Vision, Perspectivism, and Haptic Realism

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In this article I examine the perceptual metaphor at the heart of perspectivism, discussing three elements: partiality, interestedness, and interaction. I argue that perspectivists should drop the visual metaphor in favor of a haptic one. Because the sense of touch requires contact and purposeful exploration on the part of the perceiver, it is obvious that with touch one apprehends an extradermal reality in virtue of and not in spite of its interactive and interested nature. By analogy, perspectivists should investigate the thesis that scientific representations inform us about the natural world in virtue of their interactive and interested qualities.

1. Introduction: The Aim of Perspectivism. Is perspectival pluralism compatible with a modest scientific realism? Does the allegedly distinct perspectivalist position collapse into a standard form of realism or antirealism? In this article I propose to consider these questions by examining the perceptual metaphors commonly employed to illustrate perspectivism. In this section I say something about the aims of perspectivism and unpack the visual metaphor typically associated with the position. In sections 2 and 3 I discuss Chakravartty's and Morrison's recent arguments that perspectivism amounts to no more than a traditional realism or antirealism, respectively. In section 4 I argue that perspectivism can best retain a distinct identity by focusing on the interactive nature of scientific knowledge acquisition and exchanging the visual metaphor for a haptic one.

Giere's version of perspectivism asserts that "the strongest claims a scientist can legitimately make are of a qualified, conditional form: 'According

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to this highly confirmed theory (or reliable instrument), the world seems to be roughly such and such'" (Giere 2006b, 5–6). The view is intended as a via media between extreme versions of "objectivist" scientific realism (the thesis that theories can in principle provide "a complete and literally correct picture of the world itself"; Giere 2006b, 6) and constructivist antirealism ("scientific claims about any reality beyond that of ordinary experience are merely social conventions"; Giere 2006a, 26).

Famously, Giere employs color vision as an analog for scientific perspectivism: "Colors are real enough, but . . . their reality is perspectival. And it is perspectival realism that provides us with a genuine alternative to both objectivist realism and social constructivism" (Giere 2006b, 14). So what does Giere mean by "perspectival realism," and how does the notion apply both to vision and to science? I will first present the core idea and then in subsequent sections ask whether the visual comparison does the required work in distinguishing perspectivism from standard versions of scientific realism and antirealism.

In saying that colors have perspectival reality, the idea is that we cannot make any claims about what color any object has without first specifying the perspective (i.e., the kind of chromatic visual system) from which the color judgment is made. For example, Giere (2006b, 33) writes that "there is no color that the rug is 'really', that is, objectively. There is only the color of the rug as seen by a dichromat and the color as seen by a trichromat." It follows that different perspectives are compatible: there cannot be genuine disagreement between divergent claims about the world when they are made from independent perspectives. Genuine disagreement is only possible from within one single perspective. This feature of perspectival realism distinguishes it from objectivist realism. According to the latter view, there ought to be a perspective-independent fact of the matter about which color judgment is the correct one.

Giere (2006b, 33–34) argues that the possibility of genuine disagreement and intersubjective agreement from within a perspective prevents the encroachment of an "undesirable relativity." Perspectivism is not an "anything goes," overly permissive theory because enough individuals happen to share a single perspective (e.g., a majority of humans are normal trichromats) such that their judgments are highly constrained.

Giere's central idea is that scientific theories, models, and observations are perspectival in the same way that color experiences, judgments, and descriptions are. For example, the theories of classical and relativistic mechanics provide different perspectives on the motion of a body through space; the imaging techniques of positron emission tomography (PET) and magnetic resonance imaging (MRI) offer neuroscientists contrasting perspectives on the brain, each suited to different empirical challenges. One disanalogy between the scientific and chromatic perspectives is that color visual systems are fixed by genetic endowment and development. A dichromat cannot elect to take up the trichromatic view, and vice versa. On the other hand, scientists are typically trained to use a range of theoretical, observational, and modeling perspectives, and gain facility in selecting the most useful mode to attack the problem in hand.

Despite Giere's insistence on the distinctness of perspectivism, both scientific realists and antirealists have argued that perspectivism collapses into one or other of the more traditional views. Before presenting these arguments, we should first note that the analogy between chromatic and scientific perspectives can be unpacked in three distinct ways:

1. *Partiality*. Just as no one individual or species is sensitive to all of the potentially visible wavelengths of electromagnetic radiation (Giere 2006b, 35), no one theory or model (of a particular phenomenon) captures all of the potentially knowable details.
2. *Interestedness*. Just as the color visual system of any particular species has been shaped during evolution by the needs and interests of that species (Giere 2006b, 29), the theories and models of science are shaped by the needs and goals of the scientific community and wider society.
3. *Interaction*. Just as color phenomena are the result of an interaction between a perceiver and an external environment (Giere 2006b, 31–32), scientific theories and models are the result of an interaction between human thought and activity on the one hand and the natural world on the other.

