Scientific Research Publishing

Open Journal of Philosophy, 2022, 12, 474-488
https://www.scirp.org/journal/ojpp
ISSN Online: 2163-9442
ISSN Print: 2163-9434

Models, Representation and Truth: On Giere's Perspectival Realism

José Luis Rolleri

Autonomous University of Queretaro, Santiago de Querétaro, Mexico
Email: jlrolleri@yahoo.com

How to cite this paper: Rolleri, J. L. (2022). Models, Representation and Truth: On Giere's Perspectival Realism. *Open Journal of Philosophy, 12,* 474-488.
https://doi.org/10.4236/ojpp.2022.123031

Received: July 29, 2022
Accepted: August 27, 2022
Published: August 30, 2022

Abstract

Could relativist theses about scientific theories be coherent with realist theses about the relationship between such theories and the physical world? This is the central issue of this paper that we approach, mainly, on Giere's perspectival realism. We consider that his epistemological relativist theses are plausible and sustainable, but his realist thesis about the representational role that plays the theoretical models with respect to real systems as well as his thesis about true hypotheses are not. After trying to show that, we delineate an epistemological version of conceptual relativism which becomes cognate with Giere's perspectival claims but that it does not comprise realist claims.

Keywords

Theory-Dependence, Independent World, Conceptual System, Ontological Commitment

1. Introduction

Generally, philosophers of science consider that scientific realism and conceptual relativism, as epistemological stances about scientific knowledge and its relations with the physical world, are incompatible. They think that the theses of these two philosophical positions on the nature of scientific theories and their ontological assumptions and implications are contrary and irreconcilable. Recently, for example, Psillos & Shaw (2020) hold that the relativistic consequences of Kuhn's incommensurability thesis are incompatible with both ontological and epistemological realism, and Sankey (2018) through an analysis of Kuhn's relativistic view on the nature of science conclude that it is in tension with scientific realism. However, Giere (2006) has proposed a philosophical view about science, scientific perspectivism, that intends to be realist and consistent with some relativist claims at the same time.

We think that the very idea of perspectivism involves relativist theses that hardly are compatible with some theses shared by scientific realists. One purpose of this paper consists in analyzing Giere's scientific perspectivism to show that although he holds consistently relativist claims about scientific knowledge, his realist theses about the relationship between the models of scientific theories and certain aspects of the world, or real systems, are misguided. Nevertheless, the central issue of our concern here, underlying the discussion, consists in whether the epistemological theses of relativism could be coherent with certain realist assumptions of ontological character. This question, it is worth remarking, has a major relevance to some issues of the present realism/antirealism debate.

We outline Giere's perspectival realism and proceed to analyze the question of whether his relativist theses about scientific knowledge are compatible or not with his realist theses about the representational models of real systems and about the truth of the hypothetical claims about certain aspects of the world. Further, we display very briefly a relativistic construal of scientific knowledge, an epistemological version of conceptual relativism, as a plausible conception of physical theories which does not comprise realist claims. We find Giere's scientific perspectivism cognate with the relativistic construal provided here, however, we consider that his realist theses are implausible for the reasons provided below.

We focus on the main epistemological features of Giere's perspectival proposal, specifically, his model-based approach, his concept of representation as well as his thesis about true hypotheses, in such a way that the structure of this paper consists in the first part on Giere's perspectival realism, composed by the three former aspects, and a second part where we expose, in very rough terms, a version of epistemological relativism plus a final conclusion about it.

2. Perspectival Realism

2.1. Models

First of all, Giere's purpose consists in providing a view, based on models, of scientific claims which avoids the strong objectivism of most scientists and the hard realism of many philosophers of science, as well as the constructivism held by certain historians and sociologists of science (2006, p. 3), but at once eluding a silly relativism, such as the one that holds: "every perspective is regarded as good as any other" or something like that. In positive terms, he intends to develop a sort of philosophical perspectivism within the framework of contemporary science (2006, p. 39).

Giere chooses the models of scientific theories instead of their laws as the focus of his inquiry. He holds that "On this account, general principles by themselves make no claims about the world, but more specific models constructed in accordance with the principles can be used to make claims about specific aspects of the world (2006, p. 15)." Thus, the perspectival realism of Giere is not at the level of fundamental principles of theories, rather at the level of their models; we

think in a bold sense: firstly, the specific models provide perspectives of aspects of the objects under study and, secondly, this sort of models are the scientific constructs that scientists link with real objects to make claims about these objects. If that is so, then some questions could arise about the relations among models, knowledge claims and real objects, as we will see below.

