

KUHN: REALIST OR ANTIREALIST?

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ABSTRACT

*Although Kuhn is much more an antirealist than a realist, the earlier and later articulations of realist and antirealist ingredients in his views merit close scrutiny. What are the constituents of the real invariant World posited by Kuhn and its relation to the mutable paradigm-related worlds? Various proposed solutions to this problem (dubbed the “new-world problem” by Ian Hacking) are examined and shown to be unsatisfactory. In *The Structure of Scientific Revolutions*, the stable World can reasonably be taken to be made up of ordinary perceived objects, whereas in Kuhn’s later works the transparadigmatic World is identified with something akin to the Kantian world-in-itself. It is argued that both proposals are beset with insuperable difficulties which render Kuhn’s earlier and later versions of antirealism implausible.*

One might wonder in the first place if the question “Is Kuhn a realist or an antirealist?” even deserves to be asked. Isn’t it obvious that Kuhn is a typical scientific antirealist, or even an antirealist *tout court*? According to him, the very same theoretical term can have different referents or denotations in the contexts of various paradigms. Taking over a very famous example, practitioners within the Newtonian paradigm (classical mechanics) and adepts of the Ein-

steinian paradigm (special relativity) assign different referents to the same term “mass”

But the physical referents of these physical concepts [space, time, mass] are by no means identical with those of the Newtonian concepts that bear the same name (Newtonian mass is conserved, Einsteinian is convertible with energy Only at low relative velocities may the two be measured in the same way, and even then they may not be conceived to be the same) (*Structure*, p 102)

Quotations like these leave little room, if any, for defending the reality of physical denotations, like mass, unless in the weak, contextual sense of “real relative to a given paradigm” (an expression Kuhn never employs), a manoeuvre that any scientific realist would judge unacceptable For a scientific realist, the term “mass” has an, at least partially, stable denotation common to both classical and relativistic mechanics (namely, the rest mass See Earman 1977)

Moreover, for Kuhn, the very idea of a correspondence between the ontology of a theory and its correlate in reality is totally devoid of meaning

There is, I think, no theory-independent way to reconstruct phrases like “really there”, the notion of a match between the ontology of a theory and its “real” counterpart in nature now seems to me illusive in principle (1969, *Postscript to Structure*, p 206)

These citations seem to provide conclusive evidence that Kuhn’s views are antithetic to even a moderate version of *scientific realism* (Ghins 1992) Furthermore, in other — later — texts (Kuhn 1974 and 1983, for example), Kuhn says that the identification of specific objects, like geese, swans and ducks, of the observable world depends crucially

“on the essential rôle of sets of terms that must be learned together by those raised inside a culture, *scientific or other* [italics added]” (Kuhn 1983, p 682) The structure of a world, ordinary or scientific, depends on the lexicon used “() different languages impose different structures on the world” (Kuhn 1983, p 682) Since assertions of existence usually are made about specific objects, identified as ducks for example, Kuhn’s contentions cast doubts on the reality of commonly observed specific objects and the truth of descriptions and other statements about them Don’t they make Kuhn not only a *scientific* antirealist but also an antirealist *tout court*, a skeptic about the existence of identifiable ordinary objects and the truth of ordinary-language statements?

Yet, in other passages Kuhn seems to incline towards some form of realism He says “Though the world doesn’t change with a change of paradigm, the scientist afterwards works in a different world” (*Structure*, p 121) When a change of paradigm, i.e. a scientific revolution, takes place, the scientific world changes, but the world remains unaltered In which sense can Kuhn defend the permanence of a world through scientific revolutions and what does this immutable world consist in? Ian Hacking (1993) calls this problem the “new-world problem”

Although the received interpretation according to which Kuhn is much more antirealist than realist is correct, the specific characteristics of his antirealism and the (meager) concessions he makes to realism are worth close scrutiny, especially since that topic has attracted much less attention than issues like Kuhn’s alleged irrationalism, subjectivism and relativism

In chapter X of *Structure* entitled *Revolutions as Changes of World View*, Kuhn stresses that the change at

stake is above all a change in *perception*. His comparison of a revolutionary change with a *Gestaltswitch* reinforces this point, even if Kuhn himself acknowledges the limits of this comparison. The practitioners of different paradigms, while sensorially present to the same *objects*, “see” different *things*. Kuhn is usually precise and consistently uses the term “object” for permanent constituents of the transparadigmatic world (let’s call it the World, with a capital “W”), whereas the word “thing” refers to elements of ontologies relative to various paradigms (i.e. the worlds). Things are contextual, paradigm-relative and belong to changing worlds whereas objects are invariant, immutable and make up the stable World that remains unaltered through scientific revolutions. The invariant World consists in commonly perceived objects. I will call it the *ordinary* world, as opposed to the paradigm-relative *scientific* worlds.