As the citations indicate, Giere himself invokes all three of these senses of perspective at different points in the text. In this article I discuss the philosophical implications of each of these three features of the account. If we consider perspectivism according to sense 1, the account is hospitable to a robust scientific realism. That is to say, each theory may capture a mere fragment of reality but is a true representation of that bit of reality nonetheless. In contrast, sense 2 appears to be more friendly to instrumentalist antirealism. If one emphasizes the interestedness of scientific investigation, it is tempting to take scientific theories to be essentially tools that are built in the service of particular practical ends. In a similar vein, sense 3 acknowledges that all scientific theories and models are the product of the mind–world interaction and so will bear the hallmarks of human subjectivity.

Philosophers who endorse both perspectivism and realism may hope to embrace sense 1 while disavowing senses 2 and 3. But that, I argue, would be to disregard the key insights of perspectivism. Fortunately, the conflict between realism on the one hand and interestedness and interaction on the other is an illusion. To see why, it is helpful to consider a haptic metaphor. Because the sense of touch requires physical contact and purposeful exploration on the part of the perceiver, it is obvious that with touch one apprehends an external reality in virtue of and not in spite of its interactive/interested nature. By analogy, perspectivists should investigate the thesis that scientific representations inform us about the natural world in virtue of their interactive and interested qualities. Before presenting this proposal, I will first discuss the realist and antirealist challenges to perspectivism.

2. Realism and Partiality. Color vision affords a partial sampling of all the spectral information available in natural surroundings. To take a simple example, the trichromatic visual system of most humans aids the discrimination of various kinds of objects, from traffic lights to berries. At the same time, various objects around us reflect light in the ultraviolet range of the spectrum, to which we are oblivious. Many flowers display UV reflectance patterns that pollinating insects, such as honeybees, are sensitive to, while most species of bees are less sensitive than humans to patterns in the long-wavelength end of the visible spectrum.

Note, however, that spatial rather than chromatic vision furnishes us with the root idea of different, partial perspectives on the same object: every view must originate from a specific standpoint and will occlude some features of the object while revealing others. Chakravartty (2010, 406) also discusses the formal practice of perspectival drawing, used to represent three-dimensional structure on two-dimensional surfaces. The projective rules of perspectival drawing entail that some features of the object are accurately represented at the cost of distorting others. To take a case from cartography, the Mercator map projection offers a good sense of the shapes of landmasses, while grossly distorting the relative sizes of islands and continents, especially near the poles. On the other hand, the Peters projection does accurately represent the relative sizes, while distorting the shapes of landmasses.

When considering scientific models and theories, if one focuses on the partiality of perspectives, it is easy to underwrite the realist thesis that there is one, mind-independent object of inquiry onto which all our various theories and models provide us a potentially accurate, if restricted, view. As Chakravartty (2010, 406) states, "The idea of multiple perspectives does not by itself rule out the possibility that, quite independently of any given perspective on something, there are non-perspectival facts of the matter about it; neither does it rule out, by itself, the possibility that one might come to know what those facts are." In order to make perspectivism a "philosophically controversial thesis"—that is, a thesis distinct from traditional realism—one needs to say more. The claim that needs to be substantiated, Chakravartty argues, is that "perspectival facts are all that can be known" (406).[1]

Accordingly, Chakravartty next considers an argument for the more philosophically controversial perspectivism that rests on the "partiality of detection." The argument asserts that scientific measuring devices and detectors only attain causal contact with a small subset of the properties of an object of inquiry and hence only give us a very partial or abstract "view" of the object. Given the above observations concerning the partiality of perception, it is easy for the realist to address this worry. Just as there is one globe, which yields various projective representations, there is one object of inquiry that can be measured and modeled in various ways. Thus, the restricted range of the sensitivity of scientific instruments cuts no ice against the realist thesis that there are knowable, perspective independent facts. Each instrument can be said to make available a subset of these perspective independent facts, and in order to achieve a more comprehensive view of the object, one may stitch together an array of partial representations. As Chakravartty (2010, 407) writes, "The partiality of detection, here, has no perspectivist consequences. The moral is a general one: the fact that detectors generally yield information relating to limited aspects of target systems does not by itself imply any philosophically interesting sort of perspectivism." Yet, as Chakravartty concedes, there are other arguments for philosophically substantial perspectivism, which rest on more than just the partiality of perspectives. I will return to one of these (the "Kantian conditioning" idea) in section 4. Before that, I will discuss how exclusive focus on a different part of the perceptual metaphor leaves us with a variety of perspectivism that is hard to distinguish from instrumentalist antirealism.