A model of a theory T is an abstract entity defined by the principles or the fundamental laws of T together with some special nomic statements. We can say, as logicians do, that the principles and the special laws of T are true in the models of T, but what is crucial for Giere is that the specific models of T *represent* aspects of the world: "Scientists use *models* to represent aspects of the world for various purposes (2006, p. 63)." Thus, the response of Giere to the question about the relationship between specific models and aspects of real objects consist in that the former represent the latter.

A peculiar thesis of Giere's model-based view of science is that the hypotheses are not general statements about features, aspects, systems or processes in the world, as philosophers of science generally hold. Rather, they are particular statements about how well the expected values derived from a theoretical model fit the observed values which embody the model of data related to a given experimental situation:

> A focus on the activity of representing fits more comfortably within a model-based understanding of scientific theories. In this picture, scientist generate models using principles and specific conditions. The attempt to apply models to the world generates hypotheses about the fit of specific models to particular things in the world. Judgments of fit are mediated by models of data generated by applying techniques of data analysis to actual observations (Giere, 2006: p. 61).[1]

For this type of hypothetical statements, and only for them, Giere claims that they could be true or false. This is not a thesis about the relationship between a theory and the world, but about a theoretical model and a data model. As he says, it involves a model-model comparison instead of a model-world comparison.

The question that remains is about how the data models are related to the physical processes under study. For Giere, this type of hypothesis does not claim something about how the world is, rather something else like: "The model M of T fits good enough the model of data MD, for the actual purpose". This requires an elucidation of how Giere conceives that a model could represent an aspect of the world mediated by a model of data, as we will see. But, in any case, for Giere, to say that a hypothesis is true does not imply that it corresponds to the physical process under study, i.e., that it is true in virtue of such correspondence. Giere demands other sort of correspondence or, better, of coordination between elements of models and features of real systems. So, he holds that scientists construct models in a way that "[…] elements of the model can be identified with

[1]The pioneer of the concept of model of data is (Suppes, 1962).

(or coordinated with) features of the real world." (2006, p. 63).

Nevertheless, no model could represent a single aspect of the world such as it is, as classical realists would claim, rather the representation of an aspect of the world that one could obtain via any model is from within the *perspective* of the model adopted or constructed. In general, "[…] scientists create perspectives within which conceive of aspects of the world (Giere, 2006: p. 59)."

Both representing an aspect of the world through a model and testing the claim that that model fits good enough the represented aspect require, according to Giere, the confluence of an observational perspective and a theoretical perspective: "In the most general terms, I would describe the empirical testing of models as a process of bringing together two perspectives, one observational and one theoretical, in order to decide whether the models fits the world as well as desired (2006, p. 89)." The former perspective is obtained by means of instruments designed to gather data from the aspects of the world under study. Giere explains that "Like the human visual system, instruments are sensitive only to a particular kind of input. They are, so to speak, blind to everything else […] The output is a function of both the input and the internal constitution of the instrument (2006, p. 14)." This sort of perspective has precedence because it provides us, in the first instance, with a cognitive access to the world, and his perspectival character resides in that the data obtained by the instruments used depends on the design of the instruments themselves, which at once allow us to make observations of an aspect and blind us to other aspects of the world. Thus, the observations that one can perform with a given instrument depend, in part, on the perspective inherent to it.

The observational perspectives are not sufficient to obtain scientific knowledge of the world. The role of theoretical perspectives is predominant because they provide us with conceptions of aspects of the world. Giere argues that the fundamental laws of theories define highly generalized models which characterize a theoretical perspective, and that theoretical claims are also perspectival (2006, p. 14 and p. 59).

A central idea about this is that scientists utilize a relevant specific model M of the subject matter, together with a model MI of the instrumentation, to test the claim that M indeed provides a good fit to its subject matter. How precisely in practice the scientifics do such task is an important question to be inquired, but in any case, "My explanation continues to support the general position that the scientific conclusions are always relative to theoretical and instrumental perspectives (Giere, 2006: p. 90)."