Invariant objects however are described in the *language* of the paradigm in the framework of which they become contextually perceived things. Kuhn gives the example of an object which is a swinging body where Aristotelians saw a thing which is a “body falling with difficulty”, Galileans see a thing which is a “pendulum”.

Since remote antiquity most people have seen one or another heavy body swinging back and forth on a string or chain until it finally comes to rest. To the Aristotelians, who believed that a heavy body is moved by its own nature from a higher position to a state of natural rest at a lower one, the swinging body was simply falling with difficulty. Constrained by the chain, it could achieve rest at its low point only after a tortuous motion and a considerable time. Galileo, on the other hand, looking at the swinging body, saw a pendulum, a body that almost succeeded in repeating the same motion over and over again *ad infinitum* (*Structure*, pp 118–9).

Transparadigmatic objects, like oscillating bodies, are accessible to sensory observation. It is clear from the examples given by Kuhn in *Structure* that invariant objects as well as relative things can be perceived. The very use of the verb "to see" (although "to see" can also mean "to understand") gives some support to the contention that objects and things are observed entities. In opposition to the logical positivists, Kuhn broadly construes perception as extending to things observed by means of instruments. "The very ease and rapidity with which astronomers saw new things when looking at old objects [here, it seems to me, Kuhn should have used the word "thing"] with old instruments may make us wish to say that, after Copernicus, astronomers lived in a different world" (*Structure*, p 117) "Placed before the same apparatus, a modern observer would see electrostatic repulsion (rather than mechanical or gravitational rebounding)" (*Structure*, p 117) "Lavoisier saw oxygen where Priestley saw dephlogisticated air and where others had seen nothing at all" (*Structure*, p 118) With Franklin, the Leiden jar (object) becomes a condenser (thing), that is a dielectric placed between two conducting coatings, whereas Musschenbroek saw a charge-filled bottle (*Structure*, p 118 and p 122) Where Berthollet saw a chemical compound which could vary in proportion, Proust saw a physical mixture since only mixtures, unlike chemical compounds, can vary in proportion (*Structure*, p 132)

Invariant objects that make up the ordinary World are thus observable objects which can be described in everyday language but which are things seen — and described — differently in the context of distinct scientific paradigms. As far as descriptions of objects and things in a language are concerned, we all know that, according to Kuhn, there

is no theory-neutral, observational language which would permit us to identify and describe transparadigmatic objects. Kuhn speaks of swinging bodies, jars, luminous spots in the sky but those terms do not belong to a fixed, theory-neutral, observational vocabulary. He opposes the neopositivists who made a clearcut division between observational and theoretical terms paralleled by an equally sharp separation between observable and unobservable objects and properties. But Kuhn admits that partisans of competing paradigms can come to an agreement — and the history of science indeed shows that such agreements have in fact been reached, at times with some difficulty — on descriptions of objects accepted by all. Such descriptions are couched in ordinary language (which is not to be confused with a theory-neutral observational language) or may even include scientific terms (like the word “telescope”) the reference of which is sufficiently shared to permit unproblematic, though partial, communication. Moreover, sizable portions of the distinct scientific worlds are also common. “() changes of this sort [Kuhn refers to the chemical revolution] are never total. Whatever he may then see, the scientist after a revolution is still looking at the same world. Furthermore, though he may previously have employed them differently, much of his language and his laboratory instruments are still the same as they were before” (*Structure*, pp 129–30).

Even in the case of widespread agreement on invariant descriptions of objects, it typically happens that those linguistically identified objects are described by means of different vocabularies (later called lexicons) in the framework of various paradigms, the practitioners of which see different things. Thus, Galileans see a pendulum where Aristotelians see a body falling with difficulty, even though

they don't have problems in identifying a common swinging object. One of the reasons for this, according to Kuhn in *Structure*, is that the *stimuli* coming from the swinging body are the same for both Galileans and Aristotelians.