3. Instrumentalism and Interestedness. Instead of focusing on just the partiality of chromatic and spatial vision, one can, alternatively, emphasize the ways that these different channels of information have been shaped by the practical needs of their users. While UV vision serves the needs of flower foragers particularly well, it has frequently been hypothesized that the red/green sensitivity of many primates is an adaptation that aids in finding ripe fruit. Thus, it is not simply that perceptual (and by analogy scientific) perspectives are partial, but that the particular foci of attention associated with each perspective are the result of the specific purposes for which the information will be used. Moreover, the blind spots associated with each perspective will be a consequence of the narrow interests of the user.

1. This thesis itself comes in two flavors outlined by Chakravartty (2010, 407): "**p1** We have knowledge of perspectival facts only, because non-perspectival facts are beyond our epistemic grasp," and "**p2** We have knowledge of perspectival facts only, because there are no non-perspectival facts to be known."

To refer again to the example of the Mercator projection, the main reason for its popularity and continued use, despite its well-known inaccuracies, is that it provides a simple and handy tool for navigation. Any straight line from A to B on a Mercator map will be a "rhumb line"—a path that can be navigated at constant bearing in order to reach the destination. (Note, however, that rhumb lines do not indicate the shortest paths.) It is easy to think of scientific models, theories, and instruments that likewise earn their keep through pedagogical and practical utility, despite well-recognized inaccuracies: the planetary model of the atom, the liquid drop model of the atomic nucleus, and so on.

Such cases lend themselves to the thought that the most that can be said for scientific models and theories is that they have practical utility (e.g., in terms of generating reliable predictions), and not that they offer a window on the perspective-independent object of inquiry. Indeed, Morrison (2011, 350) has recently argued that "perspectivism is simply a re-branded version of instrumentalism." Morrison's argument rests on a case study of the current state of nuclear physics. Physicists employ more than 30 models of the atomic nucleus, and each is predictively powerful in some more or less restricted domain of application. Yet different models make radically different assumptions about the nature of the nucleus. Morrison urges that these different models not all be considered as different, compatible perspectives on the nucleus because "none of these 'perspectives' can be claimed to 'represent' the nucleus in even a quasi-realistic way since they all contradict each other on fundamental assumptions about dynamics and structure" (350). In her assimilation of perspectivism to antirealism, Morrison focuses on sense 2, the practical reasons for constructing different perspectives—the predictive power of the various models of the nucleus. However, one obvious problem with this argument is that it ignores a crucial feature of Giere's perspectivism, which is that agreement and disagreement ("contradiction") are only possible within one perspective and not across different perspectives. Morrison takes mutual inconsistency between models to rule out the interpretation of any of them as representing the nucleus. Yet in the case of color vision, the inconsistency between views afforded by a dichromat and a trichromat would not lead Giere's perspectivist to conclude that neither one of them is representing a visible world, but just that neither can claim to have hit on the "one true way" of chromatic representation.

I take it that the issue Morrison raises here, which is most pertinent to our discussion, is that we must abandon the realist dream of stitching together our various partial perspectives to yield a more comprehensive, panoptic view of our object of inquiry. Furthermore, Morrison (2011, 350) argues that the lack of consistency across different modeling perspectives blocks any attempt by the realist to infer representational accuracy from predictive success.

So where do things now stand? We have seen that Chakravartty's equation of perspectivism with partiality leads him to assimilate the view to traditional realism. Morrison's emphasis on the interested and instrumental nature of perspectives does undercut this realist intuition, but it also leads her to assimilate the view to antirealism. What hopes are there for a perspectivism that is distinct from both the realist and antirealist extremes? I will now argue that the third element of the perceptual metaphor—interaction—is critical here.

4. Interaction and Haptic Realism. Elsewhere I have argued that colors are attributes that can only be understood by considering the ways that animals interact with their environments with the aid of their visual systems (Chirimuuta 2015). Color visual representations guide various kinds of activity, and furthermore colors can be thought of as properties of those action-guiding perceptual interactions. This kind of color ontology is also endorsed by Giere,[2] and it is now worth spelling out the implications for an account of scientific models and theories. If one emphasizes the interestedness of scientific investigation (sense 2), it is tempting to take scientific theories to be essentially tools that are built in the service of particular practical ends. Interaction (sense 3) puts the world beyond the investigator back in the picture, by asserting that scientific theories come about through purposeful and sustained interactions with nature. This suggests that there is more to scientific theorizing than a bare-bones instrumentalism would concede.