All claims that scientists could make about the fitness between models and real systems require both perspectives, having the following general form: "Given the assumed observational and theoretical perspective, M exhibits a good fit to the subject matter of interest. There is no basis for going further to a supposed more objective, nonrelativized, claim that this is how the world is (Giere, 2006: p. 92)." In this context, Giere uses the term "objective" to mean "absolute"; his perspectivism intends to be opposite to absolutists theses such as those that af-

firm that scientific descriptions of real systems express how they really are.

The relativistic vein of Giere's perspectivism can be confirmed on several of his theses. For example, where he holds that "For a perspectivist, truth claims are always relative to a perspective" and, better said, "That scientific observational or theoretical claims should in general be relativized to a perspective is, if anything, easier to accept (2006, pp. 81-82)." Thus, we can say that from Giere's model-based view of science that the kind of statements that scientists have tested has the form: "Model M fits the real system S, relative to the perspective that M provides of S" or something like that. Eliminate the last clausula entails an absolutist claim which, for Giere, is unsupported.

According to Giere, there is a problem for the scientific realists that assume uncritically, to avoid both constructivism and relativism, that realism must be objective, absolutist, but "The problem disappears, however, if one is willing to accept relativized perspectival conclusions rather than absolutely unqualified conclusions (2006, p. 92)."

It is clear, then, that Giere holds a sort of relativism, in few words: the theoretical claims about aspects of the world are relative to the perspectives that models provide of such aspects. How is this perspectival relativism related to Giere's perspectival realism?

2.2. Representation

The central issue with respect to Giere's realism is about how theoretical models could be related to real systems. As we have seen, he holds that theoretical models represent real systems or aspects of the world. Giere intends to explain the key relation of representation—where the entities that play the role of representing are models and the entities represented are real systems—in terms of similitude between models and real objects. A problem about this realist thesis resides in that those models are abstract entities whereas real systems are concrete entities. Then, how can an abstract entity represent a concrete entity? We will see below that Giere's response involves something like a categorial mistake.

Originally, Giere (1988) held that theoretical models are similar in some respects and in certain degrees to real systems, so that the former are partial and approximative representations of the latter. The scientist, according to Giere, makes hypotheses which affirm that a given model is similar in certain aspects and degrees to a real system. Such hypotheses are true if there are real systems that fulfill the assertions about the aspects and degrees claimed.

Later, Giere develops his realist theses in some points which become relevant here. There he advances a sort of perspectival realism, according to which "[…] our theories do not ever capture the totality of reality, but provide us only with perspectives on limited aspects of reality. Scientific knowledge is not absolute, but perspectival (Giere, 1999: p. 150)". Moreover, he improves his theses maintaining that the similitude involved between models and real aspects is structural: "When, thought observations or experimentation, these particular models are

judged to be well-fitting, we are justifiably confident that the world itself exhibits a structure similar to that of our models (1999, p. 241)." We must realize that this last thesis attributed structures to real systems based on their presumed similitude with theoretical models.

Since (1988), Giere rejects van Fraassen's thesis that the scientists build isomorphisms between models and phenomena because he considers that this type of relationship is too strong and does not agree with the scientific practice. However, Giere does not see any impediment in principle about the feasibility of that thesis, as van Fraassen later realized.

It is worth noting that there is an ambiguity in van Fraassen's such thesis, which he later recognized, and declined it in favor of a representation relationship. Such ambiguity arises since van Fraassen mixed the concepts of phenomena and appearances. In a pair of page notes, he writes:

> *Mea cupla*: In *The Scientific Image* […] I define empirical adequacy using unquestioningly the idea that concrete observables entities (the appearances or phenomena) can be isomorphic to abstract ones (substructures of models).
>
> I have only slowly come to see the importance of marking such a distinction. In *The Scientific Image* I did not make this distinction either carefully or clearly. The chapter on *Saving the Phenomena* introduces "appearance" to denote what Newton called "apparent motions", identifying them as "relational structures defined by measuring relative distances, time intervals, and angles of separation" (p. 45). I would now refer to those relational structures as data models. Data models are the summarizing refinement of the contents of a battery of measurements, typically, so this is not far from my present use. But in the passages that follow there, the reference seems from time to time to be just of observables entities, i.e. phenomena rather than appearances in my current strict usage (van Fraassen, 2008: p. 386, pp. 391-392).[2]

Thus, van Fraassen new thesis consists in that data models, the appearances, are embedded into theoretical models, but not the phenomena which are observable physical processes. This claim is coherent and perhaps also plausible because those two kinds of models are abstract entities that can be comparable. Besides, van Fraassen introduces a strong pragmatic relation of representation between data models and phenomena, a relation which does not admit definition.