The stimuli that impinge upon them are the same. So is their general neural apparatus, however differently programmed. Furthermore, except in a small, if all-important, area of experience even their neural programming must be very nearly the same, for they share a history, except in the immediate past. As a result, both their everyday and most of their scientific world and language are shared. (*Structure*, p. 201)

The new paradigm describes the new things in a (partially) new terminology, but the proponents of both paradigms can rely on a common lexicon. Moreover, the practitioners of conflicting paradigms share a partly common perceptual basis grounded on the sameness of the stimuli they receive. Consequently, the identification of the invariant objects is achieved jointly by linguistic and perceptual means.

But *stimuli* cannot qualify as the invariant perceived objects which compose the World. *Stimuli* are not perceived. Their existence is posited in order to explain the partially successful communication between practitioners of different paradigms, the evidence for which comes from the study of history of science. *Stimuli* function, along with other ingredients, such as a partially shared vocabulary, as theoretical entities within an explanation of an empirically ascertained fact: scientists do understand each other, they aren't individual or social solipsists.

We posit the existence of stimuli to explain our perceptions of the world, and we posit their immutability to avoid both individual and social solipsism (*Structure*, p 193)

Paul Hoyningen-Huene points out an ambiguity of the *stimulus* concept as employed by Kuhn. According to the first meaning, *stimuli* belong to the invariant “world-in-itself” (Hoyningen-Huene 1993, p 35). They “are purely object-sided (*objektseitig*) independent, determinate characteristics but nothing more can be said about stimuli within the compass of Kuhn’s theory, for the theory insists that the purely object-sided is inaccessible” (*Ibid* , p 45). In the second sense, “stimuli are that which empirical science allows us to identify as causally responsible for our sensations, as, for example sound waves, photons, and the like” (*Ibid* , p 46) and belong to what Hoyningen-Huene calls a particular “phenomenal world constituted both by the object-sided world-in-itself and by subject-sided moments ()” (*Ibid* , p 36).

I don’t think that, at least in *Structure*, the invariant World is some Kantian “world-in-itself” or “thing-in-itself”. First, Kuhn doesn’t use those expressions in *Structure*. There we only find one marginal reference to Kant (p 162) on the categorical imperative. Second, and more importantly, unspeakable entities are unable to play a rôle in a supposedly intelligible and enlightening explanation of the sameness of the perceptions of scientists working in distinct paradigms, especially since Kuhn is well aware that *stimuli* are not the sole factors accounting for the perception of an object or a thing. Third, the very examples given by Kuhn in *Structure* indicate that invariant objects belong to the realm of perceived objects and can be described in ordinary language. Objects make up a common ordinary World in which adepts of conflicting scientific paradigms all live and

work and which constitutes the shared background of their disputes and arguments. Without such a background, discussions and disagreements could not even happen in the first place. It is important to stress that Kuhn is concerned primarily, and even exclusively, in *Structure*, with science and history of science. The issue of communication between broadly conceived worlds or cultures, such as, say, Western and Chinese cultures, is quite irrelevant here. The protagonists of the scientific debates considered by Kuhn belong to the same broader culture, but typically not to the same *scientific* cultures.

Thus, undescrivable *stimuli*, as we saw, do not belong to the invariant World since, if our interpretation is correct, they are not objects, let alone perceived objects. *Stimuli* however can be taken as belonging to a *scientific* world. According to the second sense, they are things (retinal imprints, photons, etc.) which are perceived and theorized within the framework of a scientific paradigm. *Stimuli* can then function as explanatory entities in an account of the sameness of perceived things which are parts of the *same* scientific world, but which are not invariant objects. Hoyningen-Huene appropriately remarks that if *stimuli* are paradigm-relative they are of course unable to contribute to an explanation of the permanence of the World through scientific revolutions since they belong themselves to what Hoyningen-Huene calls a *phenomenal* world, that is the world of a particular paradigm. (The expression "*scientific* world" seems to me preferable here to "*phenomenal* world" since the ordinary world, which is not scientific, is clearly phenomenal. On the other hand, paradigm-related worlds contain also things which are beyond the reach of our possible observation and are therefore not phenomenal.) Moreover, Kuhn says that in order to be

able to provide a reconstruction of the perception of a thing on the basis of *stimuli* which are identified with retinal imprints, we must be able to perceive that thing in the first place. We must therefore be already living and working in a particular scientific world. The reconstruction, if feasible at all, doesn't start from the *stimuli* but ends with them. The starting point of the reconstruction is provided by the perceived scientific thing, and not by the *stimuli*. "The scientist or the philosopher who asks what measurements or retinal imprints make the pendulum what it is must already be able to recognize a pendulum when he sees one" (*Structure*, p. 129)

Summarizing, we are in a position to maintain that there are two major reasons why the recourse to *stimuli* cannot resolve the "new-world" or what I would prefer to call the "World *versus* worlds" problem. If *stimuli* are invariant, they must be unspeakable and cannot be the objects which make up the ordinary perceptual World. And if they are describable they belong to a mutable scientific world and are no longer invariant.