Chakravartty considers an argument for the thesis that perspectival facts are all that can be known, which is grounded in the idea that scientific measurement and detection are not only partial but also "conditioned." That is, "If the detectors one employs to investigate systems of scientific interest systematically condition their outputs in such a way as to render them dissimilar to the features they detect, this lends prima facie support to the notion that our resulting knowledge of these systems is limited in just the way described by P1 [i.e., the thesis that nonperspectival facts are beyond our epistemic grasp]" (Chakravartty 2010, 408). In other words, because of the peculiar ways that measuring instruments interact with physical systems, we must worry that their outputs are ridden with artifacts and so fail to give a proper representation of the subject of investigation. Chakravartty's first response is that in spite of the occurrence of conditioning, different detectors (e.g., light

2. "I claim that colors are best thought of as neither completely objective nor purely subjective, neither as properties of either parts of the material world or of subjective experience, but as a property of an interaction between the material world and human observers" (Giere 2006b, 39). The restriction here to human observers is not pivotal to Giere's view.

and electron microscopes) can still converge on the same nonperspectival facts (e.g., about the presence of cell structures). He then goes on to consider the seemingly more challenging cases in which the realist cannot appeal to corroboration or robustness arguments. However, as will now become clear, more needs to be said about the issue of interaction—even in the supposedly easy cases.

4.1. Knowing and Picturing. Implicit in Chakravartty's characterization of conditioning is the assumption that the outputs of the ideal detector are somehow *similar* to the features they detect. The sense of similarity is not spelled out, but presumably there must be some structural correspondence between the features to be detected and the instrument's output. For example, if the concentration of CO molecules doubles, the number on the CO detector ought to double. Where the outputs of detecting devices are images, some more literal sense of similarity might be employed. The crucial point is that in both cases knowledge production is conceived on the model of a metaphorical or literal picturing of the target.

This is an observation also made by Teller (2001, 393) when characterizing the "perfect model model" cherished by traditional realists: "The photograph provides a good icon: The ambition has been to produce a perfect likeness of nature, a perfect model. The natural law ideal can be seen as the theoretical side of this more general enterprise, complemented by efforts to get untainted observations. Of course characterizing our efforts to describe nature as aimed at producing a perfect model is itself a model of the human knowledge-gathering enterprise." Teller here also notes that in the ideal case scientific observations should be "untainted"—in other words, they should not be conditioned, or molded by the interactive process through which they have come about.

Not coincidentally, of all our senses, vision is the one that is associated with this paradigm of knowing. The phenomenologist Hans Jonas (1954, 507) aptly describes this long-standing cultural association between the deliverances of sight and the attainment of objective knowledge: "Since the days of Greek philosophy sight has been recognized as the most excellent of the senses. The noblest activity of the mind, *theoria*, is described in metaphors mostly taken from the visual field." Jonas conveys this association between seeing, picturing, and objectively knowing, with frequent comparisons between vision and touch: "With sight, all I have to do is open my eyes, and the world is there, as it was all the time . . . [whereas] touch has to go out and seek the objects . . . through bodily contact" (512).

The crucial idea is that objects of sight present themselves as not being the result of any contact or interaction between the seer and the thing perceived. This gives us the impression that in vision we apprehend things objectively—

that is, we achieve a representation of the world that is without “contamination” by our own activity or subjectivity. Seeing, construed in this way, then becomes the paradigm for all kinds of knowing.

As it happens, this understanding of vision cannot be correct. For example, we have already seen above that chromatic representations are very fundamentally shaped by the varieties of photoreceptors we happen to be born with. It does not make sense to say that color visual experience just presents us with the objective colors of things.[3] Yet this conception of knowing is the picture that holds many captive. Chakravartty cannot see daylight between scientific perspectivism and traditional realism because he cannot help but frame scientific knowledge seeking in terms of the picturing of a mind-independent world. Perspectival representations may be partial and somewhat distorted (“conditioned”), but as long as they bear some relation of similarity to external reality, to the nonperspectival facts, then at least we are on the path to objective, nonperspectival knowledge. In order to see what is truly distinctive about perspectivism, it is thus necessary to reject this whole model of knowledge seeking. And in order to do this, it is particularly useful to replace the visual metaphor with a haptic one.