Giere's conceptual mistake is alike to van Fraassen's because he assumes uncritically that theoretical models can be comparable with real systems to determine whether they are similar or not and, even more, he claims that one can attribute a structure to real systems if they become similar to those models after the relevant examination. As a realist, Giere intends a direct and meaningful re-

[2]In the same paragraph, van Fraassen accepted the critical remark of Paul Teller that he used "phenomena" and "appearances" interchangeably.

lationship, that of representation, between the models of scientific theories and the systems and processes of the world. Nevertheless, if the representation relation in consideration is intended to be elucidated in terms of similitude, the former conceptual mistake arises because the idea of comparing abstract entities with concrete entities, theoretical models with aspects of the real world, is senseless.

The notion of representation in philosophy of science, with respect to the realism/antirealism debate, is a difficulty one. As we pointed out, van Fraassen does not intend to define the representation relationship between models of data and phenomena. He agrees with Suárez (2003) that "Representation is not the kind of notion that requires a theory to elucidate it: there are not necessary and sufficient conditions for it. We can at best aim to describe its most general features… (2008, p. 7)" Instead, van Fraassen claims that representation is a ternary relation of pragmatic character: somebody *x* uses something *y* to represent something else *z*, as such and such (2008, p. 258). In short, van Fraassen sustains the thesis that data models represent phenomena because "Construction of a data model is precisely the selective relevant depiction of the phenomena *by the user of the theory* required for the possibility of representation of the phenomenon (2008, p. 253)."

Cartwright does not also develop an appropriate thesis about the relationship between models and the phenomena to which they are applied. She appeals to an image, a figure: that models resemble concrete physical processes, which suggest a species of likeness between abstract objects and concrete objects. This is clear where Cartwright draws a distinction between two sorts of models: on one hand, interpretative models which are mathematical structures that fulfill the idealized laws of a physical theory and, on the other hand: "[…] models that we construct with the aid of theory to represent real arrangements and affairs that take place in the world—or could do so under the right circumstances. I call these *representative models* (Cartwright, 1999a, p. 180)." However, as Bailer-Jones points out:

> A problem with the notion of representative models is that Cartwright does not elaborate the concept of representation, which she uses to say that theories do not represent the world and that representative models do (as in (Cartwright, Shomar, & Suárez, 1995)). She does not want representation to be thought of as structural isomorphism (Cartwright, 1999b: p. 261). According to her, the notion needs to be boarder than one "based on some simple idea of picturing (ibid., p. 262)." It is a "loose notion of resemblance" that is instead suggested (ibid.). As Cartwright herself acknowledges, this is not much more than pointing to the problem of representation (Bailer-Jones, 2009: pp. 143-144).

It seems that both van Fraassen and Cartwright did not provide notions of representation appropriate to sustain their thesis about the relationship between models, as abstract entities, and phenomena, as concrete entities. Van Fraassen's

notion, although not arbitrary, is too conventional relative to a given user, whereas Cartwright's notion is too vague.

Giere is not an exception about that point. He expresses this order of ideas:

> How do scientists use models to represent aspects of the world? What is it about representational models that makes it possible to use them in this way? One way, […] is by exploiting possible *similarities* between a model and that aspect of the world it is being used to represent. […] It is not the model that is doing the representing; it is the scientist using the model who is doing the representing. One way scientists do this is by picking out some specific features of the model that are then claimed to be similar in some specific respect to features of the designated real aspect (2006, pp. 63-64).

Thus, according to Giere, scientists can represent, let it say, a physical process by means of selecting some relevant features of a model to find out if they are similar to the corresponding features of the physical process. Nevertheless, doing that type of task requires a model-world comparison, which is inviable because as Chang rightly sustains: "All we can talk about are conceptualized objects, not things-in themselves (Chang, 2020: p. 404)." We consider that Chang's remark is pertinent and relevant to Giere's stance because, for him, our conception of a real system is always perspectival from a specific model of a theory. So, we cannot compare our perspective of a real system provided by a model with its non-conceptualized counterpart in the world. This shows the misunderstanding in the claim about a comparison of a feature of a model and its counterpart in the world required to claim that they are similar in some respects.

