CHAPTER 3

Scientism and the Limits of Objective Thinking

Gurpreet Rattan

On one side, *humanism* opposes religion, or, more specifically, the idea that religion is the ultimate and universal source of cognitive and practical significance. This opposition to religion makes an alliance between humanism and *science* quite natural.[1] So does the use of a suite of tools, concepts, and ideals in science that are very much congenial for the humanist: observation, reason, evidence, argument, experimentation, progress, objectivity, universality. Indeed, this convergence between humanistic values and science might encourage not only their alliance but even an identification of sorts, at least for cognitive significance: Science is the ultimate source of cognitive significance, or as I term it later, *objective thinking*. Call this view of the role of science, *scientism*, and the interpretation of humanism, *humanism as scientism.*

On the other side, though, humanism is concerned with the subjects (and outlook) of the *humanities*: with language, and languages; literature, poetry, theater, music, dance, and art; ideas, ideologies, history, and society. And these subjects, taken at face value, are very much unlike those of science. The suite of tools, concepts, and ideals at use in the humanities are diverse and varied, including different forms of analysis and critique, creativity and new forms of expression, the articulation of new frameworks for thinking and acting, and much more. But at least one thick strand in the methods of the humanities has the humanities focused on *interpretation* and *criticism* – of words and texts, of ideas, practices and movements, of societies and their history.

This tension in humanism is the background to this chapter, the topic of which is a critique of scientism. One result of my critique is that the idea of humanism as scientism is a bad one. A more positive result is to make room for an understanding of humanism as fundamentally involving

[1] Cf. Ladyman (2018: 109): "Scientism can be seen as a struggle for science's self-determination in seeking to liberate territory from the forces of superstition and the supernatural."

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

interpretation and criticism, while at the same time locating this dimension of humanism in science itself.[2]

* * * * *

Scientism is philosophically interesting not only because it is an "ism,"[3] and so purporting to be a general framework for thinking in some domain, but also because of the particular domain for which it purports to be a general framework, namely for the domain of objective thinking itself. On this view, science *determines* the limits of objective thinking by *constituting* what it is to think objectively at all. Thinking is *validated* as objective by the fact, if it is one, that the thinking is scientific. Otherwise, the thinking is *invalidated*, at least with respect to its status as objective.[4] In a slogan, objective thinking starts and ends, constitutively, with scientific thinking.

"Objectivity" is understood in many ways. My own use emphasizes connections to impartiality, rationality, universality, and knowledge, to draw from Janack's (2002) analysis. I say more about *objective thinking* later but, roughly, objective thinking is thinking that uses concepts and methods appropriate for acquiring knowledge. This understanding of objective thinking is not meant to rule out, for example, knowledge that there is beer in the fridge, on the grounds that such mundane thinking is not scientific thinking; nor, however, it is much concerned to vindicate such thinking. The interesting contrast is not between scientific and mundane thinking (see de Ridder 2018 on "high-grade" and "low-grade" knowledge in connection with scientism), but rather, between the objective thinking and knowledge in science and the thinking that goes on in other areas of our intellectual lives: in thinking about how to live and live together in ethics and politics, about beauty and what is beautiful in aesthetics, about the ultimate nature of reality in metaphysics.

This chapter argues that although there is a connection between science and the limits of object thinking, the connection is *not* that science determines those limits. There *are* limits to objective thinking, but as I suggest near the close of this chapter, the account of these limits is

[2] For some discussion of the rivalry between scientism and humanism, see Stenmark 2018.

[3] I compare my own way of understanding "scientism" to some other ways later in the chapter. For a sense of the diversity here, see one or more of the recent edited anthologies on scientism: by Maarten Boudry and Massimo Pigliucci (2017), Jeroen de Ridder, Rik Peels, and René van Woudenberg (2018), and Moti Mizrahi (2022).

[4] My use of "validate" (and related) derives not from the validity of arguments in logic, but from Kant's "objective validity" (1929/1781/1787: A239–242/B298–300).

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

considerably different from the kind of account scientism gives, according to which the limits of objective thinking are determined by conformity to some particular kind of thinking, namely, scientific thinking. I argue instead that the connection between science and the limits of objective thinking is that some scientific thinking makes use of thinking *at* the limits of objective thinking, and this makes it the case that science *participates in* thinking at the limits of objective thinking. But it does so without *setting* those limits. The key to my argument is to identify a mismatch between, on the one hand, the conception of science that underpins scientism and, on the other hand, a conception of science that is informed by an analysis of the full extent of thinking at work in scientific thinking.

Using Thomas Kuhn's classic terminology, I argue that the conception of science that underpins scientism is a conception of science as *normal science*. Riffing on Kuhn (I discuss Kuhn in detail later), normal science is the kind of science we all know and love, with exemplary achievements and a community of practitioners employing widely accepted methods and engaged in mutually comprehensible practices resulting in a steady stream of results and progress. I argue that an analysis of the kind of thinking, both individually and collectively, that goes on in normal science shows normal science to be a plausible basis for putting forth science as an "ism" – scientism.[5] Roughly, we are impressed by science when it functions like this and tie progress in science to it possessing a distinctive claim on the truth (cf. Putnam 1975).

But science in times of crisis or revolution becomes *extraordinary science*. Extraordinary science is science interpreting and critically reflecting on its own methods and practices. In Kuhn's presentation, this is typically in response to the accumulation of anomalous results, confusion about the ameliorative possibilities for dealing with these anomalous results in the existing disciplinary matrix or paradigm, and defection by practitioners to competing paradigms. I argue that an analysis of the kind of thinking, both individually and collectively, that goes on in extraordinary science shows extraordinary science *not* to be the plausible basis for a plausible "ism."

