

Physicalism

Introduction

General Overviews

Books

“Physical” in the Narrow Sense

Identity Formulations of Physicalism

Supervenience Formulations of Physicalism

 Criticisms

Realization Formulations of Physicalism

Grounding Formulations of Physicalism

The Epistemological and Modal Status of Physicalism

Physicalism, Reduction, and Reductionism

Empirical Evidence for Physicalism

 The Causal Closure of the Physical (I)

 The Causal Closure of the Physical (II)

Further Issues

Rivals to Physicalism

Introduction

In the sense relevant to this bibliography, physicalism (or materialism; the two terms are used interchangeably in the literature) is a comprehensive view about the nature of the world to the effect that every phenomenon whatever is, or is at bottom, physical. As such, it obviously raises issues about the place of phenomenal consciousness, intentionality, and morality—among other things—in a purely physical world. But it also raises issues that are independent of these familiar special cases, and it is to them that this bibliography is devoted. One cluster of issues concerns how to formulate a thesis of physicalism that is neither obviously true nor obviously false, and significant if true. This has generally been thought to require specifying (1) a narrow sense of “physical,” perhaps linked to physics, and (2) some relation of being nothing over and above such that phenomena that are not physical in the narrow sense can be claimed to be nothing over and above phenomena that are physical in the narrow sense; candidates for such a relation are identity, supervenience, realization, and, most recently, grounding. A second cluster of issues concerns the implications of physicalism. Is physicalism a posteriori? Is it (if true at all) necessarily true? Can physicalism avoid commitment to physical reductionism? If so, how, and if not, then is that a problem for physicalism? Is physicalism consistent with the countless claims of causation and causal explanation made in the special sciences and in everyday life? (This last issue overlaps so much with the problems of mental causation, which have a vast literature of their own, that it is not addressed in the present bibliography; the reader is directed to the separate bibliography on mental causation.) A third cluster of issues concerns how in principle we could have, and whether in fact we do have, empirical evidence that physicalism is true—or of course that it is false. For example, is it true that for every (narrow sense) physical effect there is a sufficient physical cause, that is, that the causal closure of the physical holds? And if it does, then can a case for physicalism be built upon it? Can observed correlations between reported mental states (say) and brain states provide reason to think that mental states just are brain states? A fourth cluster of issues concerns alternatives to physicalism. Aside from traditional forms of mind-body dualism, what possible alternatives are there? For example, panpsychism

holds that phenomenal properties are the intrinsic aspects of the properties known in physics through their causal or structural aspects. Is this a physicalist view or not? What scope is there for theses of pluralism, or of neutral monism?

General Overviews

There are no satisfactory general overviews of all the issues mentioned in the [Introduction](#). Kim [1998](#), however, provides an excellent introduction to most of the main ones, and should be accessible to intermediate and advanced undergraduate philosophy students. Stoljar [2017](#) is a critical survey of—for the most part—the issues surrounding the formulation of physicalism; but it is aimed at a more sophisticated readership. Neither of these works brings any empirical material into their discussions. Oppenheim and Putnam [1958](#), though dated philosophically, usefully assembles empirical evidence (as available in 1958) for thinking that the world boils down to physics.

Kim, Jaegwon. *Mind in a Physical World: An Essay on the Mind-Body Problem and Mental Causation*. Cambridge, MA: MIT, 1998.

The world's leading exponent of the metaphysics of mind until his recent death explores the role of supervenience and realization in formulating physicalism, plus the implications of physicalism for causation and reductionism.

Oppenheim, Paul, and Hilary Putnam. "Unity of Science as a Working Hypothesis." In *Minnesota Studies in the Philosophy of Science*. Vol. 2. Edited by Herbert Feigl, Michael Scriven, and Grover Maxwell, 3–35. Minneapolis: University of Minnesota Press, 1958.

Classic paper arguing on empirical grounds that science is unified in the sense that all phenomena are reducible to physical phenomena; but the reducibility intended does not require that each special science phenomenon be type-identical with some physical phenomenon. Perhaps best viewed as implying eliminative physicalism.

Stoljar, Daniel. "[Physicalism](#)." In *The Stanford Encyclopedia of Philosophy*. Edited by Edward N. Zalta. Stanford, CA: Stanford University, Winter 2017.

Philosophically stimulating commentary on attempts to characterize "physical" in the narrow sense and to specify the relation of being nothing over and above.

Books

There are several book-length treatments of physicalism in our sense. Post [1987](#) is an unjustly neglected book that contains far and away the fullest and most subtle attempt to formulate non-reductive physicalism by appeal to supervenience. Poland [1994](#) treats physicalism as a desirable program for the construction of a certain system of unified scientific knowledge, but denies that we have much evidence for believing physicalism to be true, or even any clear view of what such evidence would look like; the book appeals to a relation of realization in formulating theses of physicalism, though it gives no precise definition of it. Melnyk [2003](#) carefully defines a relation of realization and uses it to formulate a thesis of physicalism which it argues for by appeal to extensive empirical evidence; it addresses nearly all of the issues mentioned in the [Introduction](#). Stoljar [2010](#) argues provocatively that physicalism cannot be formulated in a way that makes it both plausible and philosophically significant, but also that this conclusion makes surprisingly little difference to philosophy. Kirk [2013](#) is the culmination of a career's unduly

neglected reflection on what physicalism amounts to, but goes well beyond its author's previous work; it tackles most of the issues mentioned in the [Introduction](#), though not those pertaining to the evidential case for physicalism. Morris 2019 provides a very thorough critical examination of attempts to formulate non-reductive physicalism that seek to articulate the idea that the world consists of various levels, favoring instead a "one-level" view of physicalism.

Kirk, Robert. *The Conceptual Link from Physical to Mental*. Oxford: Oxford University Press, 2013.

Important book arguing that physicalism can and should be formulated, not by appeal to identity, supervenience, or realization, but in terms of "logico-conceptual necessity" as "redescriptive physicalism," and that so formulated physicalism is non-reductive and can allow causation at levels other than the physical.

Melnyk, Andrew. *A Physicalist Manifesto: Thoroughly Modern Materialism*. Cambridge, UK: Cambridge University Press, 2003.

Argues that physicalism is best formulated by appeal to realization, rather than supervenience; that, so formulated, physicalism must be importantly reductionist, and need not repudiate causal and explanatory claims framed in non-physical language; and that contemporary science provides considerable evidence for it and none against it.

Morris, Kevin. *Physicalism Deconstructed: Levels of Reality and the Mind-Body Problem*. Cambridge: Cambridge University Press, 2019.

Argues that extant attempts to formulate non-reductive physicalism either fail to be physicalist or fail to be non-reductive, and also fail to solve Kim's "exclusion problem" of mental causation; does not address the problem of specifying the narrowly physical base.