Indeed, Giere (2006) introduces the notion of data models, as van Fraassen did, as structures that mediate between theoretical models and real systems such that the elements of data models could be in correlation to aspects of the systems. Let it say, for instance, that the quantitative concepts of classical mechanics are correlated with the magnitudes that they design such as mass, force, acceleration, position, velocity, distance, through standard measurement procedures. This could be right; however, it is not the sort of thesis that a realist demands.

Giere's realist thesis is stronger: he claims that there is a similitude relationship between abstract entities, theoretical models, and concrete entities, real systems, which require or suppose a model-world comparison in terms of similitude. This is the claim that we find without sense. It is possible to define a morphism between two models—a model of data and a model of a theory—since they are entities of the same sort. It is also possible to determine if two physical objects are similar—the Eiffel tower and a physical scale model of it—since they are concrete entities. But how we could say, for instance, that a model of the atom of hydrogen is similar or not to a given hydrogen atom? In order to do that it becomes necessary to compare them, which is just unfeasible.

We observe an analogous oversight with respect to the concept of fitness in the following claims:

> The main point […] is that experimentally testing the fit of a model to some real system is a matter of comparing aspects of the model not with data directly, but with a model of the data. It is a model-model comparison, not directly a model-world comparison.
> When I speak of the "fit" of a model to the world, I do not intend any restriction to features of the model corresponding only to measured features of the real systems. In short, I do not mean merely that the model "fits the data" but that it fits the whole system under investigation (Giere, 2006:, p. 68, p. 129).

It seems then that Giere conflates two notions of fit. On one hand, when a theoretical model fits the data and, on the other, when a theoretical model fits a real system. The former type of fitness is feasible whereas the latter assumes that it is possible to compare directly theoretical models with real systems to find out whether they fit or not. Again, we deem this assumption not only unfeasible but pointless.

2.3. Truth

The previous remarks about the issue of the relationship that could be between theoretical models and real systems have consequences on the Giere's realist theses. These, in particular, undermine his thesis about the truth of scientific hypotheses. As we have seen, Giere does not provide an appropriate answer to that issue. If we are right about that, his notion of truth is also misguided. With respect to the antirealist pessimistic metainductive argument, he writes:

> It fails to connect with a perspectival realism according to which the only empirical claims that may be counted as true or false are those about the fit of models to the world. Relative to the scientific and experimental context, a claim of good fit may be rejected as false. But many such claims are justifiably taken to be true, as long as it is understanding that "good fit" does not mean "perfect fit." And that understanding is built into perspectival realism (2006, p. 95).

We have seen that, for Giere, scientific hypotheses are not general statements about the world, but particular statements about the fitness of models to real systems. This notion of scientific hypothesis deviates from the traditional notion in such a way that the idea of true hypothesis is quite different from the classical realist thesis according to which a hypothesis is true if it corresponds to the world facts. The hypotheses, in Giere's sense, are empirical in character although they do not affirm anything about how real systems are, rather about how well models fit real systems instead. Nevertheless, the prior indistinctness about the fit between theoretical models and models of data, on one hand, and the fit between theoretical models and real systems, on the other hand, undermines Giere's thesis about the possibility of attributing truth values to the sort of claims that he considers scientific hypotheses. If we the take the former alternative, we

obtain a feasible thesis which has a methodological character and matches well, for example, van Fraassen's empiricism. If we consider the latter alternative, we have an unfeasible thesis that is inappropriate to support Giere's realism.

As we have seen, Giere's scientific perspectivism contains some relativistic proposals, on one hand, and that his theses concerning theoretical models and real systems are misguided, on the other hand. Then, strong doubts about the plausibility that his intended realism could be consistent with a sensible relativism arise.

We said at the beginning that the main issue of our concern here is to determine whether relativist theses of epistemological character are consistent or not with certain realist suppositions of ontological character. We think that Giere's perspectivism assumes rightly the existence of the physical world which constitutes the diverse subject matters of the physical theories, though his realist notion of true hypotheses is unviable.

3. Epistemological Relativism

Let us now delineate our own view on those matters as an alternative to Giere's perspectivism. As an epistemological view, conceptual relativism maintains that our knowledge of the world, the way of thinking and understanding the domains of diverse physical theories, is *relative* to the theories that we assume or construct; our scientific knowledge is especially relative to the conceptual systems contained in such sort of theories, that is, webs of interconnected concepts linked by types of relationship like connotation, subsumption and entailment. Every physical theory has its own concepts, both kind (or class) concepts and metric (or quantitative) concepts, which conform its conceptual vocabulary, using Kuhn's expression (Kuhn, 1991), appropriate to describe physical systems and the processes that they undergo.