4.2. Manipulating and Learning. A key feature of our experience of touch is that the fact of immediate contact or some kind of interaction between our skin and the object perceived is undeniable. In order to explore the world through touch, we must move around, reach, and grasp things in particular ways. Furthermore, sensing by touch is more often than not associated with the performance of some deliberate action. For example, we might tap and rotate a pumpkin in order to assess how hard it is and the best angle at which to cut into it. These are characteristics of touch that, according to Jonas (1954, 514), most distinguish its phenomenology from that of vision: “The very coming into play of this sense [of touch] already changes the situation between me and the object. . . . We therefore do not have in touch that clear separation between the theoretical function of information and the practical conduct, freely based on it, that we have in vision.” The hand is both the primary sense organ for touch and our most basic means for affecting changes in the world—the root of the word “manipulation” is the Latin for “hand.” I suggest that the perspectivist think of scientific practice—and the theories and models that spring from it—along the very same lines. In other words, the perspectivist should reject the traditional realist’s conception of knowledge attainment as the picturing of objective facts, in a manner divorced from practical application, and accept the notion that scientists learn

3. See Chirimuuta (2015) for an extended argument to this effect.

about the world through tinkering and interacting with it, and that these learning practices are bound up with our practical intentions. We learn about the world because of our messy engagement with it, not in spite of it.[4]

Put more strongly, the point is that detached observation of the world is not conducive for gaining knowledge. This is a theme of philosophy in the pragmatist tradition, and interestingly it is prefigured in the writing of Helmholtz, a scientist who dedicated his research career both to physics and to the physiological mechanisms of perception through which we gain awareness of our material surroundings. As he writes in a lecture from 1868 on the theory of vision, experiment and manipulation are crucial to our learning the causes and significance of both sensory and scientific data: "The meaning we assign to our sensations depends upon experiment, and not upon mere observation of what takes place around us" (Helmholtz 1995, 195). Or as Hacking (1983, 189) famously put it, invoking Dewey's injunction against the "spectator theory of knowledge": "Don't just peer, interfere."[5]

This "haptic realism" also differs from traditional antirealism because it does assert that scientific theories and models are more than tools for predicting future observations—that is, they put us "in touch with" a reality beyond observations and sensory appearances. An interesting point, which I do not have space to develop fully here, is that the debate been traditional scientific realists and antirealists is itself symptomatic of a shared commitment to the picture model of scientific knowledge. Both sides hold that knowledge acquisition is (ideally) the business of generating true likenesses of external reality. Thus, anything the scientist brings to the picture (e.g., idealizations that make models more tractable, assumptions motivated by practical applications) can only get in the way of the process of capturing reality. Thus, the fact that scientific theories and models are shaped and conditioned by human thought and activity then motivates the antirealist thought that all they can give you are the appearances, but none of the reality behind them.

It is interesting to compare the modest notion of haptic realism that I have suggested best captures the insights of perspectivism with Hasok Chang's recent proposal for "active realism." Both accounts imply that there is something wrong with the debate between realism and antirealism, as traditionally conceived, and that a better notion of realism will undercut the motivations

4. Jim Bogen has raised the question of what to say about areas of science in which practical engagement with the system is impossible, such as solar physics and cosmology. There is not space here to give a full response. My initial thought is that it is fine to restrict haptic realism to those domains where we can manipulate the objects of inquiry and to grant that other epistemologies of science are better suited to the remaining cases.

5. Pickering (1995) also makes a pragmatist case against a representational (visual) conception of scientific knowledge.

of both of the traditional views. As Chang (2012, 217) puts it, "'Scientific realism' should mean a scientific stance that commits us to expose ourselves to reality, rather than some metaphysical hubris about how we can obtain or have obtained objective truth. Realism in this sense may sound just like empiricism." Another interesting consequence of haptic realism is that we see that it has been a mistake to characterize features of scientific representations (theories and models) that earn their keep because of their practical utility, or because of the limitations of the human mind, as obstructions to any realistic rendering of nature. Philosophers of science have long puzzled over the question of how many of our best models of physical phenomena can be so successful (yielding satisfying explanations, being predictively powerful, and being fruitful in the development of new experiments and models), while being so full of "distortions" such as idealizations and grossly simplifying abstractions. Robert Batterman (e.g., Batterman 2010) has frequently argued that these distortions are essential to the models' explanatory success, and yet it has been hard to envisage any connection between deliberate distortion and somehow getting a correct view on the natural phenomena, when thinking within the traditional realist framework. Haptic realism is a useful resource here. We can think of models as devices that aim to achieve a certain fit between a natural phenomenon, the human mind, and our particular purposes. Explanatory, predictive, and practical success are a matter of achieving the right kind of fit, not of the attainment of some God's-eye view on the subject. There can be various ways to be successful (a plurality of perspectives), and sometimes the best way to achieve a good match between the natural phenomenon, our conceptual resources, and the tasks we have at hand is through willful distortion.

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