Poland, Jeffrey. *Physicalism: The Philosophical Foundations*. Oxford: Oxford University Press, 1994.

Provides a very thorough treatment of most of the issues mentioned in the [Introduction](#), plus some other (e.g., methodological) issues, though it does not address the causal implications of physicalism or the question of how it might be supported empirically

Post, John. *The Faces of Existence: An Essay in Nonreductive Metaphysics*. Ithaca, NY: Cornell University Press, 1987.

Formulates physicalism with great care in terms (mostly) of supervenience, argues that physicalism so formulated is nonreductive, and defends it against various philosophical objections; does not tackle the causal implications of physicalism or the question of how it might be supported empirically.

Stoljar, Daniel. *Physicalism*. New York: Routledge, 2010.

Intended as an introduction as well as an original contribution, it focuses mainly on attempts to formulate physicalism. Full of challenging argumentation.

"Physical" in the Narrow Sense

Nearly all the literature on how to characterize the narrowly physical, on which, if physicalism is true, all else supervenes (or whatever), is conditioned by two brief discussions skeptical of the

possibility of a satisfactory characterization: Chomsky [1972](#) and Hempel [1980](#). Poland [1994](#) (pp. 109–185), cited under [Books](#), discusses the narrowly physical at great length, and proposes an account in terms of future physics, understood as the science that answers certain questions claimed to be definitive of physics. Jackson [1998](#) (pp. 6–8), cited under [Supervenience Formulations of Physicalism](#), defines the narrowly physical in a way that, he thinks, avoids what Melnyk called “Hempel’s Dilemma”: if formulated by appeal to current physics, physicalism is likely to be false, while if formulated by appeal to an ideal physics of the future, it is empty. Melnyk [2003](#) (pp. 11–20, 223–237), cited under [Books](#), defends an account of the narrowly physical in terms of current physics by appeal to a general account of the acceptance of scientific hypotheses, of which physicalism is taken to be an example. Vicente [2011](#) also defends a characterization of the narrowly physical in terms of current physics but rejects Melnyk’s version. Montero [1999](#) briefly proposes the so-called ‘*via negativa*’ (negative way): the idea that it suffices for physicalism if the mental is not fundamental; Crook and Gillett [2001](#) develops the idea. Wilson [2006](#) subjects earlier accounts to detailed criticism, and proposes an account appealing to both current and future physics and to the *via negativa*. Stoljar [2010](#) (chaps. 3, 4, and 5), cited under [Books](#), renews the case for doubting that a satisfactory characterization of the narrowly physical is possible. Witmer 2018 skillfully takes the second horn of Hempel’s Dilemma and defends the resulting view against many objections. Van Fraassen [1996](#) argues that the difficulty of characterizing the narrowly physical is so great that physicalism must be seen as an attitudinal, rather than a cognitive, affair. Ney [2008](#) defends an attitudinal account of physicalism precisely on the grounds that it avoids Hempel’s Dilemma.

Chomsky, Noam. *Language and Mind*. New York: Harcourt Brace Jovanovich, 1972.

Highly influential essays on language and mind by the celebrated linguist; but see especially p. 98.

Crook, Seth, and Carl Gillett. “Why Physics Alone Cannot Define the ‘Physical’: Materialism, Metaphysics, and the Formulation of Physicalism.” *Canadian Journal of Philosophy* 31.3 (2001): 333–360.

Argues against the views of Poland [1994](#) and Melnyk [2003](#) (both cited under [Books](#)), and proposes instead the view that the metaphysical heart of physicalism is the idea that there is no fundamental mentality.

Hempel, Carl G. “Comments on Goodman’s Ways of Worldmaking.” *Synthese* 45 (1980): 193–199.

Published version of remarks made at a symposium on Goodman [1978](#) (cited under [Alternatives to Physicalism](#)). See especially pp. 194–195.

Montero, Barbara. “The Body Problem.” *Noûs* 33.2 (1999): 183–200.

Provocative and wide-ranging account of the difficulties that beset attempts to characterize the “physical” for the purpose of formulating the mind-body problem. Would serve as an excellent introduction to the issue.

Ney, Alyssa. “Physicalism as an Attitude.” *Philosophical Studies* 138 (2008): 1–15.

Argues that controversies over “physical” in the narrow sense can be avoided if physicalism is construed as a commitment to be guided by physics and physics alone in one’s ontology.

Van Fraassen, Bas C. “Science, Materialism, and False Consciousness.” In *Warrant in Contemporary Epistemology: Essays in Honor of Plantinga’s Theory of Knowledge*. Edited by Jonathan L. Kvanvig, 149–181. Lanham, MD: Rowman and Littlefield, 1996.

Argues that the difficulties of explicating “physical” in the narrow sense are so great that we should treat a physicalist (i.e., materialist) not as someone who endorses a certain thesis but as someone who takes a certain attitude.

Vicente, Agustín. “Current Physics and ‘the Physical.’” *British Journal for the Philosophy of Science* 62 (2011): 393–416.

Criticizes the *via negativa* account of the narrowly physical, and argues for an account that appeals to current physics, but abstractly enough that likely developments in future physics are not ruled out.

Wilson, Jessica. “On Characterizing the Physical.” *Philosophical Studies* 131 (2006): 61–99.

Acute and sophisticated discussion of the issue of defining “physical” in the narrow sense, arguing against prior views and concluding with a hybrid proposal.

Witmer, D. Gene. “Physicality for Physicalists.” *Topoi* 37 (2018): 457–472.

Argues that the narrowly physical should be understood as whatever is posited by an ideal physics that in addition respects the constraint that at bottom there is nothing special about the distinctively human.

Identity Formulations of Physicalism

The obvious way to express the idea that all phenomena are nothing over and above physical phenomena is to say that each phenomenon is identical with—one and the same as—some physical phenomenon. But should it be each phenomenon-type or phenomenon-token? It is not clear that anyone has ever, at any rate explicitly, recommended a type-identity formulation of physicalism, though it is often (but wrongly) attributed to Oppenheim and Putnam [1958](#), cited under [General Overviews](#). However, a type-identity formulation of physicalism would follow from the claim that every phenomenon is physically reducible together with an account of reduction requiring that each reduced phenomenon be type-identical with some reducing phenomenon (see also [Physicalism, Reduction, and Reductionism](#)); and perhaps for this reason such a formulation is a frequent stalking-horse in the literature. It is, however, almost universally disbelieved on the grounds that special science phenomena are multiply realized by physical phenomena; see, for example, Aizawa and Gillett 2009. Polger and Shapiro 2016 argues empirically for skepticism regarding the actual extent of multiple realization. Chapter 5 of Kirk [2013](#), cited under [Books](#), challenges the assumption that the type-identity of every phenomenon with some physical phenomenon would be sufficient for physicalism. Fodor [1974](#) and Davidson [1980](#) famously propose token-identity formulations of physicalism, that is, token physicalism, the latter in the context of his so-called “anomalous monism.” Boyd [1980](#) argues on essentialist grounds that mental-to-physical token-identity claims are false. Haugeland [1982](#), cited under [Supervenience Formulations of Physicalism](#), objects to a token-identity formulation of physicalism while recommending his own supervenience formulation. Kim [1998](#) (pp. 4–5), cited under [General Overviews](#), argues that the mental-to-physical token-identity claims of Davidson’s anomalous monism tell us nothing positive about the relation of the mental to the