Could we think perhaps of *sense data* as possible constituents of the World? *Sense data*, unlike *stimuli*, are subjective psychological entities. But Kuhn, like many other contemporary philosophers within the empiricist tradition such as Quine and van Fraassen, unequivocally opposes what has been called the "myth of the given." What is given is never "immediately" given but always seen in the framework of an accepted paradigm. There is no given but only what is "collected with difficulty" (*Structure*, p. 126). There is no invariant ground of sensorial data which would be differently "interpreted" by the proponents of various scientific paradigms. Galileo does not see an oscillating object "as" a pendulum; he immediately sees a pendulum.

Even though Kuhn occasionally uses the expression "seeing as" he obviously does not have in mind the availability of diverse interpretations of raw, uninterpreted, data. Kuhn clearly precludes the possibility of constructing various interpretations of data. What is perceived is not an interpretation of a "given" but the given itself. Immediate sensory experience is irreducibly paradigm-laden and is much richer than putative *sense data*. Immediate experience conveys "perceptual features that a paradigm so highlights that they surrender their regularities almost upon inspection" (*Structure*, p. 125). Terms like "mass", "oxygen", "charge", "mixture", "condenser", etc. which were categorized as theoretical by the logical positivists, refer to observable things (entities or properties) according to Kuhn, but only for practitioners of specific scientific paradigms. Within the framework of a paradigm the realm of directly observable things is quite large since it includes things observable by means of instruments (which can be rather sophisticated) and the whole domain of measurable things.

Another possible way to solve the "World *versus* worlds" problem, would be to appeal to the standard distinction between "seeing" and "seeing that". When Galileo looks at a swinging body he sees *that* it is a pendulum, whereas Aristotle sees *that* it is a body falling with difficulty. But this distinction fails to do full justice to Kuhn's views. First, Kuhn himself does not refer to it. Second, he plainly says that the practitioners of the Galilean paradigm see directly a pendulum, and not *that* a given something (a swinging body) is a pendulum. If they see *that* an object is a pendulum (or "recognize" a pendulum), it comes as a consequence of their immediate, direct, vision of the pendulum. Put in the sensory presence of a swinging body, they do not immediately see a swinging body, but a pendulum.

And if you point out to them that it is (also) a swinging body, they will probably grant that it is also what is described in the ordinary language as a swinging body, but that it is a pendulum in the first place. The Galileans can be brought to see that the pendulum is a swinging body (since no contradiction occurs here). But they cannot be brought to see that the swinging body is a pendulum since what they immediately see is a pendulum. It is rather the other way around: they can be led to see that the pendulum is also what is roughly characterized in common language as a swinging body.

Finally, we would like to examine the nominalist interpretation advocated by Ian Hacking. The "new-world problem" is solved if we assume that the World is made of individuals whereas the paradigm-relative worlds are made of kinds. Kinds are conventional, they can be chosen at will and they do not correspond to real characteristics of individuals, they do not "cut the World at its joints". This nominalist interpretation, if correct, would clearly put Kuhn on the side of the antirealists who deny the existence of natural kinds.

() a suspiciously easy nominalist solution to the new-world problem has been to hand all along. The world does not change, but we work in a new world. The world that does not change is a world of individuals. The world in which we work is a world of kinds. The latter changes, the former does not. After a scientific revolution, the scientist works in a world of new kinds. In one sense, the world is exactly the same. A change in the class of sets of individuals that correspond to scientific kinds of things is not a change in the world at all. But in another sense the world in which the scientist works is entirely different, because what we work in is not a world of individuals but of kinds,

a world that we must represent using projectible predicates (Hacking 1993, p 306)

Individuals can only be talked about within a given paradigm and described by means of paradigm-relative scientific kinds which Hacking urges to identify with natural kinds. Each paradigm cuts the World of individuals in taxonomies that cannot be translated into each other, because these taxonomies overlap. This corresponds to the later Kuhnian concept of incommensurability. Thus, according to Hacking's interpretation, scientific kinds populate the worlds but they classify invariant, ineffable individuals into untranslatable categories.

