



The abundant world: Paul Feyerabend's metaphysics of science

Matthew J. Brown

Center for Values in Medicine, Science, and Technology, The University of Texas at Dallas, 800 W. Campbell Rd., JO 31, Richardson, TX, 75248, USA



ARTICLE INFO

Article history:

Available online 23 December 2015

Keywords:

Paul K. Feyerabend;
Scientific realism;
Metaphysics of science;
Materialism;
Values in science;
Science in democracy

ABSTRACT

The goal of this paper is to provide an interpretation of Feyerabend's metaphysics of science as found in late works like *Conquest of Abundance* and *Tyranny of Science*. Feyerabend's late metaphysics consists of an attempt to criticize and provide a systematic alternative to traditional scientific realism, a package of views he sometimes referred to as "scientific materialism." Scientific materialism is objectionable not only on metaphysical grounds, nor because it provides a poor ground for understanding science, but because it implies problematic claims about the epistemic and cultural authority of science, claims incompatible with situating science properly in democratic societies. I show how Feyerabend's metaphysical view, which I call "the abundant world" or "abundant realism," constitute a sophisticated and challenging form of ontological pluralism that makes interesting connections with contemporary philosophy of science and issues of the political and policy role of science in a democratic society.

© 2015 Elsevier Ltd. All rights reserved.

When citing this paper, please use the full journal title *Studies in History and Philosophy of Science*

1. Introduction

When I began this paper, my focus was on Paul Feyerabend's ideas about the relation between science and democracy,¹ particularly in his late works. While exploring Feyerabend's views, I kept coming back to metaphysical issues occupying those late works.² I found that in order to understand Feyerabend's mature views on science and democracy, we have to understand first his metaphysics of science, which proves to be a difficult task. Thus the main goal of this paper is to provide an interpretation of Feyerabend's late metaphysical views. At times, this seems like an abstruse pursuit, not at all in the spirit of Feyerabend's oeuvre. But Feyerabend developed these ideas in order to strengthen an argument about the role of science in a free society. At the end of the paper, I

will gesture all too briefly at the consequences of Feyerabend's metaphysics of science for his thinking about science and its role in democracy. This paper, then, is a necessary step for further work on this timely question.

Feyerabend's writings on these topics are, of course, scattered, unsystematic, and in tension with themselves in various ways. Many of the major sources from his late work were unpublished in Feyerabend's lifetime, which brings along familiar interpretive problems for the historian of philosophy. Nevertheless, I will attempt to show that a coherent and interesting, perhaps even a plausible view emerges from these writings. My interpretation differs from several other major interpretations of Feyerabend's later writing—as a philosophical pluralist with no positive, substantive commitments of his own (Oberheim, 2006), as a post-modern social constructivist (Preston, 1998), or as a "Kant on Wheels" neo-Kantian (Oberheim, 2006).³ I will argue for an ontological pluralist, "abundant realist" interpretation of Feyerabend's later metaphysics.

Feyerabend articulates a positive metaphysical view as part of an argument about the role of science in a democracy, and particularly

E-mail address: mattbrown@utdallas.edu.

¹ Feyerabend variously talks about "democracy," "liberalism," and "free society." He does not seem to articulate a well worked-out political philosophy, but rather to refer to common, sometimes shifting conceptions. His most worked-out political views can be found in *Science in a Free Society* (Feyerabend, 1978), a text that deserves more attention, despite Feyerabend's own later distaste for the book. See also Kidd, 2016.

² See discussion of Feyerabend's "early," "middle," and "late" periods in the issue introduction.

³ Cf. Oberheim, 2016. The expression "Kant on Wheels" is due to Peter Lipton (Lipton, 2003).

about the cultural and epistemic authority of science in a democracy.⁴ He pursues these issues because he wishes to dethrone a common view about the authority of science that is founded on scientific metaphysics, in order to replace it with a more nuanced view—one that is more compatible with his own pluralistic, democratic political leanings. While “scientific metaphysics” could mean many different things, in particular, Feyerabend attacks a view I’ll call “scientific materialism”⁵ and attempts to articulate an alternative.

Feyerabend’s alternative metaphysical view has a negative and a positive component:

Negative Nature does not have a coherent, stable, unitary structure, thus the goal of science cannot be to mirror such a structure, if science is to be a successful pursuit.

Positive Nature is abundant, ambiguous, incomplete, not structureless but rich with complex, overlapping, conflicting structures, a complex mix of determinacy and indeterminacy, safety and hazard for human life and thought.

I will attempt to put flesh on the bones of these basic ideas by exploring how Feyerabend articulates of his metaphysical views, especially in *Conquest of Abundance* and *Tyranny of Science*,⁶ and attempting to provide a coherent interpretation of them. I will try to show how they play a role in undercutting scientific materialism, and I will conclude by gesturing at consequences for our understanding of science and its role in democracy.

2. The threat of scientific materialism

I have chosen the fraught phrase “scientific materialism” to refer to Feyerabend’s target in articulating a metaphysics of science. What is scientific materialism? Scientific materialism is particular kind of scientific realism, one that arguably plays an important role both in philosophy of science as well as in popular conceptions of science. It will be worthwhile to cover some conceptual ground in clarifying scientific realism and scientific materialism before articulating Feyerabend’s alternative.

Scientific realism involves three distinct commitments (see, e.g., the influential accounts of Ladyman (2002); Chakravartty (2011b, a)):

1. **Semantic commitments**—Scientific claims should be interpreted literally as claims about the world, not re-interpreted instrumentally, phenomenally, etc.
2. **Epistemic commitments**—Theoretical scientific claims constitute knowledge of the world. They are accurate, true, approximately true, or something of that form.

⁴ Feyerabend may have been interested in these issues for many additional reasons. In the selection from *Killing Time* used as the preface for *Conquest of Abundance*, he describes a general interest in questions like “Why are so many people dissatisfied with what they can see and feel” (Feyerabend, 2001, p. vii) and why do they believe there is a hidden world that is “more trustworthy” than the world they experience. Certain passages suggest he was simply curious about ideas of “reality” as they appear in his areas of interest and passion: science, art, and ancient Greek literature.

⁵ I fully appreciate the problematic and contested nature of the term, and I hope to largely avoid the controversy by stipulating a definition of the term below in a way that connects Feyerabend’s concerns to contemporary discussions of realism. Feyerabend himself sometimes refers to his target as “materialism” and sometimes as “objectivism” in his later works.

⁶ Since I will be citing these manuscripts very frequently, I will use the following shorthand parenthetical references. *Conquest of Abundance* (Feyerabend, 2001) will be abbreviated “COA”. When essays from part 2 are cited, their title will usually be given. *Tyranny of Science* (Feyerabend, 2011) will be abbreviated “TOS”.

3. **Metaphysical commitments**—Science explores a mind-independent world with a determinate structure.

Incidentally, the arguments in favor of realism in Feyerabend’s early work can be best understood as defenses of the *semantic* form of realism rather than epistemic or metaphysical commitments. The sort of realism that Feyerabend seeks to reject is a certain kind *metaphysical* commitment. In the introduction to *Conquest of Abundance* he characterizes the view as an assumption captured in these three (or four) statements:

1. important ingredients of the world are concealed;
- 2a. the concealed ingredients form a coherent universe whose elements and motions underlie some phenomena, while other phenomena are our products entirely;
- 2b. because of 2a, a truthful account of this universe and of reality must be coherent and uniform;
3. human beings play an ephemeral role; they are not directly linked to reality and they cannot change it. (COA, p. 11)

These statements, and other texts where Feyerabend specifies his target, imply the following four commitments⁷:

Mind-independence There exists a mind-independent world that is the subject of scientific investigation.

Taxonomic monism The world has a unique, coherent, and uniform structure of entities and processes.⁸

Ontological reductionism Higher-order structures (including those we experience) can be reduced to the properties and relations of more basic structures (unless they are “subjective” illusions).

Physicalism The basic level of structure is the physical.

“Scientific materialism” is what I will call this package of views that fall under the metaphysical commitment of scientific realism. It is not the only possible version of the metaphysical commitment of scientific realism, though something like it is the most common. Feyerabend was a critic of this view through much of his career (see the introduction to Feyerabend (1981c, b)), but his criticism becomes more sophisticated in his late work, which I will focus on. While each of these theses is denied by Feyerabend, we will see that *taxonomic monism* is perhaps the most problematic.

The arguments for scientific materialism are generally grounding arguments, i.e., they have the form: we should accept scientific materialism because it grounds the success of science. One common form is a sort of transcendental argument: (1) Science is successful, i.e., it affords us a high degree of prediction and control. (2) But this success would not be possible unless there is a mind-independent reality with a determinate structure that generates the regularities in question. (3) Therefore, scientific materialism (or a near cousin) must be true.⁹ Another familiar form is the inference to the best explanation (IBE) argument: (1) Science is successful. (2’) The best explanation for its success is scientific

⁷ These theses are a bit rough-and-ready, with some notoriously tricky points (e.g., the precise meaning of the term “physical”). The main goal here is to get a sense of what sorts of views Feyerabend was worried about.

⁸ The term “taxonomic monism” is due to Chakravartty (2011b, p. 159). Longino (2004) calls (roughly) the same view simply “monism”: “For any natural process there is one (and only one) correct account (model, theory) of the process. All correct accounts of natural processes can form part of a single consistent and comprehensive account of the natural world” (p. 130).