physical. Kim [2012](#) develops this thesis into a general skepticism that there can be such a thing as a thesis of token physicalism that might be true while type physicalism is false. Melnyk [2003](#) (pp. 67–60), cited under [Books](#), argues that token physicalism's token-identity claims fail to entail the necessitation of the non-physical by the physical. Schneider [2012](#) appeals to recent work on the metaphysics of properties to argue against token-identity formulations of purportedly non-reductive physicalism.

Aizawa, Kenneth, and Carl Gillett. "The (Multiple) Realization of Psychological and other Properties in the Sciences." *Mind and Language* 24 (2009): 181-208.

Aims to clarify what multiple realization is and to argue empirically that it is a widespread phenomenon.

Boyd, Richard. "Materialism Without Reductionism: What Physicalism Does Not Entail." In *Readings in the Philosophy of Psychology*. Vol. 1. Edited by Ned Block, 268–305. London: Methuen, 1980.

Pioneering paper arguing that physicalism about the mind can be formulated—by appeal to realization—without commitment to claims of either mental-to-physical type-identity or mental-to-physical token-identity.

Davidson, Donald. "Mental Events." In *Essays on Actions and Events*. By Donald Davidson, 207–225. New York: Oxford University Press, 1980.

Classic paper arguing for Davidson's "anomalous monism," the view that, while there are no strict mental-to-physical or mental-to-mental laws (and hence no mental-to-physical type-identity claims), every mental event is a physical event.

Fodor, Jerry. "Special Sciences, or the Disunity of Science as a Working Hypothesis." *Synthese* 28 (1974): 97–115.

Classic paper arguing, on the grounds of the pervasive multiple realization of special science phenomena, that they are not in general type-identical with physical phenomena, but that physicalism is still true because every special science phenomenon is token-identical with some or other physical phenomenon.

Hornsby, Jennifer. "Physicalism, Events, and Part-Whole Relations." In *Actions and Events: Perspectives on the Philosophy of Donald Davidson*. Edited by Ernest LePore and Brian McLaughlin, 444–458. Oxford: Basil Blackwell, 1985.

Argues that token-identity formulations of physicalism must try to identify macro-events with fusions of microphysical events; that even if microphysical events are causes and effects, it doesn't follow that their fusions are causes and effects; and that if they are not, they are not genuine events.

Kim, Jaegwon. "The Very Idea of Token Physicalism." In *New Perspectives on Type Identity: The Mental and the Physical*. Edited by Simone Gozzano and Christopher S. Hill, 167–185. New York: Cambridge University Press, 2012.

Critically examines the putatively token-physicalist claims made in Davidson [1980](#) and Fodor [1974](#), and argues on several grounds that they do not qualify as physicalist. Also gives a skeptical assessment of the prospects for type physicalism.

Polger, Thomas, and Lawrence Shapiro. *The Multiple Realization Book*. Oxford: Oxford University Press, 2016.

Seeks to elucidate the nature of multiple realization and to argue on empirical grounds that its extent has been exaggerated, and that type-identity views remain a live option.

Schneider, Susan. "Non-Reductive Physicalism Cannot Appeal to Token Identity." *Philosophy and Phenomenological Research* 85.3 (2012): 719–728.

Argues that, on the commonest understandings of what properties are, the thesis that every property instantiation is identical with some physical property instantiation cannot coherently be used to formulate non-reductive physicalism.

Supervenience Formulations of Physicalism

Many philosophers have sought to precisify the claim that all phenomena are nothing over and above physical phenomena by saying that all phenomena globally supervene on physical phenomena. The pioneering paper, though it does not use the word "supervenience," is Hellman and Thompson [1975](#). Other important early supervenience formulations are Horgan [1982](#), Haugeland [1982](#), and Lewis [1983](#) (pp. 362–364). The best and most fully worked out version is Post [1987](#), cited under [Books](#). Versions are also given in chapter 2 of Chalmers [1996](#) and chapter 1 of Jackson [1998](#). An important new formulation of physicalism that is contrasted by its author with supervenience formulations but is surely at least a relative of them is given in Kirk [2013](#), cited under [Books](#).

Chalmers, David. *The Conscious Mind: In Search of a Fundamental Theory*. New York: Oxford University Press, 1996.

Brilliant and much discussed defense of the claim that phenomenal consciousness is not physical against the most resourceful replies of physicalists; ch. 2 contains a formulation of the physicalism rejected.

Haugeland, John. "Weak Supervenience." *American Philosophical Quarterly* 19 (1982): 93–103.

Proposes to formulate physicalism as a claim of global supervenience, and argues that the claim might be true even if no mental-to-physical type-identity or token-identity claims hold.

Hellman, Geoffrey, and Frank Thompson. "Physicalism: Ontology, Determination, and Reduction." *Journal of Philosophy* 72 (1975): 551–564.

Pioneering but technical and concise attempt to formulate a non-reductive but comprehensively physicalist position. It speaks of determination by the physical rather than supervenience on the physical; but determination is merely the converse of supervenience.

Horgan, Terry. "Supervenience and Microphysics." *Pacific Philosophical Quarterly* 63 (1982): 29–43.

Proposes a careful formulation of physicalism as a claim of global supervenience, and argues that the resulting thesis does not require the type-identification of higher-level with physical properties.

Jackson, Frank. *From Metaphysics to Ethics: A Defence of Conceptual Analysis*. New York: Oxford University Press, 1998.

Argues first that conceptual analysis is a defensible method and in fact necessary for “serious metaphysics.” Then applies the advocated method of metaphysics to the problems of locating colors and ethical properties in a physicalist world.

Lewis, David. “New Work for a Theory of Universals.” *Australasian Journal of Philosophy* 61 (1983): 343–377.

Immensely influential defense of the theory of universals on the grounds of its value to systematic philosophy.