Notably, though, crises abate and are sometimes overcome through conceptual and methodological innovations produced by the interpretative and critical reflective perspective extraordinary science takes on the disciplinary matrix or paradigm. The advances extraordinary science makes through its use of the interpretive and critical reflective perspective show

[5] I talk about something (mainly science) being "the basis of an 'ism'" in this chapter, but throughout this means that something does (or does not, as the case may be) form the basis for a *plausible* "ism."

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

that perspective to be of cognitive value. This means that any account of science that leaves out the kind of thinking that goes on in extraordinary science does so on pain of invalidating the intellectual achievements of extraordinary science.

So here is where we are: If science is the basis of an "ism," then the thinking in extraordinary science is invalidated, and if the thinking in extraordinary science is validated, then science is not the basis of an "ism." Since the thinking in extraordinary science is valid, any account of the limits of objective thinking should validate it, making it the case that science is not the basis of an "ism." This is my main critical argument against scientism.

Extraordinary science does, though, I argue, *participate in* thinking at the limits of objective thinking. The thinking in extraordinary science *encounters* the limits of objective thinking. So what determines the limits of objective thinking? I close by explaining how the argument of the chapter can be generalized to show that limits of objective thinking cannot be determined by a requirement that a thinker accept or adhere to any positively specified methods. I outline briefly what another approach to the limits of objective thinking might look like.

What Is Scientism?

My understanding of scientism analyzes things in a different way from most current literature on scientism. My idea is that scientism is a view about the determination of the limits of objective thinking, with science and its concepts and methods constituting what it is to think objectively at all. My understanding of scientism has its ancestry in logical empiricism, which used empiricism as a critical tool to distinguish cognitive significance from different kinds of meaning or content, including practical and expressive significance (see later in the chapter).

My general idea about scientism comes apart from some recent ideas, but I believe in a way that increases its interest and plausibility. At the same time, though, I believe that my idea is roughly consonant with mainstream ideas already in the literature, even if it emphasizes different connections. De Ridder et al. (2018), for example, open their volume on scientism with the rough formulation of scientism as "the view that only science can provide us with knowledge or rational belief" and, after recounting some common conceptions of scientism, write that "[s]cientism can thus stand for a number of exclusivity claims about science." My idea comports with their rough formulation, and falls under their general description about

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

exclusivity, assigning science an exclusive claim to the domain of objective thinking.

My understanding of scientism derives from the role of science in discussions about the limits of cognitive significance and intelligibility in the first half of the twentieth century, in the philosophy of logical empiricism. Logical empiricism was elaborated in different ways by different practitioners; I follow a strand that is particularly influential, due to Rudolf Carnap. Logical empiricism was a critical philosophy, and it found much philosophy, notably ethics and metaphysics, to be outside the realm of cognitive intelligibility.[6] These domains were contrasted with science, but the contrast was not that science is empirical and the others not.

What distinguishes the cognitively significant discourse of science from ethics and metaphysics is not so much the use of an *empirical* method but the use of an *intersubjectively authoritative method*, whatever its character, whether a priori or empirical.[7] An intersubjectively authoritative method is a method that has widespread implicit and even explicit endorsement in that community, and which governs the cognitive use of language (for expressing knowledge). Methods of empirically testing and verifying hypotheses, for example using redshift and luminosity information about galaxies to determine their relative velocity and distance, are intersubjectively authoritative methods, but so are, for example, the numerical methods used to solve the Navier–Stokes equations for incompressible flows in fluid dynamics.

The existence of intersubjectively authoritative methods figure in the account of why the statements of science have an intersubjectively constant meaning (in terms of a "criterion of cognitive significance") and of what those meanings are ("meaning is method of verification").[8] Experience and empirical method play a role here, but experience and empirical method are secondary to the general idea of intersubjective authority, whether that authority concerns empirical or a priori methods. Intersubjectively authoritative methods can also explain the meaningfulness of statements of mathematics, since there are a priori methods that can be set out that

[6] For some classic texts, see Carnap 1932, Ayer 1936. Semantics and aspects of epistemology too are outside the realm of cognitive intelligibility, in so far as questions of semantic analysis and epistemic method are *external* questions (see Carnap 1950a) and so a matter of practical decision, not cognitive attitude. Once we practically decide on some language and epistemic method, internal questions can follow.

[7] For discussion of "intersubjective accountability" in logical empiricism, see Uebel 2020.

[8] See Hempel 1951; Schlick 1936.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

explain the meanings of mathematical languages.[9] This is reflected in logical empiricism in the fact that the criterion of cognitive significance includes criteria for mathematical claims. It is true that on their view, the criteria are wholly analytic or definitional, making no tie between the cognitive use of language and experience and empirical methods; and it is also true that logical empiricists often accepted the pragmatic or conventional nature of the analytic.[10] But the latter idea is an additional, non-compulsory step to take in a view about the analytic; moreover, what matters here is not that these criteria are not empirical and instead analytic but that there are indeed such criteria, whether empirical or analytic, underpinning mathematical meaning and content. What matters is the presence of intersubjectively authoritative method.

