Kant and the Laws of Nature
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Introduction
Kant’s complex and nuanced view on the laws of nature has recently been at the center of renewed attention among Kant’s scholars. Kant’s view is one of the best examples in the early modern period of the philosophical view of nature as ‘ordered’ and ‘lawful’ that emerged with the scientific advancements of the seventeenth and eighteenth centuries. Building on the extraordinary success of Newton’s mechanics and optics, but also on the burgeoning chemistry of Hales in England, Boerhaave and Musschenbroek in the Netherlands, among many others, Kant’s life-long engagement with the natural sciences (broadly construed) influenced, and fed into his mature Critical philosophy. Explaining why laws of nature seemingly govern the natural world (as much as the moral law regulates the realm of human freedom and choice) is key to Kant’s transcendental philosophy. Kant seems to embrace a coherent account of what it is to be a law, in moral philosophy and in theoretical philosophy. When it comes to theoretical philosophy (and in particular, to Kant's philosophy of nature, which is our topic), the main question is how it is possible for us to come to know nature as ordered and lawful. Where does the lawfulness of nature come from? In the Critique of Pure Reason, and in the Prolegomena Kant held the view that our faculty of understanding is the primary source of nature’s lawfulness because the a priori categories of the understanding “prescribe laws to nature” — i.e. they play the role of constitutive a priori principle for our experience of nature. Yet, already in the first Critique, and even more so in Critique of the Power of Judgment Kant stressed the importance of the faculty of reason, first, and the faculty of reflective judgment then — with their regulative principles — in offering a system of laws necessary for our knowledge of nature. The crucial distinction between constitutive principles of the understanding versus regulative principles of reason and reflective judgment leads, in turn, to a series of further distinctions in Kant. For example, it leads to the different status of laws in the physical sciences and in the life sciences, which in turn became the battleground for the debate concerning mechanical explanations versus teleological explanations.

General Overviews
Friedman 1992 and 2013 has offered a very influential view in this debate (especially with his latest interpretation of Kant's Metaphysical Foundations). Guyer 2005 offers an authoritative reading of systematicity in Kant (both in moral philosophy and in theoretical philosophy) and Kitcher 1986 is a classic take on Kant's systematicity by a leading philosopher of science. Massimi 2014 charts the historical roots of Kant’s view back to Newton. Warren 2001 provides an insightful metaphysical take on Kant's philosophy of nature. Watkins 2001 and Watkins 2005 are a must for anyone approaching the debate for the first time by a world’s leading Kant scholar. Watkins and Stan 2003 (revised 2014)
is an excellent online entry for a detailed overview on Kant's philosophy of science (from the pre-Critical to the Critical period).


Friedman, Michael. Kant’s Construction of Nature: A Reading of the Metaphysical Foundations of Natural Science. Cambridge: Cambridge University Press, 2013. This is Friedman’s latest comprehensive study of Kant’s mature view on nature. Advanced reading for an expert audience. The Introduction is accessible to a wider audience.


Historical Background on Kant’s view of the lawfulness of nature

The next two sub-sections map the ground on the topic of the lawfulness of nature, according to Kant. In Primary Sources, the key Kantian texts on the topic can be found, spanning from the pre-Critical period to the Critical period and the Opus postumum. In Secondary Sources, some classic authoritative introductions to the topic are listed, including more recent ones.
Primary Sources

Kant’s reflections on the lawfulness of nature or the laws of nature span from pre-Critical texts to the Critical period up until the Opus postumum. Kant 2012 is one of Kant’s very first texts in natural science, offering a cosmogony according to Newtonian principles. Kant 1992 tackles the central issue of a dynamical theory of matter and in so doing it anticipates themes further explored in Kant 2004. Kant 1998 is Kant’s main text in theoretical philosophy and provides the reader with an overview on the lawfulness of nature and the role of the faculty of understanding in it. Kant 2002 is Kant’s own abridged version of Kant 1998, where reflections on the lawfulness of nature and the role of understanding are also reiterated. Kant 2004 is a must for anyone who wants to explore in depth Kant’s view on natural science (Chapters on Dynamics and Mechanics are particularly relevant to the topic here). Kant 2000 is very important for Kant’s late view on the lawfulness of nature and the role of teleological judgments and purposiveness of nature. Kant 1993 offers insights on how the topic of the lawfulness of nature came to be refined in the light of advancements in the chemical sciences of the time. Kant 2012 is the latest addition to the Cambridge Edition of the Works of Immanuel Kant and includes new translations of classical texts as well as first English translations of some less well-known pre-Critical texts on natural science.