⁹ See Cartwright (1999, p. 23) for an argument of this form (in this case for local realism rather than standard scientific realism/scientific materialism).

materialism. (3) Therefore we should accept scientific materialism.¹⁰ Obviously there is much left to fill in with such arguments, but these give a general schematic form of Feyerabend's target.

On Feyerabend's view, scientific materialism also grounds problematic attitudes about the authority of experts and the role of science in democracy. In particular, scientific materialism invests too much intellectual and cultural authority in science, narrowly construed as a reductionistic enterprise. If scientific materialism accurately describes the nature of Nature and the relation of science to it, this justifies a very high degree of authority for science. Feyerabend argues that investing too much authority in a unified scientific enterprise tends towards epistemic hegemony and elitism. As John Dupré puts it, "[T]he political power of science rests in considerable part on the assumption that it is a unified whole" (Dupré, 1996, p. 115). If we replace scientific materialism with a picture of "metaphysical disorder" and the disunity of science, as Dupré, following Feyerabend, insists on, then the distribution of authority to different scientific enterprises will be much more circumspect, fair, and meaningful.¹¹

Scientific materialism dogmatically denies the abundance of nature, that is apparent as much to the firsthand experience of the layperson as well as by examining the historical record, treating that abundance as a matter of mere appearance, shown to be illusory by expert judgment. Scientific materialists insist that "Abundance occurs in history, it does not occur in the world" (COA, p. 139). Thus they dismiss the authority of the public and of history. Scientific materialism encourages a host of epistemic and political problems: it warps our view of history, denying the efficacy of non-scientific traditions in coping with the world as well as the degree of disunity and pluralism in science itself. It leads us to ignore or devalue the methodological pluralism necessary in science, and it misrepresents science as an ideally value-free enterprise. Science, according to the materialism, is or ought to be socially autonomous as well as epistemically and culturally authoritative, a dangerous combination.¹²

3. Strategies for undercutting materialism

Feyerabend explores two strategies for challenging scientific materialism. The first is to target premise (1), the success of science, while the second is to target premise (2/2') that the success of science is grounded in scientific materialism.

3.1. Deny or downplay the success of science

One can undermine the standard argument for scientific materialism by denying its explanandum. If science isn't really successful, there is nothing for scientific materialism to ground. So too, if it is much less successful than the argument presupposes. This seems to be the strategy of Feyerabend's middle period, in works like "How to Defend Society Against Science" (1975) and *Science in a Free Society*, where he denies that science is successful, or that it is successful most of the time, or that it is more successful than other approaches (witchcraft, astrology), or that it is successful on a fair evaluation of success.¹³

¹⁰ Psillos (2008) argues that we should prefer such arguments to transcendental arguments. But such IBE arguments are probably at best question-begging and at worst commit the base-rate fallacy. See Magnus and Callender (2004).

¹¹ See also Dupré (1993).

¹² See Douglas (2009) and Brown (2013) for concerns about combining autonomy and authority.

¹³ By fair, Feyerabend means that it is based on a non-question-begging standard, that it is not based on an ignorant misrepresentation of the alternatives, and that it has not had any illegitimate help in succeeding, e.g., by repressing the opposition. This is explored in the case of alternative medicine by Kidd (2013b).

This is probably the least effective strategy, in the context of the argument with scientific materialism. First, it is rhetorically ineffective: no one who finds scientific materialism plausible will find such arguments compelling. Second, only a relatively weak version of the success claim is required in order to get the argument off the ground—one need not accept the claim that science is always successful, for example. Finally, in its stronger forms, this strategy of Feyerabend's is simply implausible—science *does* often generate sufficient prediction and control to justify some significant degree of epistemic authority (Douglas, 2009, p. 8).

In certain cases, Feyerabend's challenge to the success of science may be more effective. For example, the record of science-based interventions in the areas of environmental management and improvements to agriculture have often been underwhelming or even disastrous (TOS 46–9). Likewise, critics have raised serious questions about the success of much current biomedical research (Brown, 2008b, a). Problems with using science to engineer foods to be more desirable have become well-known (Moss, 2013).¹⁴ Nonetheless, as a wholesale argument, it is too problematic to successfully undercut scientific materialism.

Perhaps a more charitable reading of these works suggests that Feyerabend is *not* denying that science is successful, but just suggesting a less triumphalist comparison with the success of other traditions, or a case by case evaluation of their relative merits. In that case, the successes of science are still recognized and still need grounding, and scientific materialism is still the only or the main option on the table, unless such an argument is supplemented by further considerations.

3.2. Provide alternate grounds for success

A second approach is to deny that scientific materialism is needed to ground science. The more modest version of this is to deny that scientific materialism is uniquely suited to ground the success of science, while a more radical version would deny that it is possible for scientific materialism to ground science.

For the modest strategy, if we can show an alternate way of grounding the success of science, we begin to undercut the argument that scientific materialism is necessary for or the best explanation of that success. At that point, scientific materialism would be at best an optional commitment, and a detailed discussion of relative virtues could begin.

This approach naturally complements the more limited version of the first strategy. If we have options for grounding the success of science, what *kind* of success we actually attain becomes important. For instance, if we see science as ineliminably disunified and pluralistic, this may render features of scientific materialism, such as taxonomic monism, less plausible. If science is not the only mode of seeking knowledge that meets with success, then, again, this causes problems for scientific materialism.¹⁵

An alternative to finding a replacement for scientific materialism that Feyerabend rejects would be to adopt an instrumentalist or pragmatist stance towards the success of science; i.e., the success of science does not reveal anything deeper than the cleverness and usefulness of our tools for prediction and control. Feyerabend clearly rejects such anti-metaphysical approaches, insisting instead that "a science without metaphysics could not possibly bear fruit" (Feyerabend, 1991, p. 95), in part because the metaphysics in science

¹⁴ My thanks to Janet Kourany for bringing this issue to my attention.

¹⁵ While a head-to-head evaluation of scientific materialism and Feyerabend's ontological pluralism is beyond the scope of this essay, these are the sort of considerations that would aid the evaluation.

helps “interesting” theories deal with empirical and conceptual problems that would seem to refute it from the get-go. As Feyerabend further explains,

Metaphysics is not the problem. The problem is if the idea that all scientific results form a unity which reflects objective properties of a research-independent world is a good metaphysical hypothesis. I don’t think it is. (Feyerabend, 1991)

In other words, the problem is not that scientific materialism is posited as a metaphysical ground for science; the problem is that it is not good metaphysics and not good at grounding science.

Feyerabend is keen to supply an alternative metaphysical ground for scientific success:

The success of a particular research program... can be explained in at least two ways. First way: the procedures... reveal how Nature is independently of the interference. Second way: they reveal how Nature responds to the interference. (“Art as a Product of Nature as a Work of Art” COA, p. 239)

Feyerabend grounds the success of science not in its successful mirroring of a mind-independent, unique structure of reality, but in the idea of Nature “responding” to our cognitive actions or “epistemic activities” (Chang, 2009), i.e., our activities of modeling, predicting, observing, and experimenting in attempt to know the world and act on that knowledge. I will explore the meaning and the merits of such an alternative below.

3.3. Show that scientific materialism undercuts the success of science

A more radical argument (and if successful, more effective) would be to show not only that scientific materialism is optional, but that it cannot possibly ground the success of science. Ideally, we would want to see aspects of the success of science incompatible with materialism. Feyerabend points out several ways in which scientific materialism renders central features of science impossible or inexplicable.

3.3.1. The diversity and disunity of successful science are incompatible with taxonomic monism

Feyerabend argues persuasively throughout his works that when we look at the actual practice of science, what we see are a diversity of pursuits, apparently disunified, perhaps even incompatible with one another. If *real* science is what scientific materialism is supposed to ground, this raises a problem.

[T]he assumption of a single coherent worldview that underlies all of science is either a metaphysical hypothesis trying to anticipate a future unity, or a pedagogical fake; or it is an attempt to show, by a judicious up- and downgrading of disciplines, that a synthesis has already been achieved. (“Has the Scientific View...” COA, p. 154)

Put more succinctly, “the idea of a coherent ‘body of scientific knowledge’ is a chimera” (“Art as a Product...” COA, p. 232).

Scientific materialism, rather than grounding the success of science, denies that science, as it is actually practiced, *could be* successful. It either distorts existing science, or it replaces the success of existing science with a promissory note about the success of future science that looks radically different from present science.

3.3.2. The necessary ignorance, doubt, and conflict that spur and drive science have no ground in the world of scientific materialism

Feyerabend makes this point when he argues that the scientific materialists’ attempt to paint the world as “tidy, uniform, the same everywhere... eliminates precisely those conflicts that kept science going in the past and will continue inspiring its practitioners if preserved” (“Has the Scientific View of the World a Special Status?” COA, p. 155). If the world is so tidy, why is it so difficult to understand? The existence of radically different ways of understanding the world, of the struggle and conflict that drive science, is inexplicable in the world of scientific materialism.

Inquiry presupposes conflict and doubt as driving engines—they are what make scientific results significant (Brown, 2010). Of course, the scientific materialist can always insist that nature is uniform and orderly, while the conflict and doubt that drive inquiry are just a matter of our confusion and uncertainty, a consequence of our subjective epistemic situation. A metaphysical picture that grounds the existence and success of science should render these necessary conditions comprehensible, but scientific materialism seemingly denies that doubt exists as anything but a psychological phenomenon. Feyerabend, like Dewey before him, holds that resolving merely subjective problems or doubts does not adequately capture the objective significance of science.¹⁶

Feyerabend instead contrasts the metaphysics of “a single coherent world” with one where strife and conflict are given equal reality: “[W]ho says that the parts of the world hang together in a harmonious way? That strife is absent from the world at large?” (TOS, p. 10). Knowledge of the world is hard-won, but scientific materialism would appear to make it relatively easy. Scientists are driven by conflict and doubt to pursue the rigors of inquiry, but according to scientific materialism, conflict and doubt are merely subjective states of mind to be overcome, a view which is out of proportion to the apparent objective significance of science.