The distinction between science, on one hand, and ethics and metaphysics, on the other, does not imply that the latter have *no* content; the conclusion rather is that they fail to have cognitive or, as I call it, objective content. Objective contents are adequate to be the contents of belief and knowledge, and appropriate for use in acquiring knowledge of the world. Sentences (or many sentences) using language such as "witches," "curses," "horoscopes," and "phlogiston" are inappropriate for acquiring knowledge. The logical empiricist idea is that ethical ("One ought not to lie") and metaphysical ("Ordinary objects are physical objects and not ideas") sentences are also inappropriate for acquiring knowledge. In all such cases, no objective contents are expressed. These sentences may have a kind of content, but, the logical empiricists maintained, because these discourses lack any significant intersubjectively authoritative method, they cannot have the kind of content appropriate to inquiry, belief, and knowledge – they cannot have objective content.[11]

I hope I have said enough to indicate the intellectual background to the idea of scientism that I am working with. However, the conception of scientism according to which science constitutes and thereby sets the limits of objective thinking does conflict with some ideas in the recent literature.

[9] Carnap (1950a) explicitly includes languages of number and of formal semantical notions as meaningful languages, despite their apparent commitment to abstract objects, because these languages are governed by intersubjectively authoritative methods for their application.

[10] Again, see Carnap (1950a), who deflates the nature of the commitment involved to abstract objects by making acceptance of the language a practical rather than theoretical matter.

[11] "The thesis that the sentences of metaphysics are meaningless, is thus to be understood in the sense that they have no cognitive meaning, no assertive content. The obvious psychological fact that they have expressive meaning is thereby not denied" (Carnap 1932: 81).

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

One conflict is with philosophers who take mathematics to be a problem for scientism. For example, Alex Rosenberg (2018: 84) writes: "Scientism as a philosophy faces two great challenges: First, how to accommodate mathematics. If numbers are abstract objects with which we can have no causal relations, it is difficult to see how we acquired any mathematical knowledge."[12] The view seems to put, what should be from scientism's point of view, the metaphysical and epistemological cart (qualms about abstract objects, commitment to a causal theory of knowledge) before the methodological horse (in the form of the highly mathematized practice of science).[13] The conception of scientism that I have described which prioritizes intersubjectively authoritative method includes mathematics because, though not empirical, it is subject to intersubjectively authoritative method.

Other philosophers take an *expansionist* ambition to be central to scientism, according to which the concepts and methods of traditionally nonscientific areas of discourse or inquiry are replaced by scientific terms and apply scientific methods. Note, for example, the expansionism in Rik Peels' definition of scientism (which itself aims to unify three other definitions from Peacocke 1993, Radnitzky 1978/Churchland 2011, and Stenmark 2001 – hence "Scientism$_4$"): "Scientism$_4$: The view that the boundaries of the natural sciences should be expanded to include academic disciplines or realms of life that are widely considered *not* to be the domain of science" (Peels 2018: 47). The conception of scientism according to which science sets the limits of objective thinking is consistent with this idea, and even coheres with it in some sense, but it doesn't entail it. It is consistent and coheres with the idea because we might think that the explanation for why expansionism is in order is that such expansionism will extend the domain of objective thinking and knowledge, and that this is a good thing. It doesn't entail this kind of expansionism because certain domains of discourse may possess some other value for our lives different from cognitive value (e.g., for a van Fraassen-style [2002: 171] "spiritual journey of discovery"), and so may appropriately possess a different kind of content from objective content (e.g., Carnap's *expressive meaning*).

[12] The second challenge concerns eliminativism about the mental (see Paul Churchland 1981).

[13] Assuming numbers are abstract objects. But numbers could be properties to which we have empirical access (see Yi 1999); or bare determiner semantic values more friendly to a rationalist epistemology of arithmetic, and to which numbers as objects are related via cognitive type-shifting coercion (see Hofweber 2005; 2016: chapter 6; for related work see also Sher 2013).

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

Why Scient*ism*?

Why might science be the basis of an "ism"? Why scient*ism*?

First let's say some things about "isms" and the way that scientism is an "ism." As I am thinking about it here, "isms" are not propositions but instead constitute conceptual and methodological frameworks or stances for thinking about some domain (cf. Carnap 1950a; van Fraassen 2002). What is special about scientism is that it is an "ism" not for this or that area of thought but for the domain of objective thinking itself. This way of being special is not the same as being the most general kind of "ism," governing everything, like *materialism*, *idealism*, and *solipsism*. However, if all of reality is thinkable, as an "ism" scientism may nevertheless, as it were, reach *through to* all of reality via the idea that objective thought represents reality. Scientism is more general than "isms" such as *anarchism* and *capitalism*, which govern approaches to particular domains (government and economic organization), and is at the same level of generality with an "ism" such as *skepticism* in concerning the qualities and quality of representation and cognition.

So, scientism understands science as the framework for objective thinking and this connection itself is explained through an account of objective content that ties objective content to intersubjectively authoritative methods. Once we see this, we can trace at least in outline the attraction of scientism to the presence of intersubjectively authoritative methods in science. The general idea, which I elaborate later, is that science is the basis for an "ism" because the use of intersubjectively authoritative methods gives science desirable epistemological and sociological features. We are so impressed with science that we think that its status should not be that of just another discipline but that of a framework, and not just any framework but for objective thinking itself.

I try to get a handle on just what the intersubjectively authoritative methods in science consist of epistemologically, and how they contribute to an attractive sociology, by critically reviewing Thomas Kuhn's discussion of *normal science*, as well as the distinction between it and *revolutionary* or *extraordinary science*, in his classic, *The Structure of Scientific Revolutions*.