First published in 1755. This is one of the very first work by the young Kant, where a forerunner of Kant’s mature dynamical theory of matter is presented, and the nebular hypothesis introduced to explain the origin of the universe.


First published in 1756. One of the most important pre-Critical texts to understand Kant’s theory of matter and its metaphysical underpinning.


First edition first published in 1781; second edition first published in 1787. This is of course, Kant’s masterpiece in theoretical philosophy. A must for any undergraduate student in philosophy. There Kant offers his view about the faculty of understanding prescribing laws to nature.


First published in 1783. The Prolegomena provides a clear and abridged version to core issues presented in the Critique of Pure Reason (incl. Kant’s view on the lawfulness of nature).


First published in 1786. This is Kant’s most important Critical work on natural science, covering the four areas of phoronomy, dynamics, mechanics and phenomenology. A must for anyone interested in Kant’s view of nature (challenging to read).


First published in 1790. This is Kant’s third Critique where his mature view on the life sciences, organisms, and teleological explanation are expounded.


This is a collection of Kant’s very late, unpublished comments and reflections on a variety of topics (especially relevant are the sections on chemistry and the ether for Kant’s view on the chemical revolution of his time).


The latest addition to the Cambridge Edition of the Works of Immanuel Kant, with the long-awaited English translation of pre-Critical works such as Kant’s very first True estimation of living forces, among others.

**Secondary sources**

A classic (although a bit dated) treatment of Kant’s philosophy of nature.

An authoritative collection of essays covering a variety of aspects, with a focus both on the historical context and the legacy on German idealism. Especially relevant are the First Section on Kant’s first Critique and the Third Section on purposiveness in Kant.

A landmark for any undergraduate student in philosophy of science interested in Kant and his legacy for contemporary debates. Clear and accessible.

An excellent collection of essays, featuring some classic articles such as Kitcher 1986.

A classic and comprehensive treatment of the development of Kant’s philosophy of nature in the Critical period. Accessible for undergraduate students.

Another landmark in the field, presenting Friedman’s influential interpretation of Kant’s natural science. Particularly interesting is Part Two on Kant’s Opus Postumum and reflections on the
burgeoning chemistry and its impact on Kant’s view on the lawfulness of nature. Suitable for advanced graduate seminars.


This is one of the first important studies on Kant’s Metaphysical Foundations of Natural Science, offering an interpretive analysis of the Preface.


A clear, concise and helpful book summarizing the main pre-Critical works of Kant. Helpful source for navigating Kant’s work on the natural science and its historical context.


Helpful overview of the development of Kant’s ideas *in the third Critique* in their historical context. Recommended for advanced undergraduate classes.

**Kant on the lawfulness of nature**


An influential reading of Kant to get to grips with some of the controversy surrounding causal laws.


A cutting-edge study on the role of laws of nature in Kant’s epistemology.


This is Friedman’s latest treatment on the thorny topic of causal laws and necessity. Suitable for a specialist audience already familiar with Friedman’s work.


This article further develops Kitcher’s 1986 take on systematic unity in Kant and its legacy for contemporary philosophy of science.


One of the best, recent treatments of Kant’s view on laws. Suitable for graduate seminars.


A sophisticated, advanced interpretive reading on Kant’s view on the lawfulness of nature. Suitable for a specialist audience.

A clear, accessible introduction to Kant's unified and coherent view about what makes something a law of nature. Suitable for beginners.


Excellent and clear introduction to the complex issue of the relation between transcendental laws of the understanding and empirical laws of nature, both in their historical context and contemporary legacy.