4. Feyerabend’s metaphysics of abundance

It should be clear that Feyerabend thought that scientific materialism will not do as a metaphysics of science.¹⁷ He has critical arguments against the success of science itself, which materialism is meant to ground, as well as the ability of scientific materialism to successfully ground that success. These arguments are made much stronger by Feyerabend’s defense of a positive *alternative* to scientific materialism, which can equally well if not better ground the success of science, properly understood.

It is my goal in this section to explicate Feyerabend’s complex and obscure metaphysics of science. I will begin by laying out five core metaphysical theses that Feyerabend asserts, though he often presents them in informal fashion. In §4.2 I resolve some major tensions and interpretive quandaries raised by this collection of

¹⁶ This is a major theme in John Dewey’s philosophy of science and metaphysics. See Dewey’s discussion of the objectively indeterminate quality of situations that evoke doubt and the pathological nature of purely subjective doubt (Dewey, 1938, pp. 109–111; Brown, 2012) as well as his metaphysical discussion of “existence as precarious” (Dewey, 1925, chap. 2).

¹⁷ This claim has to be qualified in at least two ways. First, Feyerabend early in his career appears to *defend* scientific materialism in the particular form of “eliminative materialism” associated also with Richard Rorty and Paul Churchland (Churchland, 1981; Feyerabend, 1963; Rorty, 1965). This was, however, rather early in his career, and it is clear that he later came to reject this sort of view (see TOS p. 35 and Martin, 2016), if he ever held it as a sincere commitment. Second, Feyerabend points out that “a uniform ‘scientific view of the world’ may be useful for people doing science... However, it is a disaster for outsiders... who... are liable to fall for the most simpleminded and most vapid tale” (“Has the Scientific View...” COA, p. 160). Neither changes the point that in his later works, Feyerabend clearly rejects scientific materialism.

claims. In §5, I will trace the consequences of Feyerabend's metaphysics of science for how we understand science and democracy.

4.1. Five Theses

I will begin by laying out five central claims that Feyerabend makes throughout his late writings on the nature of reality. In this section I will present these claims in direct reference to Feyerabend's texts with only brief commentary.

4.1.1. The Abundance Thesis

In the unfinished manuscript and several of the essays collected in *Conquest of Abundance*, Feyerabend argues that the world exhibits abundance and complexity, that "The world is a complex and many-sided thing" ("Has the Scientific View of the World a Special Status?" COA, p. 152). The great abundance of the world is where the unfinished manuscript of *Conquest* begins.

The world we inhabit is abundant beyond our wildest imagination. There are trees, dreams, sunrises; there are thunderstorms, shadows, rivers; there are wars, flea bites, love affairs; there are the lives of people, Gods, entire galaxies. (COA, p. 3)

Much of human activity is an attempt to limit and manage this abundance. It begins with our preconscious perceptual and cognitive mechanisms, which screen out much of the abundance of the world.¹⁸ Humans whose perceptual mechanisms make them even a little more aware of the abundance than normal (like the mnemonist from A.R. Luria's famous account) can find it utterly paralyzing (COA, p. 4). The invention and development of the distinction between *appearance* and *reality*, the historical narrative which concerns much of *Conquest*, also serves to limit our awareness of the abundance, a development that Feyerabend calls "the process of simplifying the world" (COA, p. 5). On Feyerabend's view, it is this process that defines much of Western philosophy and science.¹⁹

The Abundance Thesis The world is abundant, complex, made up of many types of things and events, including those that are hazardous, unstable, and precarious.

Feyerabend generally takes the Abundance Thesis to imply that the world is so abundant and complex that it defies our ability to describe it, e.g., with a scientific theory. Thus, as Kidd (2013a) argues, the Abundance Thesis is connected with the Ineffability Thesis, described below.

In contrast to scientific theories, Feyerabend makes the claim in a number of places (e.g., COA pp 21, 257–260) that for the ancient Greeks, concepts were understood in terms of lists of examples rather than clear definitions. He points to Plato's dialogues, where Socrates' interlocutors first answers to his "what-is" questions are generally lists rather than definitions, and to similar examples in Homer. Concepts as open lists of exemplars may have the benefit of being better at reflecting abundance and ambiguity than Socratic concepts with clear definitions or systematized scientific theories. Yet, we can hardly say that such concepts adequately capture or describe that abundance, since they accommodate it primarily through their incompleteness, ambiguity, and open-endedness.

4.1.2. The Ineffability Thesis

Another main theme is the *ineffability* of Ultimate Reality.

Ultimate Reality, if such an entity can be postulated, is ineffable. ("What Reality?" COA, p. 214)

Being as it is, independently of any kind of approach, can never be known. ("Historical Comments on Realism," COA, p. 205)

Such claims appear frequently throughout the counter-metaphysics of Feyerabend's late writings. The thesis is generally presented as a counter to the realist idea that reality is mirrored by theoretical posits or recorded facts.

The Ineffability Thesis Ultimate Reality itself is ineffable and unknowable.

As a metaphysical doctrine, this thesis is fairly ambiguous. It is clear, however, that this is a strong, in principle sense of ineffability, "unknown and forever unknowable" ("Realism" COA, p. 196). He describes it in mystical terms and connects it explicitly with the Christian Mystic, Pseudo-Dionysius the Aeropagite: "Trying to grasp it directly we face darkness, silence, nothingness" ("Art as a Product..." COA p. 233). The Ineffability Thesis is generally presented along with the next thesis, which it must be read in the context of.²⁰ I cannot fully explain the claim of ineffability until we consider all five theses.

4.1.3. The Areopagite Thesis

But we can describe and explain our interaction with certain emanations of God or, to express it in a less theological manner, we have access to the ways in which Ultimate Reality reacts to our approach... What we do know are the various forms of *manifest reality*, i.e., the complex ways in which Ultimate Reality acts in the domain... of human life. Many scientists identify the particular manifest reality they have developed with Ultimate Reality. This is simply a mistake. ("What Reality?" COA, p. 214)

This is the doctrine that Feyerabend associates with the neo-Platonist Pseudo-Dionysius the Areopagite, from whom I borrow the name for this thesis. Though we cannot know Ultimate Reality, we can interact with it in certain ways, and those interactions can be more or less coherent and successful. When we approach reality with the concepts, theories, and experimental tools of Newtonian science, we get one manifest reality. Likewise with quantum physics, Greek mythology, or evangelical Christianity. There are many manifest realities, but none can be identified with Ultimate Reality.

Feyerabend's account of "manifest reality" is rather vague, and his various expositions of the Areopagite Thesis leave open several interpretive possibilities for the claim that it is a "mistake" to identify one manifest reality with Ultimate Reality. It could be that no manifest reality is or correctly reflects Ultimate Reality (Academic skepticism) or that manifest realities, which we have access to, are a different sort of thing from Ultimate Reality, which we do not (Kantian idealism). Or perhaps we simply cannot know whether or not our manifest reality is or reflects Ultimate reality (Pyrrhonian skepticism). Alternatively, manifest realities might be *part* of Ultimate Reality, but only a small part (ontological pluralism), such that identifying them would be a kind of fallacy of composition.

¹⁸ That Feyerabend intends the Abundance Thesis to be an ontological rather than a phenomenological claim is clear from these references to these basic psychological mechanisms of filtering out the abundance of the world.

¹⁹ See papers by Preston and Heit, 2016.

²⁰ As does Kidd (2012).

The Areopagite Thesis Ultimate Reality, though ineffable, responds to many (but not all) different approaches in a more or less successful, coherent way—a fairly stable structure of responses constituting a manifest reality. It is a mistake to identify manifest and Ultimate realities.

4.1.4. Aristotle's Principle

Feyerabend sometimes argues for a thesis he calls variously “Aristotle’s Principle” or the “Existential Criterion of Reality.” According to this thesis, “real is what plays a central role in the kind of life we identify with” (“Historical Comments on Realism,” COA, p. 201). In other words, what is called “real” is what plays a role in valued practices and chosen forms of life. Feyerabend argues that Aristotle deploys this principle in his critique of Parmenides:

Aristotle criticized Parmenides in two ways. He tried to show the mistakes in Parmenides’ reasoning and he pointed out that change, which Parmenides had called unreal, is important in human life. (COA, p. 200)

Aristotle’s Principle What is “real” is what plays a role in our valued practices and form of life, what we care about and identify with.

4.1.5. No Appearance/Reality Dichotomy

A major aim of Feyerabend’s work is to uncover the historical narrative of the invention of the appearance/reality distinction. Like many such critical genealogies, the ultimate goal in tracing the distinction’s history is to undermine it:

[T]here is no grand dichotomy, with a solid trustworthy, genuine reality on one side and deceiving appearances on the other... The notion of reality makes excellent sense [only] when applied with discretion in the appropriate context. (COA, p. 9)

The distinction between appearance and reality is not an ahistorical absolute, nor is it an obvious or inevitable conclusion. On Feyerabend’s account, it is a contingent historical invention in response to particular struggles that has been subsequently maintained and enforced by authoritative traditions with an interest in simplifying abundance and narrowing epistemic possibilities. (Feyerabend hypothesizes that the first use of the dichotomy might be the narrative struggles involving Achilles and Agamemnon in Homer’s *Iliad*.²¹) The grand philosophical dichotomy between deceptive appearances and genuine reality is too simple to function universally in our complex world and experience. At best it makes sense in very local contexts.