Kuhn, however, explicitly rejects Hacking's solution to the new-world problem in his *Afterwords* (1993). First, Kuhn refuses to follow Hacking's suggestion to identify natural kinds with scientific kinds.

() what is required is a characteristic of kinds and kind-terms in general. () this characteristic can be traced to, and on from, the evolution of neural mechanisms for re-identifying what Aristotle called "substances" things that between their origin and demise, trace a lifeline through space over time. What emerges is a mental module that permits us to learn to recognize not only kinds of physical objects (e.g. elements, fields, and forces), but also kinds of furniture, of government, of personality, and so on. () [that is] the lexicon, the module in which members of a speech community store the community's kind terms (*Afterwords*, p 315)

Everyday and non-scientific kinds can be both perfectly respectable natural kinds. Ordinary objects as well as scientific things are classified on the basis of similarity, and dissimilarity, relations, which correspond, at least partially,

to object-sided (Hoyningen-Huene 1993, p. 76) features. And this provides a second reason for Kuhn to antagonize the nominalist position: kinds are not *only* conventional. We cannot divide the world "at will" (*Afterwords* p. 315) into kinds which would be merely arbitrary; kinds must be natural and therefore projectible, that is, useful in formulating nomic regularities and predicting future occurrences of types of events. To the extent Kuhn refuses to be dubbed a nominalist, he is a realist, since he concedes that kinds express similarity relations that have *some* counterpart in reality. Reality cannot be forced into completely arbitrary boxes. As Hoyningen-Huene appropriately remarks: "Kuhn's conception of similarity relations as, in part, genetically object-sided is doubtless his reason for classifying his view as a *realist position*" (1993, p. 76). However, since similarity-relations are also in part subject-sided and since we are unable to separate the respective objectual and subjectual contributions to the constitution of a perceived object or thing, Kuhn cannot be considered a genuine realist. There is no way to ascertain which observed characteristics correspond to some real features and which propositions about perceived things or objects are true. Thus, although Kuhn may be perhaps called a *global* realist, in the sense that he believes in the independent reality of a World or Nature, he is not a *local* scientific realist since there is no reason to believe that specific scientific kinds have an adequate ontological correlate. For the same reason, he is not a realist about kinds used to classify and identify ordinary objects either.

I do not think that a completely satisfactory answer to the "new-world problem" can be found in Kuhn's work. But two possible solutions are discussed by Kuhn: the Kantian world-in-itself *versus* phenomenal worlds solution and

the ordinary World *versus* scientific worlds solution. Let us examine them in turn.

The Kantian solution, favored by Hoyningen-Huene, but not encountered in *Structure*, is presented by Kuhn in his later writings:

Underlying all these processes of differentiation and change [of worlds], there must, *of course* [italics added], be something permanent, fixed and stable. But, like Kant's *Ding an sich*, it is ineffable, undescrivable, indiscussible (Road, p. 12)

Thus, according to this solution, Kuhn is a global realist who posits the existence of an observationally, theoretically and linguistically inaccessible thing-in-itself or world-in-itself. Kuhn returns to the "evolutionary analogy" (Road, p. 6) already used (but for another purpose) at the end of *Structure* in order to shed some light on the relation between the stable World and the mutable worlds. Particular worlds are identified with biological niches which are the result of an evolutionary adaptation of a community in which the decisive factors are the interactions of individuals among themselves and with the World. "Biologically, that is, a niche is the world of the group which inhabits it, thus constituting it a niche. Conceptually, the world is *our* representation of *our* niche, the residence of the particular human community with whose members we are currently interacting" (Road, p. 11). However, no more details are given on the relationship between members of a community who inhabit a world and the real but unspeakable World which nevertheless plays a crucial rôle in the evolutionary process of shaping specific worlds. These specific worlds are characterized, in Kuhn's later work, by means of lexical and taxonomic structures shared by their inhabi-

tants But no further indication is provided on the way creatures (us!) and their niches have been "fabricated" (*Road*, p 12), a silence which casts a shadow on the explanatory force of his evolutionary theory Neither could Kuhn, on pain of contradiction, give further details on his evolutionary scheme since he should then speak about the ineffable World