Before beginning, though, I would like to say a little bit about my use of Kuhn. It is a surprising feature of recent work on scientism that it contains almost no discussion of Kuhn.[14] This is a surprising hole in the literature

[14] The three edited anthologies mentioned in note 3 contain a mere half dozen or so references to Kuhn. From the other direction, one book (Wray 2021a) and two collections of papers (Wray 2021b; Melogno et al. 2023) contain exactly zero references to scientism.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

given Kuhn's influence on the philosophy of science, but also because one might think that scientism should welcome a broadly scientific – the biological, psychological, sociological, historic, and economic factors that influence the institution of science and as a result condition scientific practice – view of science itself. I review Kuhn rather extensively. The argument of this chapter in effect charges scientism, despite being post-Kuhnian, with being, philosophically, pre-Kuhnian. The hole in the literature is filled with a spade with a critical edge.

At the same time, the main argument of the chapter, though colorfully filled out by Kuhn, relies only on some basic Kuhnian ideas about different phases of scientific practice and an idea about the kinds of thinking they involve. Kuhn, at least initially, connects these with phases of normal and extraordinary science. Philosophers have argued that the structure of science may not conform exactly to Kuhn's structure for scientific revolutions, and that normal science makes its own form of revolutionary advance (see Toulmin 1970). Kuhn later acknowledges this, emphasizing that the key to his view "is a certain sort of reconstruction of group commitments," and not necessarily revolution (Kuhn 2012: §1). This is consistent with the argument of this chapter, and its key idea that there is a substantial distinction between working within a set of basic commitments and working in a way that evaluates and challenges those basic commitments, and that these differences make a sociological difference, even if that difference is not to start a revolution.

Again, many philosophers reject Kuhn's ideas about "incommensurability" and the attending specter of relativism, but one does not need to accept those ideas to accept the idea that comes into play later, namely that communication becomes more difficult in periods of transition, and that this makes it appropriate to think that different languages are in play. However, these languages may permit intertranslation, albeit with difficulty, *pace* incommensurability. In any event, a commitment to incommensurability or relativism plays no role in my argument (and indeed is antithetical to my use of Kuhn).

With those initial clarifications and disclaimers in mind, let's return to Kuhn. Following Kuhn, I highlight two epistemological elements of intersubjectively authoritative method. The first is the presence and role of exemplars of scientific achievement. The second, which for Kuhn is epistemologically posterior to exemplars but crucial for understanding their significance, is a commitment to systems of rules – at conceptual, theoretical, experimental, and instrumentational levels – for conducting exemplar-grounded scientific inquiry.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

The attractive sociological elements include a conception of science involving a community of inquirers, whose members are capable of mutual understanding, and further, consensus and agreement, and whose work cumulatively builds and progresses. These ideas about the sociology of science are commonplace in everyday parlance – "the scientific community," "scientists have discovered," "according to scientists."

I now work out these epistemological and sociological ideas in more detail, with explicit reference to Kuhn's discussion.

"Normal science," Kuhn writes, "means research firmly based upon one or more past scientific achievements, achievements that some particular scientific community acknowledges for a time as supplying the foundation for its further practice" (II: "The Route to Normal Science").[15] The past scientific achievements, or some distinguished subset of them, constitute the *exemplars* for the scientific community – "a set of recurrent and quasi-standard illustrations of various theories in their conceptual, observational, and instrumental applications" (II: "The Route to Normal Science"). Exemplars are the gateway to new scientific forms of life with novel, unanticipated results pregnant with new problems to solve. Kuhn gives the transition from Ptolemaic to Copernican astronomy and the transition from classical to relativistic and quantum physics (see also Kuhn 1978) as exemplar-driven transitions to new *disciplinary matrices* (Kuhn 2012) or *paradigms* for the practice of science.

Exemplar achievements "are sufficiently unprecedented to attract an enduring group of adherents away from competing modes of scientific activity," but also "sufficiently open-ended to leave all sorts of problems for the redefined group of practitioners to resolve" (II: "The Route to Normal Science"). Here we see epistemological and sociological elements of exemplars and exemplar-driven science.

Epistemologically, the role of exemplars is to generate scientific problems as *puzzles*. According to Kuhn, science as normal science should be construed as a kind of "puzzle-solving." Puzzles are "that special category of problems that can serve to test ingenuity or skill in solution" (IV: "Normal Science as Puzzle-Solving"). Although arriving at a solution may require skill and ingenuity, less up for grabs is whether there are solutions. Kuhn argues that "one of the things a scientific community acquires with a paradigm is a criterion for choosing problems that, while the paradigm is taken for granted, can be assumed to have solutions" (IV:

[15] I give references to *Structure* in this way, to highlight the setting in the book for the quotations from Kuhn I give.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

"Normal Science as Puzzle-Solving"). Puzzles are thus distinguished from some other problems in promising well-defined solutions.

Further, "to classify as a puzzle, a problem must be characterized by more than an assured solution. There must also be rules that limit both the nature of acceptable solutions and the steps by which they are to be obtained" (IV, "Normal Science as Puzzle-Solving"). According to Kuhn, rules are "abstracted" (V: "The Priority of Paradigms") from the exemplars.[16] Achievement for the scientific community is modeled on the exemplars and involves following conceptual, theoretical, experimental, and instrumentational rules implicit in those exemplars. These rules, together with the exemplars, constitute the new forms of scientific life – the disciplinary matrix (Kuhn 2012) or paradigm. For a current example, in research in artificial intelligence, deep learning, large language models, and big data constitute primary elements of the disciplinary matrix, building on exemplar results about restricted Boltzmann machines, back-propagation, and deep belief networks (Hinton, Osindero, and Teh 2006).