Constitutive principles of the understanding and empirical laws
Friedman 1992, O'Shea 1997, Watkins 2010 are landmark readings to understand Kant’s notion of constitutive principles. Watkins 2000 and Watkins 2013 elaborate further on other kinds of laws Kant seemed committed to defend, and on the distinction between constitutive and regulative principles.


A classic introductory text to this key conceptual distinction in Kant.


Clear and accessible article that elaborates on the debate surrounding the constitutive demands of the faculty of understanding and the regulative nature of reason.


An interesting study of Kant’s laws of rational cosmology across the first Critique and the lectures on metaphysics, with a focus on their historical sources in Baumgarten et al.

Advanced specialist reading.


Another specialist reading by a leading Kant scholar with a focus on Kant’s logic and his take on systematicity as a regulative principle of reason.


Clear and accessible introduction to Kant’s architectonics for the faculty of understanding and its role for the lawfulness of nature.

Regulative principles: systematicity and purposiveness
Banham 2013, McLaughlin 2014, Guyer 1990 and Guyer 2003 offer each a very helpful introduction to the issue by mapping the terrain either in historical terms or in terms of Kant’s overall transcendental philosophy. Floyd 1998, Geiger 2003, Godlove 2013, Grier 1997 provide different interpretive angles on the topic.


Compares Kant’s use of “regulative” in the Ideas of Pure Reason and in the Analogies of Experience. Clear and helpful reading.

Floyd, Juliet. “Heautonomy: Kant on Reflective Judgment and Systematicity.” In Kant’s Ästhetik –
Kant and the Laws of Physics

Kant’s view on the laws of physics is a fascinating and multi-faceted topic. The following two subsections offer an overview on laws in mechanics and Kant’s view on chemistry and dynamical theory of matter. There are important differences between these two areas. For while Kant clearly thought that there are laws in mechanics, he did not think that chemistry enjoyed the same degree of lawfulness as physics (indeed, in the Metaphysical Foundations of Natural Science, he called chemistry a “systematic art” rather than a proper science). Hence, the two areas deserve separate treatments.

Laws in mechanics


Addresses key issues for Kant’s theory of matter in the Critical period.

A more historically-focused article on the relation between mechanics and dynamics in Kant.


A historical overview on the sources behind Kant’s mechanics in the pre-Critical period by a promising Kant scholar. Ideal for graduate students in history of science.


Thorough reconstruction of the historical development of Kant’s third law of mechanics. Advanced reading.


Argues that there are important differences between Kant’s laws of mechanics and Newton’s laws of motion, despite similarities and the temptation to read the former as a philosophical justification for the latter.


Offers a systematic reinterpretation of a standard received view that has long read Kant’s *Metaphysical Foundations of Natural Science* against the background of Newtonian mechanics.


Detailed interpretive analysis of Kant’s three laws of mechanics in the *Metaphysical Foundations of Natural Science* in their historical context of German (Leibnizian-Wolffian) philosophy. Recommended reading for anyone who wants to get a well-rounded view on Kant’s laws of mechanics.


This latest paper elaborates and expands on Watkins’s interpretive take on Newton’s influence for Kant, with a focus on the pre-Critical Kant of *Universal Natural History*.

**Kant’s dynamical theory of matter and chemistry**

Förster 2000 and Edwards 2000 are each a detailed monograph that addresses Kant’s dynamical theory of matter in the context of Kant’s overall architectonic and project. Massimi 2011 and Carrier 1990 draw attention to the historical context and background behind Kant’s theory of matter. Smith 2013a and Smith 2013b elaborate on metaphysical aspects of Kant’s view and its background sources, esp. in response to Warren 2010’s recent influential reading.


Tracks the development of Kant’s dynamical theory of matter from the pre-Critical period, through the Critical period and the *Opus postumum*.

Massimi, Michela. “Kant’s dynamical theory of matter in 1755, and its debt to speculative Newtonian


This is a response to Dan Warren’s 2010 article on the topic.


Sophisticated interpretive reading of Kant’s metaphysics of nature – advanced reading.