The No Appearance/Reality Dichotomy Thesis There is no universally valid philosophical dichotomy between appearance and reality, though particular, local distinctions between real and apparent may be valid in context.

This thesis of No Appearance/Reality Dichotomy is reminiscent of a passage from Nietzsche’s *Twilight of the Idols*, the enigmatic section on “How the ‘True World’ Finally Became a Fable.”

The true world — we have abolished. What world has remained? The apparent one perhaps? But no! With the true world we have also abolished the apparent one. (Nietzsche, [1889] 1976, p. 486)

4.2. Resolving tensions in Feyerabend’s metaphysics

I have presented these theses much as Feyerabend himself stated them, without yet addressing or trying to clear up any apparent contradictions between them. This leaves us with a rather unclear and seemingly contradictory metaphysical picture. If we are going to find a coherent metaphysics of science in Feyerabend’s writings, adequate to providing a counter-proposal to scientific materialism, we must resolve several tensions.

1. What, if any, access do we have to Reality? Feyerabend describes reality as inaccessible, ineffable, unknowable *but also* as dependent on choice of practices and forms of life, as malleable and pliable, responsive and reactive.
2. What can we know about Reality? If it is ineffable, how do we know it is abundant, etc.?
3. How do we reconcile claims that Reality is unknowable and ineffable with the rejection of the appearance/reality dichotomy?

I will argue that these tensions can be resolved and that an attractive alternative view based on Feyerabend’s theses can be defended. The alternative may not be consistent with every detail of what Feyerabend wrote, even restricting ourselves to these themes in the later writings. This would be too much to expect. But the view is one pattern that fits with many of the details and general movements of Feyerabend’s text, and it is one worth considering on its own.

4.2.1. Being vs. reality

Feyerabend uses a farrago of related terms to refer to fundamental reality: Being, Being in itself, Ultimate Reality, Nature, the world, God, Reality, realities, the real, etc. In order to resolve the tensions in Feyerabend’s metaphysics, we must recognize that these are not all synonyms. Feyerabend throughout these works draws a key distinction between two major concepts. Above we’ve seen Feyerabend distinguish between “manifest realities” and “Ultimate Reality.” The same distinction reappears in different places using different terms:

Being ... provides some of those acting independently (not all of them!) with **manifest worlds** they can expand, explore, and survive in (manifest worlds are in many respects like ecological niches). Inhabitants of a particular manifest world often identify it with Being. They thereby turn local problems into cosmic disasters. (“Historical Comments on Realism,” COA, p. 204, boldface emphasis mine.)

First, there is **Being**. Being is unknowable and ineffable, too complex to be captured by intellectual simplifications. Feyerabend describes Being as resisting but pliable (Tambolo, 2014), as that which “responds” or “reacts” to our practices and our epistemic adventures. In various places, Being is sometimes called “Ultimate Reality,” “Nature,” “the world,” even “God.”

Second, Being is contrasted with manifest realities or **manifest worlds**. Manifest worlds are (at least partially) knowable, because they are product of the way that Being responds to our belief and practices. Aristotle’s principle applies to manifest worlds, not to Being, again because worlds are products of our practices interacting with Being. It is crucial to qualify, however, that manifest worlds are not ideal entities or phenomenal worlds; they are not mental or conceptual in the usual sense. Nor are they as neat, tidy, and well-behaved as our theories might suggest: “But the manifest worlds themselves demonstrate their fragmentary character; they harbored events which should not be there and which are classified

²¹ Again, see Preston (2016) and Heit (2016).

away with some embarrassment” (“Historical Comments on Realism,” COA, p. 204). These anomalies drive inquiry, change of practices, and shifts of manifest worlds.

The account of manifest worlds is one way in which Feyerabend is closely allied with pragmatist philosopher John Dewey.²² Dewey used the term “situations” in similar ways to Feyerabend’s “manifest worlds.” For Dewey, “situations” are “enviroming experienced worlds” that form the contexts of all practices, inquiries, and beliefs. They are not made up of words, concepts, or thoughts, though they may contain these, but they also include desks, conversations, letters, lectures, laboratories, microscopes, tissue samples, etc. Their scope is determined by what things are relevant to practice and thought, and they contain many objects that are the products of inquiry, and not just the antecedent conditions of it. Dewey also uses the metaphor of “ecological niches” to describe situations.²³

4.2.2. Kantianism vs. pluralism

Feyerabend’s two-level account of Being and worlds naturally encourages a neo-Kantian reading of Feyerabend’s metaphysics, where “Being” is associated with Kantian “things-in-themselves” and “worlds” are associated with Kantian “appearances” or “phenomena.” This Kantian reading of Feyerabend’s metaphysics is common and supported by some important passages, especially in his early work (Oberheim, 2006, chap. 6). Of course, as we have multiple manifest worlds, in part informed by our beliefs, with the possibility of radically different structures, it is not an orthodox Kantianism. It is instead what has come to be called a “Kant on wheels” account (Lipton, 2003; Oberheim, 2006, and 2016).

This is not, however, the interpretation best suited to making a coherent account of the five theses discussed above, nor is it the most useful in providing a fresh alternative in debates about scientific realism. An alternative interpretation is suggested by the following passage:

The idea that reality is *uniform* but ineffable is *not* the only possible way of bringing order into what we think we know. Another way which, as far as I am concerned, is *less one-sided*... would be to admit that there are many different kinds of objects and features, that they are related to each other in complex ways, that some of them, such as fashions in architecture, furniture, and dress, reflect human interests while others, though manufactured with the help of complex equipment, seem to be more independent, and that this hierarchy becomes the more obscure the more we try to remove ourselves from it... An *ontological* (epistemological)²⁴ pluralism seems closer to the facts and to human nature. (“What Reality?” 215, emphasis added)

This passage more than anything leads me to reject the Kant-on-wheels interpretation of Feyerabend, or, at least, to see value in exploring this other way of thinking that Feyerabend here terms “ontological pluralism.”

The distinction between the quasi-Kantian and pluralist interpretation of Feyerabend’s metaphysics may turn around the question of whether, in any sense, we have “access” to Ultimate Reality (Being), and more generally, the relation between Being and manifest worlds. Feyerabend’s explicit denial of the fundamental nature of the appearance/reality dichotomy is crucial here; it would be a serious mistake to take the distinction between Being and manifest worlds as a variation on that dichotomy, given that Feyerabend clearly rejects it. If there is no universally valid dichotomy²⁵ between appearance and reality, then a Kantian interpretation of Being and worlds in those terms is untenable.²⁶ Likewise, Feyerabend’s talk of “ontological niches” is in tension with a Kantian interpretation of the distinction. If a manifest world is like an ecological niche, Being should be understood as encompassing rather than standing apart from them.

Feyerabend speaks directly to the question of access to Being in several places: “Humans are part of the primal world [i.e., Being], not detached aliens, and they are subjected to its whims” (“Historical Comments on Realism” COA, p. 204). The primal world is the world we act in and experience, in some sense, though it is not the world we cognize or know. Manifest worlds are not some separate metaphysical realm, nor are they mere phenomenal worlds. They are parts of the primal world (of Being), for all that they are partially products of our theories, beliefs, practices, forms of life, etc. The key to understanding the nature of manifest worlds and their relation to Being is Feyerabend’s account of causal-semantic actions.

4.2.3. Causal-semantic action

Feyerabend argues that “understanding a subject means transforming it” (COA, p. 12), and this is part of the nature of manifest realities. Objects and events are changed by being known: “Even the discovery of an immanent structure changes the scene, for the events-as-they-are and the events-known-to-have-the-structure do not affect people in the same way” (COA, p. 12). For example, consider how advances in metallurgy and the chemistry of metals transforms the nature of iron and iron ores. There is the obvious, literal way in which some pieces of iron or iron ore are subject to new processes, smelted, purified, alloyed, forged, cast, etc. One could also argue that new knowledge about iron and iron ore transforms them, prior even to their extraction and use. The possible career of any piece of iron ore, buried deep underground, is different as a result of this new understanding. It has gained new potentials and relations to human practices. Its value and meaning have changed.²⁷ Feyerabend here relies on the active character of inquiry and rejects what Dewey terms the “spectator theory of knowledge” (Dewey, 1929).²⁸

Scientists create or reshape realities both because they (1) “act causally upon the world... and they have to if they want to ‘discover’ new entities” and (2) “create semantic conditions

²⁵ This is not to deny that the appearance/reality dichotomy serves some valid purposes in some projects of some cultures. It fails at philosophical universality.

²⁶ Eric Oberheim insists that a Kant-on-wheels metaphysics rejects a universal dichotomy between appearance and reality, but rather many different “empirical realities” or “phenomenal worlds,” where each “phenomenal world is co-constituted by subject-sided and object-sided ‘moments’ that are inseparably bound” (Oberheim, 2006, pp. 202–3), and thus is broadly compatible with ontological pluralism as I’ve described it here (personal communication). The emphasis on Kant, who emphasizes the manifold of appearances, as well as the mention of “empirical realities” or “phenomenal worlds” still suggests to me a lingering appearance-reality split and a difference between his view and the what I mean by “ontological pluralism,” but I haven’t space to pursue the issue further in this essay.