A bit more specific, conceptual relativism supports the claim that it is only from, and through, the conceptual framework of a theory that one obtains a *conceptualization* of how the world is, in a certain mode. In this way, our purported scientific knowledge of the world, and our *understanding* of the entities and the processes with which we get cognitive interactions by means of experimental devices, in each physical field, are relative to, and dependent on, the theoretical framework in consideration.

Talking about scientific knowledge of the physical world amounts to saying that the theories that bear such knowledge have been validated by scientists by means of observations and experiments, in other words, that scientists have found that those theories hold in the intended applications within their domains. If we say that physical theories such as electromagnetism, quantum mechanics, relativity, and so forth, are theories that bear our contemporary scientific knowledge of the physical world, it entails that physicist have validated those theories; i.e., they have found by experimental means that the laws of such theories hold in their respective domains of application. A conceptualist thesis consists in that

the purported knowledge expressed by those theories is relative to their theoretical frameworks, and that the way we distinguish and individualize the entities, systems and processes of their physical domains depend particularly on the conceptual systems embraced in the theories in consideration. Thus, we claim that *know* something connotes to *conceptualize* it in a certain mode relative to the conceptual system of a physical theory.

Physical theories comprise, besides of lawlike statements, conceptual systems which allow the physicists to make claims about what there is in the domains of application of such theories, for example, elementary particles, fission and fusion processes and, even, diverse sorts of aleatory processes. In order to claim that there are things like those in the physical world it becomes unavoidable to apply a physical theory containing an appropriate conceptual system; otherwise, everybody would be unable to affirm anything about the field of atomic physics. As Giere points out: "The knowledge we get comes from one perspective or another, not from not perspective at all (2006, p. 92)." Our point with respect to this is that the claims that one can make about the entities and processes in any physical field are relative to the theory supposed or elaborated; in general, the ontological assertions that everyone can make about the physical world depend on, and are relative to, one theory or another.

The systems of concepts included in the contemporary physical theories make possible and limit our conceptualization of how the world is at once, as well as our cognitive access to what happens in it. This last claim involves that conceptual relativism gives priority to conceptual systems over scientific experience, regarding the conceptual contribution of such systems on our experience of the processes that occur in the physical world. But we do not want to minimize the crucial, indispensable, role that scientific experience plays in our acquisition of knowledge, we want only to confer his right place to conceptual systems in the cognitive processes involved in scientific observation and experimentation.

All the former theses, certainly relativistic in character, are proposed against the absolutistic view which permeates most of the contemporary debate between realists and antirealists philosophers about science—particularly, physics.

Perhaps it would be right to replace Giere's concept of truth, as applied to methodological claims, for a concept of valid statement. Recognizing the theory-laden on scientific observation (Hanson, 1958), which entails a theory-dependence of the evidence which one could achieve from scientific experience, we claim that saying that a physical statement is *valid* amounts to saying that a group of physicists, that share certain theory, deem it valid because what the statement asserts matches the relevant evidence obtained by them.[3] The former concept of *valid statement*, which seems suitable for the scientific practice of physicists, involves a relation of matching which is established by some groups of scientists at a given time based on some available evidence which is permeated by the conceptual vocabulary of a theory. Even so, the relevant evidence is obtained by physicists

[3]Indeed, this concept of valid statement has social and historical parameters since theories are products of the work of scientific communities during historical periods of a scientific discipline.

via interactions with physical systems by means of appropriate instruments in contexts of measurements, observations, and experiments—thus, there is not a lack of objectivity. According to the realist concept of true statement, understood in a non-epistemic sense, the relation of correspondence between a given statement and a fact exist by itself, in a way that one could discover such relation and then assert that the statement is true. Anyway, in order to make such assertion, the realist requires some kind of experience of such fact, based on which he could demand objectivity.

Hence, both the realist and the relativist require an appropriate experience with the fact, phenomenon, or process in question in order to be in a proper epistemic position to assert that a given singular statement, with scientific character, is respectively true or valid. And if the former claims objectivity on his attribution of truth to the statements that he asserts, with the same right the latter may claims objectivity on his attribution of validity of the statements that he asserts. But this does not authorize the realist to claim a sort of, so to speak, ontological objectivity, which would reside on a purported correspondence of what a statement asserts and what is really there—what some philosophers call "objective facts". The sort of objectivity in question consists in an intersubjective agreement among the members of a group of scientists (moreover, nowadays among the members of the pertinent international scientific community), which is attained based on sharing the evidence which validated the physical statements in consideration.