Schönfeld provides a very readable overview on the topic – suitable for undergraduate students.


Sustained critical study on Kant’s main argument for Dynamics in the Metaphysical Foundations. Recommended reading.

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An important contribution to the understanding of Kant’s controversial take on chemistry as a “systematic art”.


Excellent introductory book on the *Opus Postumum*. Particularly relevant is Ch. 4 on the ether proof and its overall role in Kant’s late view on chemistry.

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**Kant and the Laws of the Life Sciences**

*Kant’s view on the laws of the life sciences differs in remarkable ways from his view on the laws in the physical sciences. In this final Section, some classic resources for the historical background of Kant’s view on biology can be found. In addition, the reader will also find a selection of texts that tackle more directly both the issue of what is an organism for Kant, and the further issue of how explanations in the life sciences differ from mechanical explanations in the physical sciences.*

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**Historical background**


Influential (albeit controversial) historical analysis on the reciprocal influence between Kant’s view of organic form in the third Critique, and the anthropologist Blumenbach’s view on natural history.

Influential critical re-reading of the alleged reciprocal influence of Kant and Blumenbach. Ideal for advance graduate seminars in history of science.


Methodological analysis of Kant’s natural history in its historical context.


Critical evaluation of Lenoir 1980 suggesting a re-appraisal of the Kant-Blumenbach relation and its overall influence on the German life sciences of the end of eighteenth century.


Fascinating historical journey through Kant’s view of organic evolution.

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**Organisms and purposiveness**

Goy and Watkins 2014 is an authoritative edited collection on the topic. Ginsborg 2015, and Zuckert 2007 tackle the issue of purposiveness in the broader context of Kant’s overall project in the third *Critique*. McLaughlin 1990, Mensch 2013, and Quarfood 2004 offer comprehensive treatments of Kant’s view on organisms. Breitenbach 2009 and Breitenbach 2014 display a contemporary interpretive take on Kant’s view of living organisms and its ongoing relevance.


Systematic and comprehensive study of Kant’s philosophy of biological phenomena.


Tackles the nature of teleological judgments in the third Critique and biological purposiveness for the study of living organisms.


State of the art collection in the area – recommended reading for advanced graduate seminars in the field.


Authoritative collection of essays by Ginsborg. Particularly relevant is Section III on Teleology, biological purposiveness and organisms in Kant’s third Critique.


A classic book in the field – recommended as advanced undergraduate reading.


Collection of essays tackling issues about biological functions and teleological judgments within the broader methodological framework of Kant’s critical philosophy.

Interpretive take on Kant’s critical philosophy through the lenses of the history and philosophy of the life sciences of his time. Advanced reading.


A classic monograph on the unity and continuity between aesthetic judgment and teleological judgment in Kant’s third Critique.

**Teleological explanation versus mechanical explanation**

McLaughlin 2003, McLaughlin 2014 and Watkins 2009, Watkins 2009 are very helpful in mapping the ground on this important distinction. Ginsborg 2004 contrasts Kant’s view with some influential preceding views on the topic. Breitenbach 2006, Breitenbach 2008, Breitenbach 2009 are particularly relevant to explore the ongoing relevance of Kant’s view for contemporary philosophy of biology.


Analyses the notion of mechanical explanation in Kant’s third Critique and argues that the prospects for mechanical explanation are limited.


Discusses the conflict between mechanism and teleology in Kant and why the principle of purposiveness of nature can only be a regulative principle, but not a constitutive one.


Examines the legacy of Kant’s take on purposiveness for contemporary biology.


Traces the intellectual history and open problems for Kant’s view on mechanical explanation.


Argues that mechanism should be understood in Kant as a form of causality and that mechanical laws are a sub-special of causal laws.


Dissects different meanings for mechanical laws in the third Critique and defends the view that mechanical laws should be understood along the lines of mechanical part-whole interactions.


Discusses the origins of the antinomy of teleological judgment and argues for the philosophical inadequacy of various interpretations of it.

Extends Kant’s view on teleological judgments beyond organisms, as applying to nature in general.