The net result is that normal science is an exemplar-driven activity in which problems that are relatively assured of solutions are chosen for investigations that require high levels of skill and ingenuity while at the same time using shared rules that are implicit in the exemplars of the normal science. The exemplars and shared rules set up a disciplinary matrix within which the activity of normal science proceeds.[17] This summarizes Kuhn's influential account of what intersubjectively authoritative method in science looks like in at least some detail.

I want now to indicate how these epistemological features of normal science intertwine with an attractive sociology.

Sociologically, disciplinary matrices or paradigms are instantiated materially in textbooks and lab and instrumentational manuals that recount exemplars and contain courses of study, problems, and instructions that form the basis for inculcation into the scientific community. As Kuhn puts it, "by studying [the exemplars] and by practicing with them, the members of the corresponding community learn their trade"

[16] As Ian Hacking in effect observes in his Introduction to the 50th anniversary edition of *The Structure of Scientific Revolutions*, the role of exemplars introduces a kind of rule-following problem (Wittgenstein 1953). Kuhn also connects his discussion to Wittgenstein, but to his idea of a conceptual practice being held together by family resemblances instead of sets of necessary and sufficient conditions (V: "The Priority of Paradigms").

[17] Rules can play this role consistently with acknowledging Kuhn's rejection of the commonplace view that science is a continuous and cumulative project that moves closer and closer to the truth by application of "the scientific method" (cf. Bird 2018: §2). In this way Kuhn finds a place for the commonplace view in his system, while at the same time fundamentally challenging it.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

("Introduction"), and later, "[t]he study of [exemplars] . . . is what mainly prepares the student for membership in the particular scientific community with which he will later practice" (II: "The Route to Normal Science").

Exemplars and their role in gaining membership into the scientific community also help explain the mutual understanding and, further, the high levels of agreement and consensus in science. As Kuhn puts it, scientists "who learned the bases of their field from the same concrete models . . . seldom evoke overt disagreement over fundamentals . . . [and] are committed to the same rules and standards for scientific practice" (II: "The Route to Normal Science"). Mutual understanding, in the form of agreement over fundamentals, as well as a more general agreement and consensus, are the result of the exemplar-based inculcation into the community and propel the research tradition forward.

Finally, commitment to the exemplars and rules that make up the disciplinary matrices or paradigms of normal science explain the progress that is seen in normal science. Kuhn suggests that it is almost definitional of normal science that it progresses – "we tend to see as science any field in which progress is marked." Why though? Why should the properties of normal science give rise to progress? The answer, Kuhn tells us, "depend[s] in part upon an inversion . . . Does a field make progress because it is a science, or is it a science because it makes progress?" (XIII: "Progress through Revolutions"). The inversion is that scientific activity, including progress in science, is a result of the kind of community that forms around exemplars in normal science, and the role of those exemplars in providing a model for future achievement and success according to rules shared by the community. The community sets itself up for success not in the abstract, by having the correct methodology for success, but concretely, by having exemplars that it can follow to solve problems that the disciplinary matrix or paradigm has licensed as problems to solve, in part by limiting the problems to solve to those that can be solved by the rules implicit in paradigms. The epistemology and sociology of normal science underwrite this progress.[18]

We have been considering the prospects for scientism understood as a framework or stance for objective thinking itself. We took the inspiration for this idea to come from logical empiricism, which tied objective content

[18] Kuhn balked at the idea that it is progress toward the truth, but thought that we could still say, as Hacking puts it, that there is "progress *away from* less adequate conceptions of, and interactions with, the world" (Introduction: §13, "Progress Through Revolutions").

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

(or cognitive significance or meaning) to the presence of intersubjectively authoritative method. The idea was that science is the appropriate basis for an "ism" because the use of intersubjectively authoritative method possesses attractive epistemological and sociological features. We then used Kuhn's conception of normal science to understand what intersubjectively authoritative method in science consists in, and then, again following Kuhn, made explicit the intertwined sociology. The discussion of Kuhn confirmed the idea that normal science has attractive epistemological and sociological features in so far as concretely specified exemplars, rule-based inquiry, mutual understanding, agreement, community, and progress are epistemologically and sociologically attractive. The net result is that if the science in scientism is normal science, it is understandable why science is thought to be the basis of an "ism."

Why *not* Scient*ism*?

However, Kuhn did not think that normal science exhausts science. Kuhn thought that scientific activity also includes what he called *extraordinary science*. I discuss extraordinary science in more detail in this section, but for orientation, it is useful to note that Kuhn's distinction between normal science and extraordinary science is the fulcrum around which the argument of this chapter turns. I make this explicit in the next section.

Let us consider Kuhn's account of extraordinary science in relation to the epistemological and sociological features of normal science.

Extraordinary science happens

> when ... the profession can no longer evade anomalies that subvert the existing tradition of scientific practice ... then begin the extraordinary investigations that lead the profession at last to a new set of commitments, a new basis for the practice of science. The extraordinary episodes in which that shift of professional commitments occurs are the ones known in this essay as scientific revolutions. They are the tradition-shattering complements to the tradition-bound activity of normal science. ("Introduction")

On Kuhn's picture, as normal science proceeds, anomalies accrue and the inability of the disciplinary matrix or paradigm to explain or otherwise accommodate them becomes manifest. This "blurring of the paradigm" precipitates a crisis, from which the new paradigm emerges as a "reconstruction of the field from new fundamentals, a reconstruction that changes ... many of its paradigm methods and applications" (VIII, "The Response to Crisis"). The epistemology of extraordinary science does not include acceptance of and adherence to paradigms and their methods with

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

an eye to trace out their applications, but instead reconstruction of fields from new paradigms with new methods and applications.