Thus, it is plausible to think that the relativist philosophers demand that the sort of objectivity required resides in that the physical statements in consideration assert something about an aspect of the world which could be validated by means of scientific methods such as observation and experimentation, that the evidence obtained would match the statements, and all that could be performed intersubjectively by a group of physicists. But, besides, the evidence gives ground to the group of physicists for accepting such statement as valid because it is in accordance with their world view; in particular, with the way such aspect of the world is conceptualized from the theory adopted.

Yet of relativistic character, the construal of physical theories delineated here does not refute itself because their theses are not reflexive; that is to say, as other epistemological stances—empiricism, realism, instrumentalism, conventionalism—, conceptual relativism is a metatheory whose objects of study are precisely the physical theories, and thus what it claims is not applicable to itself. This contrast with Giere's stance about this point:

> There is an argument that has often been used to discredit perspectivism. Is perspectivism itself true or false? If it is true, then there is at least one claim that is nonperspectivally true. So if perspectivism is true, then it is false. Of course, if it is false, then it is false. So perspectivism is false. As I see, this argument simply begs the question. It assumes that truth is to be understand in objectivist terms, which is just what perspectivism denies. For a

perspectivist, truth claims are always relative to a perspective (Giere, 2006: p. 81).

It seems that Giere, as a realist, alludes to a relative concept of truth that he does not provide.

As an epistemological view of scientific knowledge, conceptual relativism does not maintain any ontological thesis, any thesis about how the physical world is. The theories suitable for sustaining claims about how the world is, are precisely the physical theories.[4] However, it could be a task of epistemological relativism to establish the criteria of the ontological commitments of such theories. Quine has already provided such a criterion: "To be assumed as an entity is, purely and simply, be reckoned as the value of a variable (Quine, 1951: p. 13)." The underlying central idea of his criterion, expressed by the slogan "to be is to be the value of a variable", can be paraphrased as follows: what there is does not depend on any conceptual scheme, however, what we say there is depends on our conceptual scheme.

Let us now consider the thesis about the independent existence of the world. The present conceptualist construal of physical theories, even if it is relativistic in character, does not assume or imply that the world, which comprises the diverse domains of contemporary physical theories, is somewhat dependent on those theories. It is a categorical mistake, or something like that, to say that the physical world is theory-dependent just because a theory provides a conceptual contribution, in virtue of its conceptual system, which allow us to attain a knowledge of the world relative to such theory. This wrong idea is expressed, for example, by the following contrast remarked by Sankey and Hoyningen-Huene: "The realist holds that the entities to which the terms of a theory refer exist independently of the theory. […] Some anti-realist philosophers hold that the world and the objects it contains are constituted, either in whole or in part, by our theories, concepts or language (Sankey & Hoyningen-Huene, 2001: p. xvi)." What is relative to the physical theories, and their conceptual systems, is our knowledge of the world, the mode in which we conceptualize the entities and processes that our theories assert that exist in the world, which does not imply any dependence on the existence of the world.

The claim that the world exists by itself is not a thesis of relativism. It is rather an assumption of all epistemological stances such as, of course, realism, empiricism, instrumentalism, conventionalism, relativism and even in some extent, constructivism. Nevertheless, there is room for disagreements, disputes between realists and antirealists about the grounds for claiming that there are some kinds of physical entities such as elementary particles, quarks, black holes, and so

[4]Indeed, one finds in the history of philosophy numerous conceptions or views of the "world." An exemplar case is Hegel's philosophical system. Nevertheless, the Hegelian philosophy, like many other philosophical systems of metaphysical character, is an absolutist *weltanschauung*, which does not intend to describe, explain, nor predict the processes that happen in the world, the world that is the subject matter of the diverse theories in the field of physics. Hence, those views are irrelevant to our issue here.

forth, debates concerning what the physical world contains, so to speak. Our main disagreement with scientific realism consists in that we cannot claim, although our scientific theories have been validated, that we know how the world is in a way which is independent of the conceptual contribution of our theories. However, this is an epistemological disagreement, not an ontological one. That thesis, epistemological in character, does not imply that the existence of the world is somehow dependent on our knowledge, the mode we conceptualize the world, relative to one theory or another.

