumes that any metaphysical construal of Hegel must, following Taylor, suppose him to "start out from [a] fantastical notion of cosmic spirit," a reading which, Patten concludes, "leaves Hegel's position looking pretty unattractive."⁴³ Similarly, Allen Wood equates Hegel's metaphysics with the theory of cosmic spirit, then concludes that this metaphysics is an "utterly unconvincing" failure to be jettisoned in favor of Hegel's concrete reflections on social issues.⁴⁴

We should hesitate, however, before equating Hegel's metaphysics with Taylor's construal of it. Taylor makes a crucial interpretive mistake: he generalizes claims that Hegel makes specifically within his philosophy of *mind* to encapsulate the content of his entire metaphysics.⁴⁵ More precisely, Taylor extrapolates Hegel's claims about the character of human subjects onto the putative cosmic subject that he calls *Geist*/God. When Hegel himself refers to a metaphysical reality embodied in nature and humanity, though, he typically speaks not of *Geist* but of the "idea," or the "logical idea." By this, he essentially means the sum-total of all the forms of thought described in his *Logic*. He observes that:

[T]he differences between the particular philosophical sciences are only determinations of the idea itself and it is this alone which presents itself in these diverse elements. In nature, it is not something other than the idea that is recognised, but the idea is in the form of *externalisation* [*Entäußerung*].
(EL §18R/42)

Hegel does not equate the omnipresent "idea" with mind: rather, the idea eventually develops *into* mind, which is "concrete and developed" in contrast to the "comparatively abstract, simple logical idea" (EM §377A/1). Thus, although Hegel does appear to believe in a nonmaterial reality of some sort which is instantiated in the natural and human domains, he does not identify this reality directly with a cosmic subject as Taylor alleges. Hegel's system is therefore hospitable to a metaphysical reading quite distinct from that of Taylor.

Hegel makes numerous statements supporting such a metaphysical reading of his philosophy, and confirming, especially, that he believes this nonmaterial reality, called “the idea” (or sometimes “the concept,” *der Begriff*), to structure and be embodied in all other beings. He famously states that “the concept is what truly comes first, and things are what they are through the activity of the concept that dwells in them” (EL §163A2/241). Elsewhere he reiterates that all these things only exist insofar as they depend upon the idea: “The proposition that the finite is ideal [*ideell*] constitutes idealism. The idealism of philosophy consists in nothing else than in recognizing that the finite is not a veritable being” (WL 154/1:172). Hegel is saying, then, that his (absolute) “idealism” consists in his view that every existent depends, ontologically, upon the idea, which embraces the totality of forms of thought, forms which exist, as Hegel tells us in his *Logic*, “objectively” (*objektiv*).

[T]houghts can be called *objective* thoughts; and among them the forms which are . . . usually taken to be only forms of *conscious* thinking have to be counted too. Thus *logic* coincides with *metaphysics*, with the science of *things* grasped in *thoughts*, which used to be taken to express the *essentialities* of *things*. . . . To say that there is understanding, or reason, in the world is exactly what is contained in the expression “objective thought.” This expression is, however, inconvenient precisely because *thought* is all too commonly used as if it belonged only to spirit, or consciousness, while the objective is used primarily just with reference to what is unspiritual. . . . [Hence] the logical is to be sought in a system of thought-determinations in which the antithesis between subjective and objective (in its usual meaning) disappears. This meaning of thinking and of its determinations is more precisely expressed by the ancients when they say that *nous* governs the world. (EL §24-§24A/56)

The central message of this paragraph is that the forms of thought which make up the “idea,” and on which all other existents depend, are not merely “subjective” categories. Rather, they primarily exist as objective structures embodied in both nature and mind.⁴⁶ For Hegel, mind necessarily develops to a point at which human beings start to think according to subjective categories which duplicate the content of the objective forms of thought (subjective categories which therefore accurately describe the world’s real structure). Thus, objective forms of thought do eventually assume subjective guise. Nonetheless, the forms

of thought are not *merely* subjective—not merely functions of the human mind; rather, subjective categories are the highly developed form that hitherto nonsubjective thought eventually assumes. Hegel's idealism thereby dissolves the subject/object “antithesis” by arguing that objective thought must ultimately develop into subjective form.