This difference in epistemology is one aspect of a more general difference between normal science and extraordinary science, namely a difference in the kind of thinking that goes on in each. Normal science of course includes proposing hypotheses gathering of evidence, performing experiments, etc., but will also include forms of reflective and metarepresenta tional thinking in the honing and revising of hypotheses and theories that is ubiquitous in the course of everyday scientific work. But in normal science, this is done against the background of a disciplinary matrix or paradigm. Extraordinary science, by contrast, involves significant reordering and reprioritization of commitments, opacity instead of transparency about proper methods, an absence of substantial common ground in disagreement over paradigms, and factionalizing instead of the fostering of scientific community. Choosing between paradigms is not "determined merely by the evaluative procedures characteristic of normal science," since "these depend in part upon a particular paradigm, and that paradigm is at issue" (IX, "The Nature and Necessity of Scientific Revolutions"). It is these kinds of more foundational and controversial but also more nebulous concerns that are addressed with interpretation and critical reflection in extraordinary science.

Further, Kuhn thinks that the thinking directed at evaluating the paradigms themselves approximates much more the kind of thinking that goes on in philosophy than the kind of thinking that goes on in normal science. In the transition to extraordinary science, "scientists [turn] to philosophical analysis as a device for unlocking the riddles of their field" and make "recourse to philosophy and to debate over fundamentals" (VIII, "The Response to Crisis"). Extraordinary science employs a form of thinking appropriate for when foundations are shifting and thinking must make progress without solid ground under its feet. It is thinking that does not proceed from first principles but examines first principles themselves.[19]

With extraordinary science comes a deterioration of intersubjective understanding and communication breakdown. In the transition to extraordinary science, scientists "whose discourse had previously proceeded with apparently full understanding may suddenly find themselves responding to the same

[19] There are familiar problems about how to understand the epistemology of first principles. Working these out, however, is not required for our purposes, which accepts that, but does not explain how, the thinking in extraordinary science is valid.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

stimulus with incompatible descriptions and generalizations." These differences in response lead to problems that are "first ... evident in communication" but which are "not merely linguistic, and [which] cannot be resolved simply by stipulating the definitions of troublesome terms" (Kuhn 2012: Postscript, 5, "Exemplars, Incommensurability, and Revolutions"). This kind of phenomenon can be seen in common examples, for example concerning the question of the connection between the availability of guns and crime, on which American conservative and liberal paradigms not only disagree (see Pew Research Center 2021) but, more deeply, on which those adopting them encounter significant problems of intersubjective comprehension.

However, when extraordinary science tries to move past the barriers to intersubjective comprehension, extraordinary science looks very different from normal science. Again, what is called for is something more like philosophy, in its interpretive, analytic, critically reflective, and even dialectical aspects. Kuhn tell us that members of different disciplinary matrices "recognize each other as members of different language communities and then become translators." Though translation will be difficult, Kuhn does not close off the possibility, and allows that translation "is a potent tool both for persuasion and for conversion" (2012: Postscript, 5, "Exemplars, Incommensurability, and Revolutions").

Unsurprisingly, the epistemology of extraordinary science is intertwined with its distinctive sociology, one conditioned by the loss of mutual understanding. The breakdown of a paradigm is accompanied by significant attention to and disagreement about foundational issues and replaces community not only with a "proliferation of competing articulations" and "different language communities" (VIII: The Response to Crisis) but with a loss of identity and alienation. Kuhn recounts Wolfgang Pauli's words of resignation in the face of the difficulties of accounting for atomic spectra that led to the development of Heisenberg's matrix mechanics: "At the moment physics is again terribly confused. In any case, it is too difficult for me, and I wish I had been a movie comedian or something of the sort and had never heard of physics" (quoted by Kuhn, VIII: "The Response to Crisis").

So, the erosion of a paradigm and rules implicit in it occasions a crisis that includes the splintering of the scientific community into different schools, among which communication is difficult enough to suspect that different languages and systems of meanings are at play, and this in turn has the potential to produce a kind of existential crisis and a loss of a sense of identity among scientists.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

Making It Explicit

So: exemplars, disciplinary matrices or paradigms, and the rules they implicitly contain are not only the basis for programs of research but also of mutual understanding, significant agreement, and the progress of science. Extraordinary science, because it interprets and critically evaluates, rather than takes for granted, the paradigms and the rules themselves, foregoes these features of normal science. If Kuhn is right about this, extraordinary science lacks the epistemologically and sociologically attractive features of normal science. But possessing these features is what made it plausible that normal science is the basis for an "ism." So, if Kuhn is right, there is no reason to think that extraordinary science is the basis of an "ism," and no reason to think that science conceived in total, as including both normal and extraordinary phases, is the basis of an "ism."

We can write this up as an explicit argument for which the main lines of support for the premises can be indicated. After that, I outline some larger lessons for the limits of objectivity and how, should they exist, they can and, especially, cannot be determined. I conclude by discussing the significance for humanism.

Here is the argument.

P1 The *science* in *scientism* means either *normal science*, or *normal science and extraordinary science.*

P1 sets up the argument, which takes the form of a dilemma for scientism, one that resolves in a way that undermines scientism. The dilemma turns on the question of how to interpret the *science* in *scientism* and, in particular, on how to interpret the distinction between normal and extraordinary science. The distinction is justified by Kuhn's analysis of science. As I've indicated, my overall argument does not require that Kuhn's analysis of science is correct in all its details. But it does require a distinction about different phases in scientific practice, and that these phases highlight the use of different kinds of thinking in science.