Criticisms

Proposed supervenience formulations of physicalism have been criticized for not being faithful articulations of physicalism. One criticism is that claims of supervenience are too strong, ruling out possible worlds that physicalism can allow; Witmer [1999](#) provides a useful critical survey of proposed solutions to what its author calls “the problem of extras.” Kim [1987](#) (p. 321) charges that claims of global supervenience are too weak to articulate physicalist intuitions, allowing large non-physical differences given only tiny and intuitively irrelevant physical differences; Post [1995](#) responds to this charge in great detail. Horgan [1993](#) appeals to G. E. Moore’s treatment of moral properties as non-natural and yet supervenient on natural properties to suggest that supervenience formulations of physicalism are too weak to ensure the physicalistic acceptability of whatever supervenes. The objection is developed in different ways in chapter 2 of Melnyk [2003](#), cited under [Books](#), and in Wilson [2005](#); Howell [2009](#) responds to the objection. Hawthorne [2002](#) offers an entirely different and very ingenious reason for finding supervenience formulations of physicalism to be too weak.

Hawthorne, John. “Blocking Definitions of Materialism.” *Philosophical Studies* 110.2 (2002): 103–113.

Argues that trouble is made for supervenience formulations of physicalism by the apparent possibility that the physical might only necessitate the mental weakly, that is, only given the absence of certain potentially “blocking” properties.

Horgan, Terry. “From Supervenience to Superdupervenience: Meeting the Demands of a Material World.” *Mind* 102 (1993): 555–586.

Survey of supervenience theses, with special reference to formulating physicalism, in which it is argued that such theses must be explainable if they are to serve as formulations of physicalism that distinguish it from emergentism.

Howell, Robert J. “Emergentism and Supervenience Physicalism.” *Australasian Journal of Philosophy* 87.1 (2009): 83–98.

Defends supervenience formulations of physicalism from the objection that they fail to rule out emergentism by linking it to the characterization of “physical” in the narrow sense.

Kim, Jaegwon. “‘Strong’ and ‘Global’ Supervenience Revisited.” *Philosophy and Phenomenological Research* 48 (1987): 315–326.

Discussion of the logical relations between strong and global supervenience, and of the sufficiency of proposed global supervenience formulations of physicalism.

Post, John. “‘Global’ Supervenient Determination: Too Permissive?” In *Supervenience: New Essays*. Edited by Elias E. Savellos and Umit D. Yalçın, 73–100. Cambridge, UK: Cambridge University Press, 1995.

Thorough and careful examination of Kim’s charge that claims of global supervenience permit enormous non-physical differences in the presence of physical differences that are tiny and intuitively irrelevant.

Wilson, Jessica. “Supervenience-Based Formulations of Physicalism.” *Noûs* 39.3 (2005): 426–459.

Argues by appeal to anti-Humean views of properties and of laws of nature that proposed supervenience formulations of physicalism are consistent with emergentism and hence insufficient for physicalism.

Witmer, D. Gene. “Supervenience Physicalism and the Problem of Extras.” *Southern Journal of Philosophy* 37 (1999): 315–331.

Critical examination of attempts by Terry Horgan, David Lewis, Frank Jackson, and David Chalmers to solve the problem of extras for supervenience formulations of physicalism, plus a new proposal.

Realization Formulations of Physicalism

Many philosophers have sought to precisify the claim that all phenomena are nothing over and above physical phenomena by saying that all phenomena are realized by physical phenomena in the sense of “realize” familiar from discussions of functionalism. The paper that pioneered this formulation is Boyd [1980](#), cited under [Identity Formulations of Physicalism](#). The theses of physicalism presented in Poland [1994](#), cited under [Books](#), appeal in part to realization. A realization formulation of physicalism is developed and argued for empirically in Melnyk [2003](#), cited under [Books](#), and defended against critics in Melnyk [2018](#). Realization is there understood, roughly, as role-playing; Wilson [1999](#) proposes a novel account of realization in terms of the subset relation and causal powers, and proposes that physicalism be formulated by appeal to it. Important new light is thrown on this conception of realization in Shoemaker [2007](#). For critical discussion of what Shoemaker [2007](#) says about physicalism, see McLaughlin [2009](#). Realization physicalism is criticized in Kirk [2013](#), cited under [Books](#). Kim [2008](#) (pp. 109–112) argues that the genuine functional properties (rather than functional concepts) which realization physicalism requires do not exist. The relation of realization is provocatively rejected as a gratuitous posit in Wrenn [2010](#). Francescotti [2010](#) alleges that realization cannot capture the sense in which, on physicalism, the nonphysical depends on the physical. Physicalism is formulated by appeal to a certain sort of constitution—a close relative of realization—in Pereboom [2002](#) and in more detail in chapters 7 and 8 of Pereboom [2011](#).

Francescotti, Robert. “Realization and Physicalism.” *Philosophical Psychology* 23.5 (2010): 601–616.

Argues that realization (as understood by Melnyk, Shoemaker, and Yablo) is inadequate for formulating physicalism, because it implies that some physical properties are realized by mental properties.

Kim, Jaegwon. "Reduction and Reductive Explanation: Is One Possible Without the Other?" In *Being Reduced: New Essays on Reduction, Explanation, and Causation*. Edited by Jakob Hohwy and Jesper Kallestrup, 93–114. Oxford: Oxford University Press, 2008.

Argues that Nagelian bridge-law reduction yields neither reduction nor reductive explanation; that reduction appealing to type-identity claims yields reduction but not reductive explanation; and that functional reduction, favored by Kim, yields reductive explanation and perhaps also reduction.

McLaughlin, Brian. "[Physical Realization](#)." *Notre Dame Journal of Philosophical Reviews* (July 17, 2009).

Review of Shoemaker [2007](#) focusing on Shoemaker's main concept of realization and whether it can serve in a formulation of physicalism.

Melnyk, Andrew. "In Defense Of A Realization Formulation Of Physicalism." *Topoi* 37 (2018): 483-493.

Concise restates the author's formulation of physicalism and then answers four objections to its appeal to realization.

Pereboom, Derk. "Robust Nonreductive Materialism." *Journal of Philosophy* 99 (2002): 499–531.

A formulation of non-reductive physicalism in terms of constitution, without appeal to claims of token or type identity. Defends the view against four major challenges from the late Jaegwon Kim.

Pereboom, Derk. *Consciousness and the Prospects of Physicalism*. Oxford: Oxford University Press, 2011.

Further develops the author's 2002 formulation of non-reductive physicalism. Also defends (1) the possibility that our introspective access to phenomenal consciousness is systematically misleading and (2) the possibility of a form of physicalism holding that phenomenal properties are the intrinsic aspects of physical properties.

Shoemaker, Sydney. *Physical Realization*. Oxford: Oxford University Press, 2007.

A brilliant essay in analytic metaphysics, this book carefully explicates several relations of realization and then develops solutions to problems of mental causation and material constitution, among others, that are consistent with the thesis of physical realization.