On the other hand, a theory about the fabrication of mutable worlds from the stable World would be a scientific theory, a kind of biological, or even ecological, theory in a broad sense And such a theory would fall prey to the type of objections which were directed, as we saw above, against the appeal to a scientific theory of the construction of perceptions from *stimuli* This biological theory would be itself an integral constituent of a niche and would therefore be incapable of providing a transparadigmatic account of the relation between the worlds and the World

Notice moreover that Kuhn's identification of worlds with niches inhabited by populations studied by evolutionary biology goes far beyond his initial concern with scientific communities "On the one hand, the evolutionary process gives rise to creatures more and more closely adapted to a narrower and narrower biological niche On the other, the niche to which they are adaptable is only recognized in retrospect, with its population in place ()" (*Road*, p 11) "And the practice-in-the-world of *some* [italics added] of those groups is science" (*Road*, p 11) These quotations show that Kuhn's later views are not restricted to scientific communities alone but also apply to any kind of human group or culture The rôle of the posited real World is not to account for the partial communication of practitioners of conflicting scientific paradigms, as was the case in *Structure*, but to provide the common

source (albeit “located outside of space and time” (*Road*, p 12)) of the plurality of world-niches and the common background to their variation in time

() the position I am defending is a sort of post-Darwinian kantianism Like the Kantian categories, the lexicon supplies preconditions of possible experience But lexical categories, unlike their Kantian forebears, can and do change () (*Road*, p 12)

No world, and *a fortiori* no scientific world, can claim any privileged access to reality Kuhn never backed down on his rejection of a correspondence theory of truth There is no sense in speaking of a match, even approximate, between a world and the World A world is rather more like a “form of life” (*Road*, p 12) than a possible representation As such, a given world can be more appropriate to one goal rather than another and, inside such a world, the issue of the adequacy of means to an end is meaningful and can be unambiguously and perhaps unanimously resolved Such a view, we have to admit, is barely reconcilable with scientific realism and even realism *tout court* What we referred to above as the ordinary perceived, unscientific, World becomes here just another niche with no privileged status not only with respect to truth but also invariance

On this issue “The Road since Structure” has led Kuhn to a more radical position Whereas in *Structure* there was an invariant perceived World whose objects were described in a common language, no such possibility is allowed by the later Kuhn It seems to me that no communication is possible between the inhabitants of different niches since they speak different languages and there is no common ‘meta-niche’, so to speak, on the basis of which communication, even partial, could take place Untranslat-

ability of lexicons coupled with the absence of a commonly perceived world leads to incommunicability. This more radical view follows, in my opinion, from Kuhn's later emphasis on language, an emphasis rightly pointed out by Hoyningen-Huene (1993, p. 61). If inhabitants of various niches speak different languages and if, as a result, any shared access to a common identifiable World of sensible objects is blocked, the social solipsism which Kuhn sought to avoid in *Structure (Postscript)* seems inevitable. Remember that the purpose of the *stimulus* ontology, despite its defects, was to avoid the pitfall of solipsism. The evolutionary biology scheme of fabrication of niches out of a Kantian world-in-itself does not even offer a promise to escape solipsism. Although this scheme can perhaps contribute to a better understanding of the difficulties encountered in intercultural dialogue, it is clearly refuted by the historiography of science, which offers ample evidence of agreement — and disagreement — among scientists and, consequently, of successful communication among them, as Kuhn stressed in *Structure*.

To conclude this analysis of the Kantian solution to the “new-world problem”, let me add one further objection. On what grounds can Kuhn justify the adoption of evolutionary biology and its application to the evolution of worlds, thereby embracing some sort of biologism? Apart from its fashionability and *prima facie* plausibility, this epistemological posture goes against Kuhn's own presuppositions. The niche which Kuhn carves and in which he puts himself as resident may seem hospitable to some but inhospitable to others, even if they pursue the same aim of giving a satisfactory account of world mutations in the course of human and scientific history. Since for Kuhn no truth can be ascribed to evolutionary biology and *a fortiori* to its

epistemological utilization, no compelling reason can be adduced in favor of his theory. This is especially the case in view of the fact that little, if any, explanatory power can be conferred, as we have just seen, on his Kantian conception of the relationship between the worlds and the World.