P2 If the *science* in *scientism* means *normal science*, then science can be the basis of an "ism" and scientism becomes plausible, but only at the expense of making the thinking in extraordinary science invalid.

P2 recognizes that there is something attractive about normal science, and it is justified by the argument, based in Kuhn's account of normal science, that normal science possesses attractive epistemological (exemplar-driven, rule-following) and sociological (community, mutual understanding, agreement,

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

progress) features. But this comes at a cost. As a reminder, to say that some form of thinking is invalid is to say that it fails to trade in objective contents, the kinds of contents appropriate for belief and knowledge. According to scientism, whether a kind of thinking counts as objective thinking is determined by whether the relevant thinking is scientific. Further, we are supposing that the *science* in *scientism* is normal science, and the thinking that goes on in normal science is fundamentally different in kind from the thinking that goes on in extraordinary science, which is more like philosophical thinking in involving interpretive, analytical, and dialectical aspects. P2 records the consequence of this understanding of a scientism that is based exclusively on normal science for the status any kind of thinking that does not conform to the kind of thinking that goes on in normal science.

P3 If the *science* in *scientism* means *normal and extraordinary science*, the thinking in extraordinary science is valid, but at the expense of undermining the idea that science is the basis of an "ism."

P3 recognizes that what is attractive about normal science, and what made plausible the idea that normal science could be the basis of an "ism," is missing in extraordinary science. This was justified by the argument, based in Kuhn's description of extraordinary science, that extraordinary science lacks the attractive epistemological and sociological features of normal science: It is not paradigm-driven and rule-following but challenges paradigms and rules, and involves the fragmentation of scientific communities, significant disagreement, the breakdown of communication, stalled progress, and even loss of identity and alienation.

C1 Either science is the basis of an "ism," or the thinking in extraordinary science is valid, not both (P1–P3).

C1 makes the dilemma for scientism explicit. To put the dilemma in different terms from those in C1, science can either be an "ism" but exclude a part, maybe the intellectually most profound part, of science itself, or science can include *all* of science, but then not be the basis of an "ism."

A dilemma is an exhaustive disjunction (throughout I have assumed that science should not be identified with extraordinary science alone for purposes of scientism) with unattractive disjuncts. Spelling out the disjunction a little, it says that either science is the basis of an "ism" and extraordinary science is invalid *or* extraordinary science is valid and science is not the basis of an "ism." For all that has been said so far it is open to the proponent of scientism to accept the first disjunct. But the next premise closes that option off.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

P4 The thinking in extraordinary science is valid.

P4 needs more discussion. I briefly discuss two considerations here. My point is not to provide a comprehensive defense of P4 but to make it plausible and to indicate the costs of rejecting it.

The first is that unless extraordinary science were valid, the current practice of science would seem to have a significant *objectivity deficit*, since the current practice of science is the result of extraordinary science replacing former paradigms and rules by new (the current) ones: If extraordinary science is not valid, this acceptance of new paradigms and rules is based on invalid thinking (again, thinking that does not trade in objective contents and that is not appropriate for belief and knowledge of how things are). The idea that the thinking that led to a new paradigm is invalid, but the paradigm and its rules are nonetheless valid, seems difficult to accept.

Second, though extraordinary science is not the basis for an "ism," extraordinary science is, for Kuhn, cognitively valuable.[20] So Kuhn is on board with the idea expressed in the previous paragraph. However, the kind of thinking that extraordinary science involves is not proprietary to science. As Kuhn put it, in times of crisis and revolution, scientists "turn to philosophical analysis" and make "recourse to philosophy."

More specifically, we can say that the kind of thinking that occurs during periods of crisis involves a significant dose of a kind of topic-neutral, completely general, reflection of thought on itself, where thought takes its commitments, normative standards, and standing as subject. What this amounts to in science is reflection on accepted paradigms and rules that form the foundation for the practice of normal science. But, again, this is not a kind of thinking or cognition that is special to science. It is instead a kind of thinking or cognition that evaluates the commitments, standards, and standing of thought in any domain. We can summarize this by saying that extraordinary science makes use of the resources of *interpretation and critical reflection* as it transitions from the paradigms and rules of one tradition of normal science to another. This identification, or partial identification, of the thinking in extraordinary science with interpretation and critical reflection suggests that unless there is reason

[20] Many inspired by Kuhn saw him as highlighting arational and even irrational considerations. Kuhn himself did not see things this way – see for example XIII: "Progress Through Revolutions" and his interaction with Lakatos (1970), in Kuhn 1970: "Either we are both defenders of irrationality, which I join him in doubting, or else, as I suppose, we are both trying to change a current notion of what rationality is" (Kuhn 1970: 39).

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

to think that interpretation and critical reflection are in general without cognitive value,[21] or that they are widely applicable but just not in science, the kind of thinking in extraordinary science should be validated.

Finally:

C Science is not the basis for an "ism" for objective thinking.

From these premises, our conclusion about the prospects for scientism follows.

Science and the Limits of Objectivity

On the view according to which science is the basis of an "ism," there is a tight connection between science and the limits of objectivity according to which science, by constituting what it is to think objectively, sets or determines the limits of objectivity. But if science is not the basis of an "ism" and so does not set the limits of objectivity, is there *any* connection at all between science and those limits? And if science does not set or determine the limits of objectivity, what does so instead?