Considerable textual evidence supports this interpretation of Hegel's metaphysics,⁴⁷ which avoids Taylor's problem of postulating a creative cosmic subject. Yet even once Hegel's metaphysics is disentangled from Taylor's construal of it, there are further reasons that some commentators will remain unsympathetic to it. The central problem is that the metaphysical reading risks portraying Hegel as an implausibly pre-critical thinker, blithely unconcerned by Kant's strictures on the impossibility of knowing about how reality might be independent of our modes of representation. For instance, Pippin contends that:

[T]he standard view of how Hegel passes beyond Kant into speculative philosophy makes very puzzling, to the point of unintelligibility, how Hegel could have been the post-Kantian philosopher he understood himself to be . . . Just attributing moderate philosophic intelligence to Hegel should at least make one hesitate before construing him as a post-Kantian philosopher with a pre-critical metaphysics.⁴⁸

So, on philosophical grounds, many scholars think it wise to construe Hegel nonmetaphysically. Admittedly, this necessitates painstaking reconstruction of those passages in Hegel that appear unambiguously metaphysical, but his texts are multifaceted enough to permit such reconstruction.

However, the objection that construing Hegel metaphysically makes him unacceptably naïve is not conclusive. This is for two reasons. First, unlike pre-critical metaphysicians, Hegel does not attempt to describe a reality that he conceives to exist *independently* of our representations. Although Hegel aims to describe objectively existing structures that organize reality, he does not believe that these structures exist independently of our ways of thinking about and representing them, for thought necessarily develops into subjective forms that replicate and describe its earlier, merely objective, structures. Thus, the really existing structures which Hegel endeavors to describe are necessarily interrelated with—not independent of—our forms of representation.⁴⁹ Second, Hegel does not simply make assertions about these objective structures. He strenuously attempts to support his metaphysical descriptions through his exhaustive critique of rival metaphysical views in the *Phenomenology*.

This critical strategy may not entirely succeed, but it represents a considered and challenging alternative to traditional epistemology. Hegel's metaphysical approach is therefore not naïvely pre-Kantian, but arises from careful, prolonged, confrontation with epistemological problems.⁵⁰

These considerations imply that, properly understood, Hegel's possible metaphysical project can be at least as cogent as his possible nonmetaphysical project. But I wish, also, to make a stronger claim: namely, that his metaphysical project of describing the world's conceptual structures is considerably more *fruitful* than the nonmetaphysical project of a category theory. The metaphysical project, I want to suggest, is more fruitful both in its philosophical consequences and in its ethical and political implications. Hegel's metaphysical project is fruitful just because its attempt to describe the conceptual structures organizing reality must include an attempt to describe the objective forms or structures that organize the natural world. Insofar as this description of natural forms belongs within the broader description of reality as pervaded by the "idea," this description of nature can be expected to diverge significantly from any of the descriptions available within empirical science. Hegel's metaphysical project, then, must include the intention of developing a metaphysical theory of the natural world which characterizes it in substantially nonscientific terms. This puts him in a position to advance a strong and interesting critique of modern science. If he can show that his descriptions of natural forms rest on a stronger metaphysical basis than the descriptions offered by empirical science, then he can conclude that scientific claims and theories are inadequate, in respect of their defective metaphysical basis. Insofar as Hegel takes a metaphysical approach to nature, then, he can articulate a distinctive critique of the scientific approach: that it rests on inadequate metaphysical foundations.⁵¹

A problem of this sort within science—that is, of the sort which Hegel articulates as the problem of science's inadequate metaphysical foundations—can plausibly be seen as the root cause of widespread environmental degradation. In large part, this degradation is directly attributable to modern technological developments, which have a more "unprecedented and immediate impact" on nature than has previously been possible.⁵² Yet these technological developments themselves stem from modern empirical science, not only in that they result from the application of science, but also, more deeply, in that they enact practical possibilities already encompassed and anticipated within the theoretical characterizations of nature that science provides.⁵³ It is therefore reasonable to think that these technological developments are damaging because the scientific characterizations of nature in which they are grounded

are, in some way, theoretically deficient in the first place. Hegel's metaphysical approach identifies a basis for such a theoretical deficiency in modern science: namely, that science has inadequate metaphysical foundations which both pervade and distort its accounts of nature. In proposing to outline a theory of nature based on his own, more adequate, metaphysics, Hegel opens up the possibility that his more adequate theory could facilitate more environmentally sensitive technological applications and so a more sustainable way of life as a whole.