The ordinary World *versus* the scientific worlds solution to the "new-world problem" is developed in *Structure*. The common World is composed of real perceived objects which can be described in a common language. Thus, according to this interpretation, Kuhn seems to be a realist about usual observable objects. But since he doesn't endorse the correspondence theory of truth, it would be senseless to assert that objects have "in themselves" the observable properties we assign to them. Nevertheless, this World provides a stable background for scientific controversies and a shared empirical evidence with respect to which claims of superiority of competing paradigms can be evaluated, not only at a given epoch, but over long periods of time. Contemporary scientists share a great deal not only of common ordinary perceptions and language, but also of common experimental manipulations and scientific vocabulary, which permits partially successful communication between them. Kuhn concedes that there is a soil of evidence, expressed in a shared language, which provides the agreed upon background against which the respective merits of conflicting paradigms can be assessed, even if such an evaluation may be, and typically is, controversial.

The stability of the observable World is not restricted to a limited period in which a given scientific controversy develops, but endures throughout history. Kuhn (at least what Tim Maudlin (1996, p. 434) calls the "moderate Kuhn") grants that scientific debates have been correctly resolved, even if he always rejected as meaningless

the idea of a progression of successive theories towards truth. But the judgment on the superiority of a paradigm can only hold firm if a universal evidential basis remains available. As Maudlin remarks: "If presented with a moon rock, Aristotle would experience it as a rock, and as an object with a tendency to fall. He could not fail to conclude that the material of which the moon is made is not fundamentally different from terrestrial material with respect to its natural motion" (*Ibid*, p. 442). If a stable long-lasting observational World did not exist, what would be the *rationale* in favor of the contention that scientific debates have ended with the acceptance of the better paradigm and that this judgment can still rationally be defended today? Without such a fixed observational background, the very notion of scientific progress would be devoid of meaning.

The difficulty of this solution lies in the nature of the relationship of the various scientific worlds with the ordinary World. Kuhn insists, as we saw, that scientists see paradigm-relative things, not objects. If so, the empirical evidence immediately accessible to practitioners of distinct paradigms is only partially shared. And the unshared portions of evidence typically have a crucial impact on scientific debates. Where Berthollet saw chemical compounds, Proust saw physical mixtures. Proust was right and Berthollet wrong, but this was established on the basis of *other*, not paradigm-contextual, shared evidence. What is the nature of the relationship of shared evidence in the World with the scientific worldly things? The *stimulus* theory, if satisfactory, could have provided an answer to that question. Since Kuhn doesn't elaborate an adequate alternative explanation of the relationship of the ordinary

World with the worlds, the “new-world problem” remains unsolved

Where does all this leave us on the issue of Kuhn’s realism or, more appropriately, antirealism? Scientific and paradigm-relative worlds certainly cannot be claimed to correspond, even partially or approximately, to some reality. Kuhn is a scientific antirealist. However, Kuhn believes in the independent existence of nature, reality or what we called a ‘World’. In this sense, he is a global realist. But since, as we argued, Kuhn does not articulate a cogent explanation of the relation between the worlds and the World, the epistemic and ontic status of the latter remain problematic. If, as seems to be the case in *Structure*, the World is populated with observable ordinary objects, Kuhn, despite his rejection of the correspondence theory of truth, can perhaps be considered a realist about everyday objects, to the extent that they are classified in categories that are, at least partially, object-sided (see above). Commonly observed objects exist but they aren’t cognitively accessible to scientists, *as scientists*, who only know — and see — paradigm-relative things. For Galileans, a swinging body is a pendulum with specific characteristics. How then is Kuhn still entitled to claim that science is concerned with solving problems about Nature (*Structure*, p. 168), which can only be, it seems to me, an invariant World, and not only about scientifically constructed worlds? And if not, what would be the point of still doing, at great costs, science? Couldn’t we just rest content with the real, reassuring, ordinary World?

On the other hand, if the World is, for the later Kuhn, a sort of Kantian ineffable World-in-itself, it is *de dicto* cognitively inaccessible. The World is a big ‘X’ about which nothing can be said except that it exists and that the

various cultural and scientific worlds or niches are, somewhat mysteriously, fabricated from it. If we are ready to endow the title of realist to someone who says that there is "something out there" which opposes resistance to our conceptual constructions which for that matter cannot be completely arbitrary, then Kuhn can be said to espouse an, admittedly very weak, form of (global) realism. But what would be the explanatory force of such an unspeakable World in a rational and illuminating account of the history and the progress of science which, after all, was Kuhn's initial main concern?

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