Wilson, Jessica. "How Superduper does a Physicalist Supervenience Need to Be?" *Philosophical Quarterly* 49 (1999): 33-52.

Agrees with Horgan 1993, cited under Criticisms, that supervenience formulations of physicalism are inadequate, but rejects its proposal for strengthening such formulations, and instead proposes formulating physicalism by appeal to a relation of realization understood in terms of causal powers and the subset relation.

Wrenn, Chase. "The Unreality of Realization." *Australasian Journal of Philosophy* 88.2 (2010): 305–322.

Argues against, and against motivations for believing, the claim that higher-level properties stand in a reified relation of realization to lower-level properties.

Grounding Formulations of Physicalism

Schaffer 2009 has briefly proposed formulating physicalism by appeal to a relation of so-called grounding, understood as a primitive relation on a par with, but distinct from, such relations as supervenience and realization. Wilson [2014](#) argues that appeals to grounding contribute nothing to various debates, explicitly including the formulation of physicalism. Melnyk 2016 argues that the appeal to grounding would yield an inadequate formulation of physicalism.

Melnyk, Andrew. "Grounding And The Formulation Of Physicalism." In *Scientific Composition and Metaphysical Ground*. Edited by Ken Aizawa and Carl Gillett, 249-269. London: Palgrave-Macmillan, 2016.

Argues that grounding is not needed to improve on supervenience formulations, cannot yield an adequate formulation anyway, and is actually incompatible with physicalism.

Schaffer, Jonathan. "On What Grounds What." In *Metametaphysics: New Essays on the Foundations of Ontology*. Edited by David Chalmers, David Manley, and Ryan Wasserman, 347–383. Oxford: Oxford University Press, 2009.

Argues that metaphysics should aim at uncovering the hierarchical structure of reality, and that to do so it should appeal to a primitive relation of grounding. Suggests formulating physicalism by appeal to grounding on p. 364.

Wilson, Jessica M. "No Work for a Theory of Grounding." *Inquiry: An Interdisciplinary Journal of Philosophy* 57.5–6 (2014): 535–579.

Argues in detail that the relation of grounding posited by some philosophers cannot do the metaphysical work it has been thought capable of doing, and that such traditional relations as reduction, identity, supervenience, and realization are still needed.

The Epistemological and Modal Status of Physicalism

Among contemporary philosophers, there is agreement that physicalism is a posteriori. But there are at least two further issues in the neighborhood. The first is whether physicalism is contingent, i.e., true in some possible worlds only. Its contingency is widely assumed, as when physicalism is formulated as a supervenience thesis that quantifies over some but not all possible worlds, or as the thesis that all actual objects, events, and property-instances are physically realized. The assumption is powerfully challenged in Levine and Trogdon [2009](#). The second issue arises on the widely shared assumption that, to speak approximately, if physicalism is true, then a certain conditional is necessarily true, its antecedent being a complete description of the actual way the world is physically, its consequent being a complete (positive) description of the actual way the world is non-physically. The issue is whether this necessarily true conditional is a priori or a posteriori, and hence whether physicalism entails a physical-to-non-physical conditional that is a priori or a posteriori. In the highly misleading terminology of the debate, those who say that it does are called a priori physicalists (even if they neither endorse

physicalism nor regard it as knowable a priori), while those who say that it does not are called a posteriori physicalists (even if they do not endorse physicalism). Chalmers [1996](#) and Jackson [1998](#), both cited under [Supervenience Formulations of Physicalism](#), argue for a priori physicalism by appeal to a two-dimensionalist semantic framework. Byrne [1999](#) replies to such arguments. Block and Stalnaker [1999](#) argues for a posteriori physicalism; Chalmers and Jackson [2001](#) is a much-discussed reply. McLaughlin [2007](#) is a powerful critique of a priori physicalism.

Block, Ned, and Robert Stalnaker. "Conceptual Analysis, Dualism, and the Explanatory Gap." *Philosophical Review* 108.1 (1999): 1–46.

Argues against a priori physicalism and hence against the claim that the existence of an explanatory gap (= the absence of an a priori connection) between a person's physical states and their phenomenally conscious mental states entails the falsity of physicalism.

Byrne, Alex. "Cosmic Hermeneutics." *Nous-Supplement: Philosophical Perspectives* 13 (1999): 347–383.

Argues that the reasons given, especially by Frank Jackson, to endorse a priori physicalism are no good.

Chalmers, David, and Frank Jackson. "Conceptual Analysis and Reductive Explanation." *Philosophical Review* 110.3 (2001): 315–360.

Argues for a priori physicalism and against the objections to it made in Block and Stalnaker [1999](#).

Levine, Joseph, and Kelly Trogdon. "The Modal Status of Materialism." *Philosophical Studies* 145 (2009): 351–362.

Draws on considerations about the characterization of the narrowly physical to argue that, if physicalism is true, then it is necessarily true.

McLaughlin, Brian. "On the Limits of A Priori Physicalism." In *Contemporary Debates in Philosophy of Mind*. Edited by Brian McLaughlin and Jonathan Cohen, 200–223. Malden MA: Blackwell, 2007.

Thorough critical examination of the a priori physicalist thesis that, if physicalism is true, then there is an a priori conditional linking a complete description of the actual way the world is physically to a complete (positive) description of the actual way the world is non-physically.

Physicalism, Reduction, and Reductionism

The main issue here is whether physicalism is reductive, that is, whether it entails the physical reducibility of what is not narrowly physical to what is narrowly physical. But if such physical reducibility is assumed, as it very often has been, to require the type-identity of every entity that is not narrowly physical with some entity that is narrowly physical, then all the formulations of physicalism cited above under [Identity Formulations of Physicalism](#), [Supervenience Formulations of Physicalism](#), [Realization Formulations of Physicalism](#), and [Grounding Formulations of Physicalism](#), are non-reductive. Pereboom and Kornblith [1991](#) usefully spell out the metaphysics of non-reductive physicalism in this sense. There remains the issue, of course, of whether physicalism entails the physical reducibility of the non-physical in some other sense. The most influential skeptic about the possibility of maintaining physicalism while avoiding

commitment to any kind of physical reducibility was Jaegwon Kim. Kim [1989](#) contains a brief and relatively accessible presentation of his skepticism; Kim [1992](#) and Kim [1993](#) provide more detail. Chapter 4 of Kim [2005](#) represents Kim's more recent thoughts, including his "functionalizing" view of reduction. Non-reductive physicalism is explicitly defended against Kim's objections in Pereboom [2002](#) and Pereboom [2011](#), cited under [Realization Formulations of Physicalism](#). Witmer [2003](#) contains a useful reply to Kim [1992](#). Loewer [2009](#) investigates the nature and plausibility of the special-science autonomy that Fodor's non-reductive physicalism (see, for example, Fodor [1974](#), cited under [Identity Formulations of Physicalism](#)) is committed to. Because a priori physicalism amounts to the view that physicalism entails a certain sort of a priori physical reducibility, the literature cited under [The Epistemological and Modal Status of Physicalism](#) on a priori and a posteriori physicalism is relevant here too. Wilson [2010](#) is an unusually creative defense of the possibility of non-reductive physicalism. Discussion of whether physicalism can be non-reductive is also to be found in Post [1987](#), Poland [1994](#), Melnyk [2003](#), and Kirk [2013](#), all cited under [Books](#).