²⁷ It is in this sense that Dewey insists that inquiry or knowing changes and creates its own objects (Dewey, 1938, p. 122). See also Godfrey-Smith (2002).

²⁸ See also the critique of Rorty (1979).

²² One could perhaps argue that Feyerabend’s views are also allied with Heidegger’s. See, e.g., the several senses of “world” as used by Heidegger in *Being and Time* (Dreyfus, 1991, pp. 89–91).

²³ Dewey’s account of situations can be found in his *Logic: The Theory of Inquiry* (1938) as well as Dewey (1930, 1941); Balz and Dewey (1949). For discussions of Dewey’s theory of situations, see Russell (1939); Thayer (1952); Burke (1994, 2000, 2009a, 2009b); Browning (2002); Brown (2012).

²⁴ What is the connection between epistemological and ontological pluralisms implied by this strange parenthesis? Feyerabend clearly takes epistemological pluralism to be the actual state of affairs in science, and if we take science to be a successful enterprise, we should expect it to be a permanent condition. Ontological pluralism then might be the best alternative for someone who takes science as at least a partial guide to ontology.

engendering strong inferences from known effects to novel predictions and, conversely, from the projections to testable effects” (COA, p. 144). (1) is (relatively speaking) a mundane claim: as part of the process of science, as well as a result of its activities, scientists (and human actors generally) act in new ways that reshape their local environments through ordinary causal channels. Because electrons are hard to find in the wild, scientists build artificial environments unlike any given in Nature, which stabilize the structures or regularities we call “electrons.” (See Cartwright (1999) on “nomological machines,” discussed below). This work leads to creation of further novel environments, such as the internals of an electronic circuit, which, by clever artifice stabilize structures in which electrons act so regularly and predictably that they can be relied on for an incredibly variety of tasks. Likewise, because ordinary terrain is difficult to navigate, we build roads to stabilize our ability to travel. Because food is relatively hard to come by in the wild, we develop agriculture that allows us to replace large areas of natural flora and fauna with those that are more dependable.

In other words, science (or knowledge generally) involves causally manipulating the world in order to create or stabilize structures that can be relied upon in understanding and action. This cognitive ability is very basic, as the world is so abundant with complex, overlapping, malleable structures.²⁹ In order to get a handle on things, to be able to predict and explain events, to cope successfully with the trials and tribulations of Nature, to have stable practices and habits that can be relied on to some extent, we must materially transform our environment, to simplify it and to strengthen that which remains.

According to (2), science creates semantic conditions under which such structures become manifest. Feyerabend is here strongly influenced by Niels Bohr.³⁰ According to Bohr, a measurement apparatus creates the semantic conditions that make possible the assignment of physical properties. Without some (existing or implied) spatial frame of reference, the semantic conditions for speaking of the *position* of objects does not exist; there are no truth conditions for a claim like, “Particle P is at coordinates {x,y,z}” without an agreed-upon reference frame. Likewise, without an apparatus that reacts in a measurable way to impacts from particles, the semantic conditions for *momentum* do not exist. The main discovery of quantum physics, according to Bohr, is that not all measuring apparatuses are compatible, that is, it is not the case that the semantic conditions for all structures can exist simultaneously. Because the semantic conditions for (precise) position and momentum cannot exist simultaneously, particles cannot have precise positions and momenta simultaneously, hence the “indeterminacy” or “uncertainty” between them.³¹ Bohr was happy to apply this approach well beyond particle physics to biology,

psychology, even culture and morality.³² Bohr took “complementarity” as a general epistemology or philosophy of science, rather than merely an interpretation of quantum physics. Feyerabend likewise takes this account as inspiration for metaphysics and epistemology. The multiple, incompatible, complementary sets of semantic conditions for measurement become Feyerabend’s manifest worlds.

Finally, there is no absolute dichotomy between processes (1) and (2), i.e., “the dichotomy subjective/objective and the correspondence dichotomy between [semantic] descriptions and [causal] constructions are much too naïve to guide our ideas about the nature and the implications of knowledge claims” (COA, p. 144). Instead, scientists (or human actors generally) take **causal-semantic action** on the world. It is in this sense that Feyerabend speaks of scientists as “sculptors” or the world (COA, p. 144). But it is important to keep in mind the Areopagite thesis: “I do not assert that any combined causal-semantic action will lead to a well-articulated and livable world. The material humans... face must be approached in the right way. It *offers resistance*; some constructions... simply collapse. On the other hand, *this material is more pliable than is commonly assumed*.” (COA, p. 145). The pliability of Nature is limited by the resistance (Tambolo, 2014).

4.2.4. Ineffability and unknowability

Feyerabend repeatedly claims that Ultimate Reality or Being is ineffable and unknowable. These are, unsurprisingly, the most difficult of Feyerabend’s claims to interpret. The tricky thing about the ineffable is that as soon as one calls it ineffable, one is tempted to try to tell us something about it. The tricky thing about the unknowable is that one is tempted to talk about it as if we know what it is like. Without keeping clear distinction between *Being* (Ultimate Reality, etc.) and *manifest worlds* or *realities*, Feyerabend could easily be accused of such inconsistencies. But on a careful reading of Feyerabend’s view, it is *Being* that we cannot know or speak of (in a very particular sense), whereas most (not all) of his statements about the nature of reality refer to *manifest worlds*.

As shown above, when Feyerabend asserts that Being is “ineffable and unknowable,” he is *not* making the transcendental idealist metaphysical claim about the existence of separate realms of appearances and things-in-themselves, or that we lack any access whatsoever to Being, etc. Instead, Feyerabend is asserting that no practice, theory, idea, knowledge, or conceptual scheme takes on the world *as a totality*. In other words, the ineffability and unknowability of the world follows from its abundance.³³ The complex, overlapping, malleable nature of Being’s structure make it impossible to capture in a single formulation. As Helen Longino puts it, “Those advocating strong forms of pluralism are claiming that the complexity of natural processes eludes complete representation by any single theoretical or investigative approach available to human cognizers” (Longino, 2004, p. 130).³⁴

In addition to our inability to represent the world as a totality, there is a second sense in which Feyerabend discusses “ineffability,” related to the fact that there are aspects of our experience of the world that are incommensurable with our explicit understanding. Feyerabend emphasizes that the richness of our experience of the world outstrips our conception of it, and that in actual practice, the world often “misbehaves” in surprising ways, given our explicit conceptualizations of it. There are experiences of or encounters with Being that are different from and incommensurably with cognition and language. In emphasizing the ineffability of Being in

²⁹ This notion is very fundamental to Peter Godfrey-Smith’s account of the origins and function of cognition in *Complexity and the Function of Mind in Nature* (Godfrey-Smith, 1996), in which intelligent organisms construct (or reconstruct) their environment in ways that lead to greater success.

³⁰ Oberheim (2006, pp. 165ff.) discusses Feyerabend’s complicated relationship to Bohr. In his autobiography, Feyerabend acknowledged Bohr’s influence on his development of the concept of incommensurability. Feyerabend wrote criticisms and defenses of Bohr’s philosophy of complementarity. See Feyerabend (1958, 1960, 1968, 1969, 1981a). Bohr and quantum theory are discussed frequently throughout the essays that make up part 2 of *Conquest of Abundance*, and the apparently unwritten fifth chapter of the unfinished manuscript was to take up these ideas as well.

³¹ For a development of this aspect of Bohr’s thinking about quantum mechanics, see Brown (2014), “Quantum Frames.” In the language of that paper, compatible sets of semantic conditions form “quantum frames,” and (interestingly), among the structures in that frame, classical determinism holds. Quantum indeterminacy arises when one jumps between incompatible frames. (In a sense, it is the experimenter and not the particle that makes “quantum jumps.”)

³² See the collected Bohr (1987–1998), especially the essays in Volume II.

³³ My thanks to Ian James Kidd for helping me see this connection.

³⁴ Longino does not mention Feyerabend in this context.

this sense, Feyerabend echoes earlier views expressed by John Dewey about the distinction between our precognitive, qualitative, aesthetic “primary experience” of the world, and our cognitive “secondary experience” (Dewey, 1925).³⁵

There remains an interpretive problem: Feyerabend claims that Being responds differentially to various approaches to it. This would appear to be a claim about the nature of Being, a potential violation of Feyerabend’s own assertion of ineffability and unknowability. But what Feyerabend is really pointing out is the *multiplicity* of manifest realities, the fact that there have been many approaches that create relatively coherent, reliable worlds, while there have also been many that fail to do so. It is in this connection that Feyerabend refers to the neo-Platonist Christian mystic, Pseudo-Dionysius:

God [according to Pseudo-Dionysius Areopagita] is ineffable. But depending on our approach God may respond in a variety of comprehensible ways. God is not identical with any one of these ways and it would be a mistake to identify Him (Her, It) with, say, Nature as conceived by modern cosmology... Moreover, describing a response and not Being itself, all knowledge about the world now becomes ambiguous and transparent. It points beyond itself to other types of knowledge and, together with them, to an unknown and forever unknowable Basic Reality. (COA, p. 195–6).

All we know about Being is that we have no grounds for identifying it with this or that manifest reality, that what we really know is how Being “acts in the domain (the ‘ontological niche’) of human life” (COA, p. 214).