My suggestion, then, is that Hegel's metaphysical project is not only philosophically cogent but also promises a fresh approach to nature and a sustained and forceful critique of modern empirical science. Moreover, this critique is forceful partly because it avoids simplistic antisecularism. Hegel's critique does not view scientific claims and theories as straightforwardly false and worthless, but, more cautiously, as flawed by their inadequate metaphysical foundation. This calls on us not to reject those claims but to engage with and reassess them, redescribing them in more metaphysically adequate terms.

The fruitfulness of Hegel's possible metaphysical project gives us philosophical reason to interpret him *as* a metaphysical thinker. After all, when we decide on philosophical grounds between competing interpretations of a text, we need not refer solely to the values of consistency and cogency (although presumably those values set minimum conditions for the acceptability of an interpretation). We may also refer to the theoretical or practical *fecundity* of a position in justifying our decision to interpret a text in its terms. Indeed, it appears that considerations of fecundity often (covertly, if not overtly) guide choices of interpretive frameworks for texts. To take one example, contemporary feminist philosophers often reinterpret texts from the history of philosophy in ways that recover submerged protofeminist themes within those texts, this project of recovery being motivated by its fruitfulness in facilitating the elaboration of positive feminist theories.⁵⁴

The Fecundity of the Strong A Priori Reading

Hegel's *Philosophy of Nature* has been repeatedly condemned for adopting the method that I have called strong a priorism, a method which critics have presumed to entail either blanket dismissal or fallacious absolutization of empirical claims. I have argued that these criticisms are misplaced: correctly understood, strong a priorism incorporates scientific claims on a merely provisional and interpretive basis. On the other hand, weak a priorism—which, as Hegel presents it, aims to reconstruct scientifically described forms into a necessary sequence—

does entail the false absolutization of fallible scientific findings. In its unreconstructed form, the weak a priori reading of the *Philosophy of Nature* should be rejected. As we have seen, though, weak a priorism can be reformulated into the considerably more plausible a posteriori method. Strong a priorism may then be judged problematic relative to a posteriorism, in this case because strong a priorism presupposes the validity of a metaphysical approach to nature, which attempts to describe nature's objectively existing structures. This presents itself as a problem, though, only if the project of describing reality's objective structures is regarded as naively pre-Kantian. I have suggested that this objection to the metaphysical project is inconclusive, so that strong a priorism's connection with the metaphysical approach need not diminish its cogency. On the contrary, this connection may actually *enhance* its attractiveness, insofar as Hegel's metaphysical project is unusually fruitful, both theoretically and practically. Given this fecundity, I have suggested, we should read Hegel as a metaphysical thinker: this allows us to explore the possibility that he develops a *sui generis* theory of nature and an attendant critique of science. In this light, strong a priorism becomes philosophically fruitful too, providing the method by which Hegel can develop a theory of nature couched in a language alternative to, and more metaphysically adequate than, that of empirical science. As part of reading Hegel metaphysically, then, we should construe his *Philosophy of Nature* in strong a priori terms. This will enable us to understand his theory as a *sui generis*, specifically philosophical, description of nature, and to explore how he compares this description against scientific accounts and reinterprets those accounts in terms of his own metaphysical framework.

The next chapter therefore proposes a strong a priori reading of Hegel's substantive account of nature in the *Philosophy of Nature*. This reading will provide us with an initial overview of Hegel's *sui generis* theory of nature and how it relates to empirical scientific accounts. This reading will also enable us to see how Hegel's *sui generis* theory of nature reflects his general metaphysical project and, in particular, his central metaphysical thesis that all reality embodies and is structured by forms of thought.