Kim, Jaegwon. "The Myth of Nonreductive Materialism." *Proceedings and Addresses of the American Philosophical Association* 63.3 (1989): 31–47.

Argues that, given physicalism, the non-physical is either reducible to the physical or should be eliminated, i.e., deemed not to exist.

Kim, Jaegwon. "Multiple Realization and the Metaphysics of Reduction." *Philosophy and Phenomenological Research* 52.1 (1992): 1–26.

Raises problems for the projectibility of special science predicates given physicalism without physical reducibility of any kind. Argues that physicalism requires the local (i.e., species-specific or type-restricted) physical reducibility of the non-physical. Includes explicit criticism of Pereboom and Kornblith [1991](#).

Kim, Jaegwon. "The Non-Reductivist's Troubles with Mental Causation." In *Mental Causation*. Edited by John Heil and Alfred Mele, 189–210. New York: Clarendon, 1993.

Sustained argument to show that non-reductive physicalism fares no better than emergentism at yielding a coherent account of the causal structure of the world.

Kim, Jaegwon. *Physicalism, or Something Near Enough*. Princeton, NJ: Princeton University Press, 2005.

Argues for Kim's view of the mind-body problem: physicalism—of a certain reductive sort—is true of everything except phenomenal consciousness.

Loewer, Barry. "Why Is There Anything Except Physics?" *Synthese* 170 (2009): 217–233.

Interprets Fodor's non-reductive physicalism as committed to the metaphysical, and not merely epistemological, autonomy of the special sciences, and argues that the commitment is unmotivated.

Pereboom, Derk, and Hilary Kornblith. "The Metaphysics of Irreducibility." *Philosophical Studies* 63 (1991): 125–145.

Restates and defends the sort of non-reductive physicalism espoused in Fodor [1974](#), cited under [Identity Formulations of Physicalism](#), and Boyd [1980](#), cited under [Identity Formulations of Physicalism](#).

Wilson, Jessica. “Non-reductive Physicalism and Degrees of Freedom.” *British Journal for the Philosophy of Science* 61 (2010): 279–311.

Carefully defends the possibility of an ontologically non-reductive physicalism by analyzing and then appealing to the notion of the degrees of freedom that a system has.

Witmer, Gene. “Multiple Realizability and Psychological Laws: Evaluating Kim’s Challenge.” In *Physicalism and Mental Causation: The Metaphysics of Mind and Action*. Edited by Walter, Sven and Heinz-Dieter Heckmann, 59–84. Exeter, UK: Imprint Academic, 2003.

Careful examination of the late Jaegwon Kim’s argument in Kim [1992](#) that multiple realizability makes genuine psychological laws impossible.

Empirical Evidence for Physicalism

If theses of physicalism are a posteriori, as is generally agreed, then arguments for physicalism must appeal to empirical evidence of some sort. Some, perhaps most, opponents of physicalism allow that physicalism is true of all phenomena except the mental; they deny it only of the mental. But others (e.g., across-the-board emergentists) deny the claim that physicalism is even true of all non-mental phenomena. Extensive evidence to support the claim that physicalism is true of all non-mental phenomena can be found in Melnyk [2003](#) (pp. 238–280), cited under [Books](#). In Smart [1959](#) it is suggested that, if physicalism is indeed true of all phenomena except the mental, then that is some evidence that physicalism is also true of the mental; the suggestion is developed in Melnyk [2003](#) (pp. 283–285), cited under [Books](#). Chapter 2 of Hill [1991](#) argues that detailed correlations observed to hold between types of mental state and types of brain state provide evidence, via inference to the best explanation, that mental state-types are one and the same as certain brain state-types. Important criticisms of this reasoning are made in chapter 5 of Kim [2005](#), cited under [Physicalism, Reduction, and Reductionism](#). Bates [2009](#) and McLaughlin [2010](#) try to answer Kim’s objections. Huemer [2009](#) is a valuable discussion of appeals to parsimony in philosophy, including appeals made in arguments for physicalism. Traditionally, though not recently, physicalists have thought that their view gains support from physical conservation laws. Montero [2006](#) argues for skepticism about this tradition, but see also Vicente [2011](#), cited under [“Physical” in the Narrow Sense](#).

Bates, Jared. “A Defence of the Explanatory Argument for Physicalism.” *Philosophical Quarterly* 59.235 (2009): 315–324.

Point-by-point rebuttal to the objections in chapter 5 of Kim [2005](#), cited under [Physicalism, Reduction, and Reductionism](#), to arguing for psychophysical identity claims on the grounds that they provide the best explanation of observed psychophysical correlations.

Hill, Christopher. *Sensations: A Defense of Type Materialism*. Cambridge, UK: Cambridge University Press, 1991.

Systematic and very clear case for a type physicalist view of sensations, addressing metaphysical, epistemological, and semantic issues.

Huemer, Michael. "When Is Parsimony a Virtue?" *Philosophical Quarterly* 59.235 (2009): 216–236.

Argues that parsimony has no evidential value when it comes to philosophical theorizing, including when it is used to argue for physicalism.

McLaughlin, Brian P. "Consciousness, Type Physicalism and Inference to the Best Explanation." *Nous-Supplement: Philosophical Issues* 20 (2010): 266–304.

Restatement, and defense against objections in chapter 5 of Kim [2005](#) (cited under [Physicalism, Reduction, and Reductionism](#)), of an argument that infers the identity of mental states with neural states as the best explanation of detailed correlations observed between mental states and neural states.

Montero, Barbara. "What Does the Conservation of Energy Have to Do with Physicalism?" *dialectica* 60 (2006): 383–396.

Argues for a negative answer to the titular question.

Smart, J. J. C. "Sensations and Brain Processes." *Philosophical Review* 68 (1959): 141–156.

Classic paper defending the thesis that sensations are brain processes from various objections. Also hints at positive considerations favoring the thesis.