4.3. *The abundant world*

“The world we inhabit is abundant beyond our wildest imagination,” Feyerabend tells us (COA, p. 3). Abundant with objects and events, relations and structures, classes and kinds, connections, powers, and potentialities. This world has elements of the precarious, unstable, hazardous, incomplete, ambiguous, mysterious; it also rich with structure, connection, clarity, and relative constancy. The order and disorder of the world are deeply connected. Our experience and activity bring us directly into contact with this abundance, though both our perceptual mechanisms and intellectual activity make us conscious of this abundance only in selected and limited ways. Nature is partially receptive to, partially resistant to our perceptual and cognitive simplifications.

There is no all-purpose way of distinguishing amongst our experience those that reflect “Reality” and those that are deceiving appearances; all of our experience is an event in Nature that discloses some aspect of Being. It is a drastic mistake, however, to equate an aspect of Being with the totality. If we are clever and lucky, our experiences, our practices, and our efforts to understand Nature will yield a coherent manifest world of relatively stable structures and reliable patterns. A manifest world contains not only the products of scientific inquiry but also those things which play a part in our valued practices and forms of life. Manifest worlds are a kind of “ontological niche” which is partially made and remade by us, just as organisms partially make and remake their ecological niches.

³⁵ This further form of the ineffability of Being suggests potential for future research on the shared ground between Feyerabend’s metaphysics and Taoism, Zen Buddhism, and forms of mysticism that emphasize the ineffability of our fundamental experience of the world, what F.S.C. Northrop called “the undifferentiated aesthetic continuum” (Northrop, 1946). See Ben-Israel (2001); Kidd (2012); Martin (2016).

As Feyerabend tells us, “This world is not a paradise” (COA, p. 4). Here he echoes Dewey, who insists that “The world is a scene of risk; it is uncertain, unstable, uncannily unstable. Its dangers are irregular, inconstant” (Dewey, 1925, p. 43). This instability is a feature both of the inevitably partial nature of the understanding and control afforded by our approaches to Nature, partially a result of the complex, overlapping, shifting, malleable nature of the structures of Being itself. In such a world, it is in our best interest to manage the abundance, complexity, uncertainty, and precariousness of Nature as best we can. Scientific inquiry is *inter alia* a tool for managing the abundance and stabilizing more coherent, successful manifest worlds.³⁶ In the course of inquiry, we make choices that transform our practices and our world.

5. Consequences for science and democracy

Feyerabend sought an alternative to the metaphysics of scientific materialism, not only because of its historical and philosophical inadequacies, but also because he saw it encouraging an elitist, authoritarian conception of science incompatible with his vision of liberal democracy. In this section, I will briefly the consequences of Feyerabend’s metaphysics of abundance for thinking about the nature of science, as well as its role in a democratic society. In these sections, I try to make explicit the connections between Feyerabend’s ideas, recent philosophy of science, and issues of the political and policy role of science.

5.1. *The nature of science*

In this section I will trace the consequences of Feyerabend’s metaphysics of the abundant world for our understanding of the nature of science, with a special focus on connections with contemporary philosophy of science.

5.1.1. *Science taps the stable to manage abundance*

Because of the precariousness and hazard inherent in Nature or Being, according to Feyerabend we do (and we must) take some measure of control over our environment. Science taps into relatively stable, consistent, and repeatable aspects of reality to give us control over lives beset by abundance, instability, and ambiguity. Humans not only discover and make use of the structure and regularity in Nature in order to predict and control, assuage doubt, and establish forms of life they prefer; they stabilize and amplify existing *and* create new structures and regularities, in an attempt to control the abundance and precariousness that assaults us.

The processes of science that help to manage this abundance are, in the most general terms, the “combined causal-semantic actions” described above. We create new concepts and theories, which enable new operations and procedures, which then make it possible for certain structures and regularities to manifest. We don’t just create new arrangements of things, though we certainly do that. We create the contextual conditions, causal and conceptual, that allows structure and regularity to “show up” for us.

Feyerabend’s analysis here bears a striking resemblance to Nancy Cartwright’s account of “nomological machines” (Cartwright, 1999). Like Feyerabend, Cartwright is opposed to the idea of reality as a uniform, determinate, universal order or structure that is the object of science, to which all phenomena can be reduced. Concerned specifically with laws of nature, Cartwright argues that they apply only to a “nomological machine.”

³⁶ Feyerabend would qualify this point by saying that science is many other things, not all of them benign, and that there are many other ways of managing abundance, more or less well, than those we would recognize as scientific.

What is a nomological machine? It is a fixed (enough) arrangement of components, or factors, with stable (enough) capacities that in the right sort of stable (enough) environment will, with repeated operation, give rise to the kind of regular behavior that we represent in our scientific laws. (Cartwright, 1999, p. 50)

We often bring nomological machines together physically, as laboratory experiments or technologies. But we can also create semantic conditions for treating systems as nomological machines that we have no hope of physically controlling, such as the solar system (Cartwright, 1999, 50–3). By cleverly setting up the context for interpreting the system, it was possible for Newton to make the regularities of the system clear and comprehensible. Nomological machines are local, and contextual, thus limiting the scope and applicability of scientific laws. Nomological machines must be actively maintained by causal-semantic actions, in Feyerabend's terms.

5.1.2. Managing abundance increases abundance

Ironically, the very process of managing abundance by crafting manifest worlds (or nomological machines) creates further abundance: “a large part of the abundance that surrounds us here on Earth arose in the attempt to conquer abundance” (COA, p. 13). Bruno Latour (1993) makes a similar point: though the scientific enterprise is supposed to forward the modernist project by creating objective knowledge and separating the real or natural from the social and political, in fact it only multiplies hybrids of the natural and social. In attempting to reduce the abundance, complexity, and hybridity which faces us, we create new things that contribute to the abundance and complexity of the world, things the likes of which Nature had never imagined: “frozen embryos, expert systems, digital machines, sensor-equipped robots, hybrid corn, data banks, psychotropic drugs, whales outfitted with radar sounding devices, gene synthesizers, audience analyzers, and so on” (Latour, 1993, pp. 49–50).

I often challenge my students to go through their daily routine and try to pick out anything they encounter that is not in some sense a product of human artifice. While in some ways the things we bring into existence simplify and ease our lives, in a general way they contribute to rather than reduce the abundance and complexity of our world. One could argue that global climate change is an extreme example of this tendency. A variety of attempts to cope with the complexity of our world create emissions and increase temperatures, which then interact with a highly complex, interlinked natural system to create a cascade of problems and dangers. This abundance created by science is why Feyerabend argues that “we cannot do without scientific know-how” (COA, p. 145). We must use science to address the problems of technoscientific civilization, as at least one tool to diagnose and resolve the problems of our manifest technoscientific worlds.

5.1.3. Contextualism and pluralism

One implication of Feyerabend's thesis of the richness of Being is that no one approach will be adequate to suit every context, purpose, or question. The abundance of the world, and our evolving need to manage it, means that there is an unavoidably multiplicity of different manifest worlds, contingent on different times, groups, and aims. Methodological pluralism is necessary for the scientific enterprise, to get at the different, overlapping, and potentially realizable structures that can serve our various explanatory and practical aims. Methodological pluralism has been a strong position in contemporary philosophy of science. Longino (1990) has explored a pluralism justified primarily by epistemic considerations

(to some extent indebted to Feyerabend's earlier epistemic arguments for pluralism), while Dupré (1993, 1996), like the late Feyerabend, has argued for pluralism on metaphysical grounds.

A form of contextualism is necessary as well, on this account. Insofar as scientific inquiries make use of different structures to pursue different purposes, we should not automatically assume that we achieve any generality or universality in our scientific inquiries. The same structures which serve to resolve one problem may be entirely useless in another.³⁷ When and insofar as science achieves degrees of generality, it is a hard one achievement that must be maintained by carefully managing the structures in question. Cartwright has pursued this line forcefully in her discussion of the pitfalls of “evidence for use” and the difficulties in establishing the relevance of scientific results to policy situations (e.g., Cartwright, 2006, 2009).

5.1.4. Anti-realism or non-standard realism

Orthodox scientific realism is incompatible with this metaphysical picture. Indeed, as we have seen, Feyerabend created his metaphysical views in attempt to provide a compelling alternative to undermine the hegemony of one form of realism. Because of the abundance of Being, any particular theory or problem-solving approach can capture only a limited set of the structures that exist. Furthermore, to the extent that it focuses exclusively on structures, relations, patterns, and regularities, science misses the ineffable, the individual, the unstable, and the ambiguous aspects of Nature.

At its best, science captures a very limited aspect of reality, a manifestation or perspective limited by the context and purposes guiding the inquiry. It need not do so by “discover[ing] and map [ping] out an already structured and mind-independent world” (Psillos, 1999, p. xvii) or part of that world; but neither does that imply that the structure is projected onto an essentially structureless empirical world. Science helps us grab on to and stabilize one set of structures that can reliably guide expectations and be manipulated to desired effects.

Feyerabend hesitated to call this view “realism,” but also rejected the term “relativism” that he had embraced before thinking through some of these metaphysical views. Today, some philosophers of science defend unorthodox “realisms” that are similar to Feyerabend's approach in certain ways. Ronald Giere's perspectival realism (2006), Dupre's promiscuous realism (1993), and Nancy Cartwright's local realism in a “dappled world” (1999) all fit with aspects of Feyerabend's metaphysical views. To what extent any of these views, including Feyerabend's, ought to be called “realism” is of course a fraught, open question.³⁸ “Realism” may in the barest sense be taken as a contrast term to idealism or strict empiricism, in which case Giere, Dupre, and Cartwright all count as realists without commitment to “scientific materialism” as defined above. If, as I have argued, Feyerabend can be interpreted as an ontological pluralist rather than a neo-Kantian, then his view also could be called a form of realism, perhaps “abundant realism.”

