



Rehabilitating the regulative use of reason: Kant on empirical and chemical laws



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ABSTRACT

In his *Kritik der reinen Vernunft*, Kant asserts that laws of nature “carry with them an expression of necessity” (A159/B198). There is, however, widespread interpretive disagreement regarding the nature and source of the necessity of empirical laws of natural sciences in Kant’s system. It is especially unclear how chemistry—a science without a clear, straightforward connection to the *a priori* principles of the understanding—could contain such genuine, empirical laws. Existing accounts of the necessity of causal laws unfortunately fail to illuminate the possibility of non-physical laws. In this paper, I develop an alternative, ‘ideational’ account of natural laws, according to which ideas of reason necessitate the laws of some non-physical sciences. Chemical laws, for instance, are grounded on ideas of the elements, and the chemist aims to reduce her phenomena to these elements via experimentation. Although such ideas are beyond the possibility of experience, their postulation is necessary for the achievement of reason’s theoretical ends: the unification and explanation of the cognitions of science.

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1. Introduction

In the *Analytic of Principles of KrV*,¹ Kant famously claims that empirical laws are, in some sense, necessary.

Even laws of nature, if they are considered as principles of the empirical use of the understanding, at the same time carry with them an expression of necessity, thus at least the presumption

of determination by grounds that are *a priori* and valid prior to all experience. (KrV, A159/B198)²

Although the nature and the source of this necessity are elusive, Kant is reasonably clear about some aspects of empirical lawfulness. First, empirical laws cannot be derived directly from the categories or the pure principles of the understanding, thus ruling out a straightforward, deductivist interpretation of empirical laws (KrV, A127, B165).³ Second, the systematization of the understanding’s cognitions—that is, the hierarchical ordering of concepts and judgments—is central to the necessity of empirical laws (KrV, A645/B673; KU, 5:179f.).

Kant clearly highlights the importance of systematization for empirical lawfulness, yet he fails to identify transparently the source of the necessity of empirical laws. There are a variety of positions on empirical lawfulness available in the existing scholarship on Kant. According to Michael Friedman’s ‘categorical

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¹ I use the following abbreviations for Kant’s works: KpV = *Kritik der praktischen Vernunft*, KrV = *Kritik der reinen Vernunft*, KU = *Kritik der Urteilskraft*, Log = *Jäsche Logik*, MAN = *Metaphysische Anfangsgründe der Naturwissenschaft*, OP = *Opus Postumum*, Prol = *Prolegomena zu einer jeden künftigen Metaphysik*, Refl = *Reflexionen*, and V-Ph/Danziger = *Danziger Physik*. (The *Danziger Physik* is a collection of C. C. Mrongovius’ notes from Kant’s physics lectures, given in the summer semester of 1785. The notes are reproduced in volume 29 of the Akademie edition of Kant’s works along with W. J. G. Karsten’s *Anleitung zur gemeinnützlichen Kenntniss der Natur*, hereafter abbreviated as “AKN.”) Citations of KrV refer to the standard A/B pagination. All other citations of Kant’s works refer to the Akademie edition volume number and page number(s) (Kant, 1902). For English translations, I use those available in Cambridge University Press’ edition of Kant’s works: (Kant, 1993, 1996, 1998, 2004). All other translations from German are my own.

² See also Prol (4:312) and KU (5:184–5).

³ Were such a derivation possible, it would imply that the categories or the pure principles of the understanding have empirical content: see Butts (1986, p. 171).

interpretation,' the categories are the ultimate source of the necessity of empirical laws. The systematization of a science only confers necessity by connecting empirical laws to higher, *a priori* laws that are (indirectly) derived from the categories. In contrast, 'system interpretations'—espoused by, e.g., Buchdahl, Kitcher, and Guyer—hold that systematization plays no mere subsidiary role in the necessitation of empirical laws. Rather, the hierarchical ordering of empirically discovered regularities and the approximation of an ideal, final science constitute an *independent* source of necessity. As I argue in Section 2, both sorts of interpretation are inadequate. Friedman's categorial interpretation of lawfulness cannot account for the possibility of empirical laws in sciences other than physics, like chemistry. Interpretations that place systematization at the heart of lawfulness, though they would better account for the possibility of laws in non-physical sciences, ultimately fail to specify a plausible and textually supported source of necessity that is exploited through systematization.

In this paper, I defend an alternative 'ideational interpretation,' according to which systematization confers necessity onto empirical, causal laws of non-physical sciences, especially chemistry, by connecting them to ideas of reason. According to Kant the regulative use of reason (described in the appendix to the *Transcendental Dialectic*) essentially involves the postulation and testing of principles that unify empirically discovered regularities. When a principle is put forth that maximally unifies such regularities and cannot be derived from a higher principle it is considered to be strictly universal and necessary. The regularities that follow from this principle then, themselves, carry necessity and hence become laws. In contrast to system interpretations, I argue that interconnection of a science's concepts and judgments cannot, on its own, secure the necessity of empirical laws. Rather, it is only by grounding such laws upon the *a priori* foundation provided by reason's ideas that they become necessary.