The Causal Closure of the Physical (I)

Two kinds of arguments for physicalism have been developed that both start from the claim that the physical is causally closed (or complete), the claim that, intuitively, it is not necessary to step outside the domain of the physical in order to explain physical events because the probability of any physical event is its probability given earlier physical events plus the laws of physics. (The terminology of "causal closure" is misleading.) The first kind of argument concludes that the mental supervenes on the physical, and is presented in Papineau [1990](#), Papineau [1995](#), and Loewer [1995](#). Objections to the argument can be found in Crane [1991](#) (to which Papineau [1991](#) replies) and Witmer [1998](#).

Crane, Tim. "Why Indeed? Papineau on Supervenience." *Analysis* 51.1 (1991): 32–37.

Detailed response to Papineau [1990](#), charging it with equivocation on "physical."

Loewer, Barry. "An Argument for Strong Supervenience." In *Supervenience: New Essays*. Edited by Elias E. Savellos and Umit D. Yalçın, 218–225. Cambridge, UK: Cambridge University Press, 1995.

Argues from the causal closure of the physical to the supervenience of the non-physical on the physical.

Papineau, David. "Why Supervenience?" *Analysis* 50.2 (1990): 66–71.

Argues that, because the causal closure of the physical rules out the possibility of the mental manifesting itself causally as it should if the mental failed to supervene on the physical, the mental does supervene on the physical.

Papineau, David. "The Reason Why: Response to Crane." *Analysis* 51.1 (1991): 37–40.

A reply to Crane [1991](#).

Papineau, David. "Arguments for Supervenience and Physical Realization." In *Supervenience: New Essays*. Edited by Elias E. Savellos and Umit D. Yalçin, 226–243. Cambridge, UK: Cambridge University Press, 1995.

Appeals to the causal closure of the physical to argue in one way (as in Papineau [1990](#)) that the non-physical supervenes on the physical, and in another way that the non-physical is realized by the physical.

Witmer, Gene. "What Is Wrong with the Manifestability Argument for Supervenience." *Australasian Journal of Philosophy* 76.1 (1998): 84–89.

Critique of the argument for the supervenience of the non-physical on the physical given in Loewer [1995](#) and Papineau [1995](#).

The Causal Closure of the Physical (II)

A second kind of argument, often (but misleadingly) called the "causal argument", also starts from the premise that the physical is causally closed. It concludes that mental (more generally, non-physical) states are token-identical with, or at least realized by, physical states, on the grounds that, if mental states were distinct from, and not even realized by, physical states, then, given the causal closure of the physical, the effects that mental states cause would be overdetermined, which is an unacceptable consequence. The argument seems to have originated in chapter 3.3 of Peacocke [1979](#). The assumption that causal overdetermination is an unacceptable consequence is challenged in Mills [1996](#); see also Sider [2003](#) for a general defense of causal overdetermination. The causal closure of the physical is challenged in Sturgeon [1998](#) and, on quite different grounds, in Bishop [2006](#); Witmer 2000 responds to Sturgeon 1998. The causal argument is developed and its premises argued for (including the closure premise) in Papineau [2001](#) and in Melnyk [2003](#), which, however, formulates the argument as inductive rather than deductive. Lowe [2003](#) contains a defense of dualism against the force of the argument by a long-standing critic.

Bishop, Robert. "The Hidden Premiss in the Causal Argument for Physicalism." *Analysis* 66.1 (2006): 44–52.

Argues that physics does not in fact support the claim that the physical is causally closed.

Lowe, E. Jonathan. "Physical Causal Closure and the Invisibility of Mental Causation." In *Physicalism and Mental Causation: The Metaphysics of Mind and Action*. Edited by Sven Walter and Heinz-Dieter Heckmann, 137–154. Exeter, UK: Imprint Academic, 2003.

Argues that the causal argument for physicalism fails because irreducibly mental and non-overdetermining causes, if invisible in a certain sense, might exist even if the argument's premises are true.

Melnyk, Andrew. "Some Evidence For Physicalism." In *Physicalism and Mental Causation: The Metaphysics of Mind and Action*. Edited by Sven Walter and Heinz-Dieter Heckmann, 155–172. Exeter, UK: Imprint Academic, 2003.

Presents an inductive version of the causal argument for physicalism. Argues explicitly for the closure of the physical and for the unacceptability of widespread overdetermination of the effects of mental causes.

Mills, Eugene. "Interactionism and Overdetermination." *American Philosophical Quarterly* 33 (1996): 105–117.

Argues that the overdetermination to which interactionist dualism leads is unobjectionable.

Papineau, David. "The Rise of Physicalism." In *Physicalism and its Discontents*. Edited by Carl Gillett and Barry Loewer, 3–36. Cambridge, UK: Cambridge University Press, 2001.

Formulates a causal argument for the identity of the mental by the physical, and claims to find support for the key premise that the physical is causally closed in a detailed review of the history of science.

Peacocke, Christopher. *Holistic Explanation*. Oxford: Clarendon, 1979.

Wide-ranging book arguing for, and for the significance of, a deep structural similarity between the explanation of action and that of perceptual experience.

Sider, Theodore. "What's So Bad About Overdetermination?" *Philosophy and Phenomenological Research* 67.3 (2003): 719–726.

Brief critical discussion of reasons for thinking that overdetermination is an undesirable consequence of a view.

Sturgeon, Scott. "Physicalism and Overdetermination." *Mind* 107.426 (1998): 411–432.

Powerfully challenges causal arguments for physicalism on the ground that the key premise that the physical is causally closed equivocates on "physical."

Witmer, D. Gene. "Locating the overdetermination problem." *British Journal for the Philosophy of Science* 51 (2000): 273–286.

Defends the causal argument against Sturgeon 1998.

Further Issues

Obviously there are numerous objections to physicalism that arise from consideration of such comparatively specific features of the world as phenomenal consciousness, intentionality, and morality; but the literature concerning these objections lies beyond the scope of this bibliography. Among other issues so far unmentioned, however, are some to do with the relationship between physicalism and actual physics. One is whether reality has a fundamental level, and if it does not, whether physicalism must therefore be false; see Schaffer [2003](#), which first raised the issue, and Montero [2006](#), which brings out its complexity. Another issue is the relationship between physicalism and the apparently popular claim that everything supervenes, in particular, on the microphysical; see Hüttemann and Papineau [2005](#), which forcefully brings out the non-triviality of the issue, and Papineau [2008](#). A third and related issue is whether or not the world as described by current physics constitutes a single object. Esfeld [1999](#) argues that it does in an admirably accessible way (though a glancing familiarity with quantum mechanics on the reader's part would be helpful). Chapter 7 of Horgan and Potrč [2009](#) formulates in more detail the view that fundamentally the world is a single object—what they call the "bobject." A fourth issue is the question of why, if physicalism is true, there are any laws in addition to those of physics; Loewer [2008](#) raises this issue. Wilson [2010](#), cited under [Physicalism, Reduction, and Reductionism](#), in effect addresses the issue that Loewer raises, but gives a response in terms of

the different degrees of freedom of systems at different scales. Wallace [2003](#) contains a fascinating discussion of the place of commonsense and special-scientific objects in a world as described by quantum mechanics. A fifth issue is whether the apparently indispensable role of mathematics in physics poses a problem for physicalism; Schneider 2017 argues at length that it poses an insuperable problem.