There is one way in which Feyerabend's realism, if it should be called that, might differ from some other unorthodox realisms. On Feyerabend's view, such a realism cannot in principle be restricted to only “scientific” inquiries, as normally understood.³⁹ Many forms of inquiry and practice successfully generate manifest worlds which

³⁷ Dewey's theory of situations is just this sort of contextualism. See footnote above and especially Brown (2012).

³⁸ Tambolo (2014) argues that Feyerabend should be understood as a sophisticated scientific realist.

³⁹ Though, on the other hand, one should not make too much of the scientific/nonscientific distinction, other than as a reminder to avoid scientism.

admit of realist commitments. As far as I am aware, only Dupre's "promiscuous realism" explicitly extends his realism in this way, though there is no reason Cartwright and Giere should not do so. Giere might resist this extension due to his own commitment to methodological naturalism (Giere, 2006, p. 11–13), but such a commitment seemingly requires a principled way to distinguish science from non-science, and on that principle show the superiority of the former. Feyerabend of course raised serious challenges to this approach.⁴⁰

5.2. Science, values, and democracy

Finally, I will address the issues that spurred this paper in the first place: the consequences of Feyerabend's views for thinking about the relationship between science, our values, and democratic society.

5.2.1. Values in science

As Feyerabend articulates as "Aristotle's principle," decision to pursue scientific activity is part of a commitment to a set of purposes, practices, and forms of life, which are all value-laden. On Feyerabend's account, many approaches to coping with Nature may be successful, not only ones that are recognizably scientific. Pursuing science is a choice we make to live a certain way, to live in a certain kind of world, to pursue prediction and control rather than rest on authority and tradition.⁴¹ Here is one way in which Feyerabend explicitly argues that science as an approach is value-laden:

Turn now to the sciences as they present themselves today. They are free of values, it is said. But that is simply not so. An experimental result or an observation becomes a scientific fact only when it is clear that it does not contain any "subjective" elements—that it can be detached from the process that led to its announcement. This means that values play an important role in the constitution of scientific facts. (TOS, pp. 94–5)

Why do values play an important role? First, because the creation of scientific facts is a selection or a valuing of certain observations or results over others, independent of or despite their relative social value. Feyerabend gives the example of what he sees when he looks at the face of a close friend: "She looks now different from the way she looked to me when I first met her... This look is not an objective fact. It does not sit on her face waiting to be discovered by an objective experimental procedure. It is part of our relationship and it involves me in an essential way" (TOS, p. 95). It is not therefore less important or less real. The scientific approach involves a commitment to results that are "objective" in the specific sense of being entirely impersonal.

Second, decisions within a scientific inquiry are decisions in part about what structures to select, project, stabilize, or create. Such decisions can support, modify, or destroy forms of life. They can have serious consequences for the welfare of individuals, social institutions, or the natural environment. These decisions are generally *open*; incompatible decisions might be successful. As open decisions, they depend in part on what we value. If we have a choice of manifest worlds, the consequences of that choice for what we value should be one governing consideration for that choice.

Hence the title of one of Feyerabend's late essays, "Ethics as a Measure of Scientific Truth."

One important qualification is necessary here. The intrusion of ethical and social values into the scientific process may seem to open the door to "subjectivism" and "irrationality."⁴² Feyerabend sometimes played up this result, (usually with those scare-quotes, see COA, p. 251), but strictly speaking, this is not required by or perhaps even compatible with the view in question. Why think that ethics and social values are subjective or irrational? Primarily, because there is no place for acknowledging them as objective, justified, or real within the framework of scientific materialism. With the rejection of scientific materialism, the ground for ruling values as systematically less real or objective than scientific facts is lost. What is, what should be, and what we choose are tangled up in the process of scientific inquiry.

The recognition of a positive role for values in science, even deep within the "internal" processes of science (i.e., those that cannot be regarded as external aspects of the so-called "context of discovery") has been building since before Feyerabend wrote his later works, especially in the work of feminist philosophers of science. Sometimes value-judgments can be left up to the scientists, when the consequences of their work are merely private. But many have argued that since science often has widespread social consequences (e.g., via technology or policy), the value-judgments that play a role in science should be connected with the interests of the public, that some form of public participation or representation is necessary in science. In other words, the scientific process must be democratized where the public is a rightful stakeholder and value-judgments must be made (Brown, 2013; Douglas, 2005).

5.2.2. Limited intellectual and cultural authority

Because the sciences play a role in creating our manifest worlds in ways that are not value-free, participation in the scientific process is sometimes called for. This is one major consequence of Feyerabend's metaphysics for science and democracy, that the social autonomy of science must be restricted. Another major consequence speaks not to the role of the public or the political within science, but the role of science in politics and policymaking. If Feyerabend is right, the intellectual authority of science must be limited.

The intellectual authority of science has been historically mixed up with its political power to enforce its view of the world. Over the last couple of centuries, science has steadily replaced the role of theology in doctrinal education. Scientists have special roles in policymaking and the courts. If Feyerabend is right, the intellectual authority of science must be decoupled from political doctrinal power and limited. Feyerabend's historical argument is that other traditions not recognizably scientific are successful in manifesting structures useful to their purposes, and further that science itself is not a unified approach. Metaphysically, this is grounded in the abundance of Nature. Methodological pluralism, scientific disunity, and metaphysical abundance and disorder show that there is no sense to the absolute authority of science qua science. That one adopts certain values merely by pursuing science shows that, so far as those values are controversial, science is a special interest group and thus limited in authority over those who do not share those values. The social value and authority of science would thus be established on a case-by-case basis.

⁴⁰ See "How to Defend Society Against Science" (Feyerabend, 1975) and "Has the Scientific View of the World a Special Status Compared with Other Views?" (COA, 147ff.).

⁴¹ This is not to say that all science pursues or is committed to the same set of values. Here as elsewhere, the disunity of science obtains.

⁴² Though many philosophers of science would now deny this, including those I mention below.

6. Conclusion

Scientific realism, and particularly scientific materialism, have long been the default positions in philosophy of science, especially when it comes to the metaphysics of science. While philosophers in this area admit that there are difficult philosophical problems, they lie largely in finding the proper interpretation of fundamental physics and ontological reduction. The dominance of scientific materialism may be due in large part to the lack of compelling alternative points of view. Often, anti-realisms are defined largely by their opposition to realism and their reticence to make any further metaphysical claims. Giere, Cartwright, and Dupre among contemporary philosophers of science have done the most to build alternative accounts to scientific materialism; Nietzsche, Dewey, Wittgenstein, and Heidegger are becoming recognized as historical figures with interesting alternative approaches. Much has been made of Kuhn's neo-Kantian alternative to scientific realism.

I hope to have shown that Feyerabend offers a subtle, imaginative, and challenging alternative to standard forms of realism which scientific materialists, taxonomic monists, and other realists must frankly, fairly, and carefully confront. Feyerabend's metaphysics of science emphasizes the sheer abundance of the world and its structure, the partial and contextual nature of our ways of understanding and exploring the world, the transformative power of our cognitive activities, the pliability and the resistance of Nature, and the ineffability of Being itself and our primary encounters with it. I have argued that Feyerabend's distinction between Being and manifest reality is best understood as a form of ontological pluralism rather than neo-Kantian idealism. And I have all too briefly drawn some further conclusions for philosophy of science and the role of science in democratic society.