In Section 2, I argue against the aforementioned categorial and system interpretations of Kant's views on empirical laws. During the course of these arguments, I observe that system interpretations require some sort of source for the necessity of empirical laws; mere systematization is insufficient. In Section 3, I present my ideational interpretation, according to which ideas of reason serve as the requisite source for the necessity of empirical laws and which clarifies the sort of necessity attainable in the non-physical sciences. Throughout this section, I also situate my account with respect to the recent body of literature on Kant's conception of laws.⁴ Finally, in Section 4, I flesh out my account by defending it from three natural challenges.

2. Against existing conceptions of the necessity of laws

According to Friedman's categorial interpretation, genuine laws of nature result from successively superadding empirical content to the pure principles of the understanding.⁵ For example, in MAN, Kant specifies the principles of the understanding with the (empirical) concept of matter to derive the *a priori* special metaphysical principles of physics (e.g., the mechanical laws). These principles are themselves necessary and universal due to their connection with the categories and communicate this necessity and universality to the other laws of physics, like the law of universal gravitation. This law results from the application of the special metaphysical principles of physics to empirical regularities, specifically Kepler's. Though these regularities are based on induction

and hence contingent, the law of universal gravitation is nonetheless necessary and universal in virtue of resulting from an application of the *a priori* principles of physics.

For Friedman, the *a priori* core of physics, derived from the categories, is hence the foundation for empirical laws that carry necessity. Any other natural science, according to the categorial interpretation, admits of genuine empirical laws only insofar as its laws can be (indirectly) derived from the special metaphysical principles of physics: it is only in virtue of such a derivation that a law can inherit the necessity of the pure principles of the understanding. Kitcher (1994, p. 258) complains that the categorial interpretation thereby rules out the possibility of genuine, non-physical laws (e.g., chemical laws). Although Friedman (1992b, pp. 188–91; 2013, p. 241) recognizes this implication of his interpretation, he dismisses any shortcoming, because he thinks Kant's denial that chemistry is a "properly so-called natural science" (MAN, 4:468, 471) implies that it is incapable of laws.⁶ So, for Friedman, the purported laws of chemistry are actually mere empirical regularities, carrying no necessity.

However, there are two significant problems with the categorial interpretation. First, Kant regularly refers to chemical laws [*Gesetze*] (MAN, 4:468, 534) and chemical principles [*Grundsätze, Principien*] (MAN, 4:469, 471). In the General Remark to the Dynamics, he discusses the discovery of laws regarding matter's "inherent" [*eigene*] forces (MAN, 4:533); a subset of these forces is the chemical (MAN, 4:530; OP, 21:453). Throughout the opening passages of V-Ph/Danziger, Kant claims that there are chemical laws and principles (29:97–9). And in KpV Kant makes clear that chemistry has laws, though its laws are of a different sort than those of physics.

Even the rules of uniform appearances are called laws of nature (e.g., mechanical laws) only when they are either cognized really *a priori* or (as in the case of chemical laws) when it is assumed that they would be cognized *a priori* from objective grounds if our insight went deeper. (KpV, 5:26)

Now, while the difference between chemical and physical laws is opaque at this point,⁷ Kant clearly maintains the existence of chemical laws; to claim that chemistry admits only of mere empirical regularities is in conflict with his stated views. Second, the categorial interpretation effectively collapses the distinction between rational sciences (those capable of causal laws)⁸ and proper sciences (those capable of *a priori*, apodictically certain laws) drawn by Kant in the opening pages of MAN. For Friedman, a science only has laws when they are connected to the *a priori* ground derived from the categories. But Kant claims that rational sciences, like chemistry, have "laws of experience" without being reducible to physics (MAN, 4:468). There is no conceptual space in Friedman's framework for such lawful, non-physical sciences.

Alternative, system interpretations emphasize that the necessity of empirical laws essentially involves the process of systematization, discussed by Kant most prominently in the appendix to the

⁴ Allison (1994, p. 305), despite criticizing Friedman's views and advancing a system interpretation, concurs that chemistry has no genuine laws. For an alternative account of chemistry's status as an improper science, see McNulty (2014).

⁵ I explain this passage in Section 4.1.

⁶ I concur with Van den Berg (2011, pp. 11–6), who argues that rational sciences are those that contain real ground-consequent relations, or causal laws. However, others—like Plaass (1965, p. 38), Pollok (2001, pp. 58f.), and Watkins (1998, p. 568)—differently conceive of rational sciences. While a detailed account of Kant's conception of rational science is beyond the scope of this article, Kant is nonetheless clear that rational sciences contain "interconnection[s] of grounds and consequences," that chemistry is a rational science, and that chemistry has genuine laws (see MAN, 4:468).

⁴ I especially consider interpretations from Henschen (2014), Massimi (2014), and Watkins (2014), which my account well complements.

⁵ See, especially, Friedman (1992a; 1992b, pp. 165–201; and 1992c).

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