Esfeld, Michael. "Physicalism and Ontological Holism." *Metaphilosophy* 30.4 (1999): 319–337. Argues that, to judge by our best current physics, if physicalism is true, then what everything ultimately supervenes on, or is realized by, is one thing: the global quantum state of the world.

Horgan, Terry, and Matjaž Potrč. *Austere Realism: Contextual Semantics Meets Minimal Ontology*. Cambridge, MA: MIT, 2009.

Proposes a highly revisionary monistic view of the world's ontology, but combines it with a theory of truth that still allows many claims from common sense and from the special sciences to be true.

Hüttemann, Andreas, and David Papineau. "Physicalism Decomposed." *Analysis* 65.1 (2005): 33–39.

Argues that the issue of whether physicalism is true is distinct from the issue of whether everything depends on how things are *microphysically*.

Loewer, Barry. "Why There Is Anything Except Physics." In *Being Reduced: New Essays on Reduction, Explanation, and Causation*. Edited by Jakob Hohwy and Jesper Kallestrup, 149–163. Oxford: Oxford University Press, 2008.

Addresses the problem of how there can be local, temporally-asymmetric special-scientific laws, given that the best candidates for fundamental physical laws are global and temporally symmetric. Proposes as a solution David Albert's suggestion that, as a matter of fundamental law, the universe began in a low entropy state.

Montero, Barbara. "Physicalism in an Infinitely Decomposable World." *Erkenntnis* 64.2 (2006): 177–191.

Argues that, when suitably formulated, physicalism might be true in a world with no fundamental level.

Papineau, David. "Must a Physicalist Be a Microphysicalist?" In *Being Reduced: New Essays on Reduction, Explanation, and Causation*. Edited by Jakob Hohwy and Jesper Kallestrup, 126–148. Oxford: Oxford University Press, 2008.

Distinguishes various sub-questions raised by the title's question, and proposes answers to them.

Schaffer, Jonathan. "Is There a Fundamental Level?" *Noûs* 37.3 (2003): 498–517.

Explores the consequences for various views, including physicalism, of the possibility (which the author regards as open) that reality has no fundamental level such as physicalism seems to require.

Schneider, Susan. "Does the Mathematical Nature of Physics Undermine Physicalism?" *Journal of Consciousness Studies* 24 (2017): 7–39.

Argues that physics is committed to mind-independent abstract mathematical entities that are not compatible with physicalism; published alongside the paper are several critical responses, most of which defend physicalism.

Wallace, David. "Everett and Structure." *Studies in History and Philosophy of Modern Physics* 34 (2003): 87–105.

Argues that the so-called "many worlds" interpretation of quantum mechanics can rebut the charge that it does not allow for the determinate macro-world of common sense.

Rivals to Physicalism

The traditional varieties of mind-body dualism fall outside the scope of the present bibliography because they are restricted to the relationship between the mental and the physical. Here we only consider rivals to physicalism that share with physicalism in our sense the goal of giving an account of the relationship between everything that is not narrowly physical and what is narrowly physical. One class of such rivals claims, roughly, that the privilege that physicalism assigns to physics is undeserved, and that all the sciences are on an ontological par. Such a view seems to be endorsed in chapters 1, 6, and 7 of Goodman [1978](#) and is clearly endorsed in Crane and Mellor [1990](#), Dupré [1993](#), Cartwright [1994](#), and Ladyman and Ross [2007](#) (which is unique in giving, in chapter 4, a detailed positive account of how the respective domains of the many sciences are meant to fit together on its non-physicalist view). A second class of such rivals claims that physics is indeed privileged in the sense that all phenomena are ultimately emergent from physical phenomena, but emergence is understood in such a way that the resulting emergentist doctrine is incompatible with physicalism. Gillett 2016 explores the relevant issues with unparalleled thoroughness. A third class of rivals takes inspiration from the Aristotelian doctrine of hylomorphism; Jaworski 2016 contains the fullest and most sophisticated elaboration of such a view currently available. The varieties of idealism form a fourth class of rivals to physicalism, though they are rarely if ever discussed in the literature on physicalism; Foster [2008](#) [makes](#) a powerful case for idealism.

Cartwright, Nancy. "Fundamentalism versus the Patchwork of Laws." *Proceedings of the Aristotelian Society* 94 (1994): 279–292.

Argues that there is no warrant for taking the well-confirmed laws of physics to have the sort of universal scope that would be required for them to constitute fundamental laws on which all other laws depend.

Crane, Tim, and D. H. Mellor. "There Is No Question of Physicalism." *Mind* 90 (1990): 185–206.

Argues that previous attempts to formulate physicalism do not simultaneously avoid both triviality and obvious falsity.

Dupré, John. *The Disorder of Things: Metaphysical Foundations of the Disunity of Science*. Cambridge, MA: Harvard University Press, 1993.

Argues, with special reference to the biological sciences, against physical reductionism and physicalism.

Foster, John. *A World for Us: The Case for Phenomenalistic Idealism*. Oxford: Oxford University Press, 2008.

Argues lucidly and with great care against the mind-independent reality of the (supposedly) external world, and for an ultimately theistic kind of idealism.

Gillett, Carl. *Reduction and Emergence in Science and Philosophy*. Cambridge: Cambridge University Press, 2016.

Philosophically sophisticated and scientifically informed, this examination of current debates between reductionists and emergentists in both science and philosophy seeks to clarify the issues, and argues that these debates are empirically tractable.

Goodman, Nelson. *Ways of Worldmaking*. Indianapolis, IN: Hackett, 1978.

Stylish but highly elliptical explorations of the author's view that all things—even the stars—are made by human thought.

Jaworski, William. *Structure and the Metaphysics of Mind: How Hylomorphism Solves the Mind-Body Problem*. Oxford: Oxford University Press, 2016.

Carefully formulates a hylomorphic account of the relation between the mental and the physical (and, more generally, between the non-physical and the physical), argues for its superiority over physicalist alternatives, and defends it against multiple objections.

Ladyman, James, and Don Ross. *Every Thing Must Go: Metaphysics Naturalized*. Oxford: Oxford University Press, 2007. With David Spurrett and John Collier.

A highly ambitious exercise in naturalized metaphysics, it argues that, when current physics is taken seriously as our best guide to what the world is like, we must conclude that there are no objects, not even at the fundamental physical level, and that the world is at bottom purely structural.