At this point we can make the following conditional claim: If interpretation and critical reflection have some substantial connection to the limits of objectivity, then science will have such a connection to the limits of objectivity. This is because science includes extraordinary science, and extraordinary science makes uses of interpretation and critical reflection. However, this connection will be looser than that envisioned by scientism. The connection would not be that science sets or determines the limits of objectivity, but that science, through extraordinary science and its use of interpretation and critical reflection, sometimes operates at and thereby participates in and encounters those limits.[22] To repeat, though, this depends on the idea that interpretation and critical reflection themselves have a tight connection to the limits of objectivity. Do they?

There is an objection to the view that critical reflection has or could have the kind of tight connection to the limits of objectivity that we have argued science lacks. The objection is that the argument against scientism arguably generalizes and licenses the conclusion that the limits of objectivity are not set or determined by *any* positively specified methodology. The reason is that whatever positively specified methodology one may accept or adhere to in hopes of setting or determining the limits of objectivity (the

[21] For views along these lines, see Hilary Kornblith 2012, Whiting 2019.

[22] Perhaps, more strongly, normal science itself trades in objective contents only because of its connections to extraordinary science and critical reflection. For related discussion, see Rattan 2016.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

way that adherence to scientific methodology is supposed to set or determine the limits of objectivity), it will always be possible to take that positively specified methodology as itself an object of evaluation and critically reason about *it*.[23] When we are in engaged in interpretation and critical reflection, our thinking takes positively specified methodology as a subject of critical evaluation. This means, though, that the positive methodology in question does not occur in thinking in a mode of full acceptance (because it is under critical evaluation), and so by the lights of the "ism" for objective thinking that the positively specified methodology ostensibly defines, interpretation and critical reflection about it are invalidated. So, again, if interpretation and critical reflection are valid and possible for any positively specified methodology, then no positively specified methodology can be the basis of an "ism."

This might be thought to be an objection to discerning some limit to objective thinking in interpretation and critical reflection, but really there is no objection. The way that the limits of objective thinking come up in interpretation and critical reflection is not by interpretation and critical reflection serving, with some positively specified methodology, to *police* the limits of objectivity. Another general conclusion of the chapter is that the limits of objectivity are not what they are because of any kind of methodological policing presence ruling *this* kind of thinking in and *that* kind out. Scientism falls really to this more general idea.

I want to suggest though, in closing, that when it comes to interpretation and critical reflection, there is reason to think that they could bear a tight connection to the limits of objectivity without some positively specified methodology for interpretation and critical reflection playing some kind of policing role. Instead, the tight connection to the limits of objectivity comes from the epistemology of interpretation and critical reflection itself. The epistemology of interpretation and critical reflection is a topic for another time, but for now we can briefly think of that structure as having a *subjective aspect* according to which the subject critically reasons about her own beliefs for the purpose of achieving comprehension and reflective justification for them; an *intersubjective aspect* according to which a subject critically reasons about another's beliefs for the purpose of being able to understand and learn from or instruct another, even under conditions of disagreement about paradigms; and an *objective aspect* according to which evaluation of a disagreement with

[23] Cf. Tyler Burge (1986: 720) on use- or role-theoretic accounts of conceptual content. "Our conception of mind is responsive to intellectual norms which provide the permanent possibility of challenge to any actual practices of individuals or communities that we could envisage."

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005

another does not build in preference for one's own belief (or paradigm) merely because it is one's own. And now we might imagine that the limits of objectivity arise not from any methodological policing but are instead based on principled difficulties in reconciling the subjective, intersubjective, and objective aspects of interpretation and critical reflection. Again, science will participate in such limits, but it does not set or determine those limits, which are, to repeat, set or determined by principled difficulties in reconciling the subjective, intersubjective, and objective aspects of interpretation and critical reflection. This is an approach to the limits of objectivity that does not arise through methodological policing, and so is consistent with the considerations adduced here against scientism.

* * * * *

Let me conclude by returning to the issue of humanism. I said that a direct consequence of my argument is that the view of humanism as scientism is a bad idea. But what else? Does anything else follow for humanism? Well, one thing is that if science does not constitute the limits of objective thinking, then there is room to think that the humanities, too, can participate in objective thinking. Against logical empiricism, the possibility is now open for ethics and metaphysics, too, to participate in objective thinking, even though their methods are not those of science. And against scientism, no discipline in general need follow science in its proprietary methods to count as being engaged in objective thinking. We might insist that a necessary condition for engaging in objective thinking is to engage in interpretation and critical reflection, but interpretation and critical reflection do not provide any specific positive methodology conformity to which sets the limits of objectivity. Disciplines that do engage in interpretation and critical reflection about their most basic commitments will still encounter the limits of objectivity as a result of trying simultaneously to meet subjective, intersubjective, and objective norms in interpretation and critical reflection.

This, I think, is a cheerful conclusion for any humanism that wants to recognize the validity of the humanities and their methods, since it emphasizes the role of interpretation and critical reflection in understanding what it is to think objectively and what the limits are that objective thinking can expect to encounter. Since science too makes use of the resources of interpretation and critical reflection, the result does not reflect negatively on the status of science with respect to objective thinking. Science is thus included within humanism without, as scientism would have it, science setting the limits of objective thinking.

Downloaded from https://www.cambridge.org/core. UNIVERSIDAD AUTONOMA METROPOLITANA, on 17 Nov 2026 at 13:33:46, subject to the Cambridge Core terms of use, available at https://www.cambridge.org/core/terms. https://doi.org/10.1017/9781009626880.005