Once again, we think that the former view of physical theories is consonant to Giere's perspectival view. More precisely, his relativist view about scientific knowledge is not only compatible but also cognate with the conceptualist order of ideas outlined earlier. However, we do not intend to maintain any realist thesis, in particular, any realist thesis about the truth of scientific statements.

4. Conclusion

To close, we give a brief recapitulation of our main asserts about the central issue here. Firstly, physical theories, together with their laws and their models, just provide the means to conceptualize the physical world in a certain mode, to understand someway what happens in it relative to them. Such theories neither contribute to constitute what there is and what happens in the physical world, nor describe the physical entities and processes such as they are really, nor provide models which represent phenomena based on similarities between them. Secondly, the version of epistemological relativism delineated is consistent with the thesis about the independent existence of the physical world, the world that is the subject matter of the diverse theories of physics. The conceptual contribution of these theories on the mode that we conceptualize that world does not entail any dependence of its existence on such theories.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

Bailer-Jones, D. (2009). *Scientific Models in Philosophy of Science*. Pittsburgh University Press. https://doi.org/10.2307/j.ctt5vkdnq

Cartwright, N. (1999a). *The Dappled World. A Study on the Boundaries of Science*. Cambridge University Press. https://doi.org/10.1017/CBO9781139167093

Cartwright, N. (1999b). Models and the Limits of Theory: Quantum Hamiltonians and BCS Model of Superconductivity. In M. Morgan, & M. Morrison (Eds.), *Models as Mediators* (pp. 241-281). Cambridge University Press. https://doi.org/10.1017/CBO9780511660108.010

Cartwright, N., Shomar, T., & Suárez, M. (1995). The Tool Box of Science: Tools for the Building of Models with a Superconductivity Example. In W. E. Herfel, W. Krajewski, I. Niiniluoto, & R. Wojcicki (Eds.), *Theories and Models in Scientific Processes* (pp. 137-149). Rodopi.

Chang, H. (2020). Relativism, Perspectivism and Pluralism. In M. Kusch (Ed.), *The Routledge Handbook of Philosophy of Relativism* (pp. 398-406). Routledge. https://doi.org/10.4324/9781351052306-43

Giere, R. (1988). *Explaining Science: A Cognitive Approach.* Chicago University Press. https://doi.org/10.7208/chicago/9780226292038.001.0001

Giere, R. (1999). *Science without Laws*. Chicago University Press.

Giere, R. (2006). *Scientific Perspectivism*. Chicago University Press. https://doi.org/10.7208/chicago/9780226292144.001.0001

Hanson, N. R. (1958). *Patters of Discovery*. Cambridge University Press.

Kuhn, T. S. (1991). The Road Since *Structure*. In A. Fine, M. Forbes, & L. Wessels (Eds.), *Philosophy of Science Association 1990* (pp. 3-13). East Lansing.

Psillos, S., & Shaw, J. (2020). Relativism and Scientific Realism. In M. Kusch (Ed.), *The Routledge Handbook of Philosophy of Relativism* (pp. 407-415). Routledge. https://doi.org/10.4324/9781351052306-44

Quine W. V. O. (1951). *From a Logical Point of View*. Cambridge University Press.

Sankey H., & Hoyningen-Huene, P. (2001). Introduction. In P. Hoyningen-Huene, & H. Sankey (Eds.), *Incommensurability and Related Matters* (pp. vii-xxxiv). Boston Studies in the Philosophy of Science. https://doi.org/10.1007/978-94-015-9680-0

Sankey, H. (2018). Kuhn, Relativism and Realism. In J. Saatsi (Ed.), *The Routledge Handbook of Scientific Realism* (pp. 72-83). Routledge.

Suárez, M. (2003). Scientific Representation: Against Similarity and Isomorphism. *International Studies in the Philosophy of Science, 17,* 225-244. https://doi.org/10.1080/0269859032000169442

Suppes, P. (1962). Models of Data. In E. Nagel, P. Suppes, & A. Tarski (Eds.), *Logic, Methodology and Philosophy of Science: Proceedings of the 1960 International Congress* (pp. 252-261). Stanford University Press.

Van Fraassen, B. (2008). *Scientific Representation. Paradoxes of Perspective*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199278220.001.0001