References

- Balz, A. G., & Dewey, J. (1949). A letter to Mr. Dewey concerning John Dewey's Doctrine of possibility, published together with his reply. *The Journal of Philosophy*, 313–342.
- Ben-Israel, I. (2001). Philosophy and methodology of military intelligence: Correspondence with Paul Feyerabend. *Philosophia*, 28, 71–100.
- Bohr, N. (1987–1998). *The philosophical writings of Niels Bohr Vol. I–IV. (I: Atomic theory and the description of nature (1934), II: Essays 1932–1957 on atomic physics and human knowledge, III: Essays 1958–1962 on atomic physics and human knowledge, IV: Causality and complementarity.)*. Woodbridge: Ox Bow Press.
- Brown, J. R. (2008a). Politics, method, and medical research. *Philosophy of Science*, 75, 756–766.
- Brown, J. R. (2008b). The community of Science®. In M. Carrier, D. Howard, & J. A. Kourany (Eds.), *The Challenge of the social and the pressure of Practice: Science and values revisited*. Pittsburgh, PA: University of Pittsburgh Press.
- Brown, M. J. (2010). Genuine problems and the significance of science. *Contemporary Pragmatism*, 7, 131–153.
- Brown, M. J. (2012). John Dewey's logic of science. *HOPOS: The Journal of the International Society for the History of Philosophy of Science*, 2.
- Brown, M. J. (2013). The democratic control of the scientific control of democracy. In V. Karakostas, & D. Dieks (Eds.), *EPSA11 perspectives and foundational problems in philosophy of science* (pp. 479–492). Dordrecht: Springer.
- Brown, M. J. (2014). Quantum frames. *Studies in History and Philosophy of Science Part B: Studies in History and Philosophy of Modern Physics*, 45, 1–10.
- Browning, D. (2002). Designation, characterization, and theory in Dewey's logic. In F. T. Burke, D. M. Hester, & R. B. Talisse (Eds.), *Dewey's logical theory: New studies and interpretations* (pp. 160–179). Vanderbilt University Press.
- Burke, T. (1994). *Dewey's new logic*. University of Chicago Press.
- Burke, T. (2000). What is a situation? *History and Philosophy of Logic*, 21, 95–113.
- Burke, T. (2009a). Browning on inquiry into inquiry, part 1. *Transactions of the Charles S. Peirce Society: A Quarterly Journal in American Philosophy*, 45, 27–44.
- Burke, T. (2009b). Browning on inquiry into inquiry, part 2. *Transactions of the Charles S. Peirce Society: A Quarterly Journal in American Philosophy*, 45, 157–176.
- Cartwright, N. (1999). *The dappled world: A study of the boundaries of science*. Cambridge University Press.
- Cartwright, N. (2006). Well-ordered science: Evidence for use. *Philosophy of Science*, 73, 981–990.
- Cartwright, N. (2009). Evidence-based policy: What's to be done about relevance. *Philosophical Studies*, 143, 127–136.
- Chakravartty, A. (2011a). Scientific realism. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of philosophy* (Summer 2011 ed.) URL = <<http://plato.stanford.edu/archives/sum2011/entries/scientific-realism/>>.
- Chakravartty, A. (2011b). Scientific realism and ontological relativity. *Monist*, 94, 157.
- Chang, H. (2009). Ontological principles and the intelligibility of epistemic activities. In H. de Regt, S. Leonelli, & K. Eigner (Eds.), *Scientific Understanding: Philosophical perspectives* (pp. 64–82). Pittsburgh: University of Pittsburgh Press.
- Churchland, P. M. (1981). Eliminative materialism and the propositional attitudes. *The Journal of Philosophy*, 78, 67–90.
- Dewey, J. (1925). *Experience and Nature* volume 1 of *The Later Works of John Dewey*. Southern Illinois UP, 1988.
- Dewey, J. (1929). *The Quest for Certainty: A Study of the Relation of Knowledge and Action* volume 4 of *The Later Works of John Dewey*. Carbondale: Southern Illinois University Press, 1984/2008.
- Dewey, J. (1930). Qualitative thought. *Symposium*, 1, 5–32.
- Dewey, J. (1938). *Logic: The Theory of Inquiry* volume 12 of *The Later Works of John Dewey*. Southern Illinois UP, 1991.
- Dewey, J. (1941). Propositions, warranted assertibility, and truth. *The Journal of Philosophy*, 38, 169–186.
- Douglas, H. (2005). Inserting the public into science. In S. Maasen, & P. Weingart (Eds.), *Democratization of expertise? Exploring novel forms of scientific advice in political decision-making* (pp. 153–169). Dordrecht: Springer. volume 24 of *Sociology of the Sciences Yearbook*.
- Douglas, H. (2009). *Science, policy, and the value-free ideal*. Pittsburgh: University of Pittsburgh Press.
- Dreyfus, H. L. (1991). *Being-in-the-world: A commentary on Heidegger's being and time*, division I. Cambridge, Mass: MIT Press.
- Dupré, J. (1993). *The disorder of things: Metaphysical foundations of the disunity of science*. Cambridge, Mass: Harvard University Press.
- Dupré, J. (1996). Metaphysical disorder and scientific disunity. In P. Galison, & D. Stump (Eds.), *The disunity of science* (pp. 101–117). Stanford: Stanford University Press.
- Feyerabend, P. K. (1958). Complementarity. *Proceedings of the Aristotelian Society, Supplementary Volumes*, 32, 75–104.
- Feyerabend, P. K. (1960). Professor Bohm's philosophy of nature.
- Feyerabend, P. K. (1963). Materialism and the mind-body problem. *The Review of Metaphysics*, 49–66.
- Feyerabend, P. K. (1968). On a recent critique of complementarity: Part I. *Philosophy of Science*, 309–331.
- Feyerabend, P. K. (1969). On a recent critique of complementarity: Part II. *Philosophy of Science*, 36, 82–105.
- Feyerabend, P. K. (1975). How to defend society against science. *Radical Philosophy*, 11.
- Feyerabend, P. K. (1978). *Science in a free society*. New left books.
- Feyerabend, P. K. (1981a). Niels Bohr's world view. In *Realism, rationalism and scientific method* (pp. 247–297). Cambridge: Cambridge University Press. volume 1 of *Philosophical papers*.
- Feyerabend, P. K. (1981b). *Problems of empiricism*. volume 2 of *Philosophical Papers*. Cambridge: Cambridge University Press.
- Feyerabend, P. K. (1981c). *Realism, rationalism and scientific method*. volume 1 of *Philosophical Papers*. Cambridge: Cambridge University Press.
- Feyerabend, P. (1991). Gods and atoms: Comments on the problem of reality. In D. Cicchetti, & W. M. Grove (Eds.), *Thinking clearly about psychology volume 1: Matters of public interest* (pp. 91–99). Minneapolis: University of Minnesota Press.
- Feyerabend, P. K. (2001). *Conquest of abundance: A tale of abstraction versus the richness of being*. University Of Chicago Press.
- Feyerabend, P. K. (2011). *Tyranny of science*. Cambridge, UK: Polity Press.
- Giere, R. N. (2006). *Scientific perspectivism*. Chicago: University of Chicago Press.
- Godfrey-Smith, P. (1996). *Complexity and the function of mind in nature*. Cambridge: Cambridge University Press.
- Godfrey-Smith, P. (2002). Dewey on naturalism, realism and science. *Philosophy of Science*, 69, S25–S35.
- Heit, H. (2016). Reasons for relativism: Feyerabend on the 'Rise of Rationalism' in ancient Greece. *Studies in History and Philosophy of Science*, 57, 70–78.
- Kidd, I. J. (2012). Feyerabend, pseudo-dionysius, and the ineffability of reality. *Philosophia*, 40, 365–377.
- Kidd, I. J. (2013a). Feyerabend on the ineffability of ultimate reality. In J. Diller, & A. Kasher (Eds.), *Models of god and alternative ultimate realities* (pp. 849–859). Netherlands: Springer.
- Kidd, I. J. (2013b). A pluralist challenge to "integrative medicine": Feyerabend and Popper on the cognitive value of alternative medicine. *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*, 44, 392–400.
- Kidd, I. J. (2016). Feyerabend on politics, education, and scientific culture. *Studies in History and Philosophy of Science*, 57, 121–128.
- Ladyman, J. (2002). *Understanding philosophy of science*. Routledge.
- Latour, B. (1993). *We have never been modern*. Cambridge, Mass: Harvard University Press.
- Lipton, P. (2003). Kant on wheels. *Social Epistemology*, 17, 215–219.
- Longino, H. E. (1990). *Science as social knowledge: Values and objectivity in scientific inquiry*. Princeton, NJ: Princeton University Press.
- Longino, H. E. (2004). How values can be good for science. *Science, Values and Objectivity*, 127–142.

- Magnus, P. D., & Callender, C. (2004). Realist ennui and the base rate fallacy. *Philosophy of Science*, 71, 320–338.
- Martin, K. (2016). Relativism in Feyerabend's later writings. *Studies in History and Philosophy of Science*, 57, 106–113.
- Moss, M. (2013). *Salt, sugar, fat: How the food giants hooked us*. New York: Random House.
- Nietzsche, F. W. ([1889] 1976). Twilight of the idols, or, how to philosophize with a hammer. In W. Kaufmann (Ed.), *The portable Nietzsche*. New York: Penguin Books.
- Northrop, F. S. C. (1946). *The meeting of East and West: An inquiry concerning world understanding*. New York: Macmillan.
- Oberheim, E. (2006). *Feyerabend's philosophy*. Berlin: Walter de Gruyter.
- Oberheim, E. (2016). Rediscovering Einstein's legacy: How Einstein anticipates Kuhn and Feyerabend on the nature of science. *Studies in History and Philosophy of Science*, 57, 17–26.
- Preston, J. M. (1998). Science as supermarket: "Post-modern" themes in Paul Feyerabend's later philosophy of science. *Studies in History and Philosophy of Science*, 29, 425–447.
- Preston, J. (2016). The rise of western rationalism: Paul Feyerabend's story. *Studies in History and Philosophy of Science*, 57, 79–86.
- Psillos, S. (1999). *Scientific realism: How science tracks truth*. London: Routledge.
- Psillos, S. (2008). Cartwright's realist toil: From entities to capacities. In L. Bovens, C. Hofer, & S. Hartmann (Eds.), *Nancy Cartwright's philosophy of science Routledge studies in the philosophy of science chapter 8* (pp. 167–194). Routledge.
- Rorty, R. (1965). Mind-body identity, privacy, and categories. *The Review of Metaphysics*, 24–54.
- Rorty, R. (1979). *Philosophy and the mirror of nature*. Princeton University Press.
- Russell, B. (1939). Dewey's new Logic. In P. Schilpp (Ed.), *The philosophy of John Dewey* (pp. 137–156). Evanston, Ill., and Chicago: Northwestern University Press. volume 1 of *The Library of Living Philosophers*.
- Tambolo, L. (2014). Pliability and resistance: Feyerabendian insights into sophisticated realism. *European Journal for Philosophy of Science*, 4, 197–213.
- Thayer, H. (1952). *The logic of Pragmatism: An examination of John Dewey's logic*. New York: The Humanities Press.