CHAPTER 1

Reference, perception, and realism

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One of the perennial themes in philosophy has been the problem of our access (if any) to the world around us. This is, widely construed, the problem of realism. The question can be made more specific. Do our perceptual systems bring us into contact with the world as it is or do some of the ways they present the world depend on the systems themselves, e.g. as due to one's conceptual frameworks or to the make up of the perceptual systems? If they do not show us the world as it really is, and if there is no neutral perspective or independent way to know the world, does it make sense to talk about a world that exists independently of organisms that perceive or experience it? A somewhat related question is whether our scientific theories reveal the world as it really is or whether the theoretical assumptions and concepts constitutive of every theory somehow describe the world only in ways presupposed by the theory and its background assumptions.

The answers to these questions hinge in the last analysis on whether our perceptual acts, such as fixing the eyes and other deictic operations, succeed in picking out real objects or features in the world. Since perception is the basis for our evidence for scientific theories, the related question becomes whether the terms, especially the theoretical terms, of our best scientific theories ought to be taken to refer to entities, events, and processes in the world. If they do, then our perceptual system and our best scientific theories would correctly represent the world. Of course, scientific theories have a history, and, so even at best, they do not always get things right.

One might think that to address these questions one should be able to stand outside any perceptual system and any theory, and see from that neutral, objective standpoint the way perceivers see the world and the ways theories depict or represent the world. Then one could judge whether perception and theories deliver the world faithfully or accurately.

This position outside perceptual systems and theories would be a metaphysical Archimedean point (Kitcher 2001) from which one could compare our representations of the world, whether through our perceptual systems or through our theories, and the (allegedly) mind-independent world we represent. This objective point of view does not exist, and if Putnam (1981, 1982) and Rorty (1980) are right, no one could ever find such a standpoint and answer definitely the above-mentioned questions by showing that our perception and scientific theories depict the world accurately. The reason is that the only way one could determine the reference of perceptual demonstratives and of scientific theoretical terms is through the perceptual system and our best available scientific theories. It seems metaphysically impossible that we could ever directly, and independently of the perceptual system and of our theories, compare our symbols with the world they represent; inevitably information about the world is delivered to us through our perceptions and through our theories.

Considerations like these have given rise to two powerful attacks on realism from realism's nemesis – to wit, constructivism. Constructivists claim that any knowledge of material objects is constructed out of representations, and that the objects of these representations, as mind-independent entities, are epistemically inaccessible. Constructivism denies the realist's claims that scientific theories tell us about mind-independent objects.

Epistemological constructivism undermines realism by arguing that our experience of the world is mediated by our concepts, and that there is no direct way to examine which aspects of objects belong to them independently of our conceptualizations. There is no metaphysical Archimedean point from which one could compare our representations of objects and the mind-independent objects we represent. Perception is cognitively penetrable and theory laden. More specifically, the thrust of constructivism's argument is that the theory-ladenness of our perception implies that our experience is mediated by our concepts, and thus:

(a) People with two different conceptual backgrounds experience the world differently and may refer to different entities or processes even when they view the same scene.
(b) They could agree on what they see only if they had the same conceptual framework.
(c) There could be no theory-neutral basis on which debates about theory testing, confirmation, and choice could eventually be resolved. From this ensues the famous incommensurability thesis that bars

communication across paradigms. It also follows that if there is no neutral basis on which to decide whose references are successful and whose are not, for the same (allegedly) visual scene, it may not make sense to talk about there being one visual scene that two people perceive.

Epistemological *constructivism* can be traced back to N. R. Hanson's *Patterns of Discovery* (1958) and Quine's famous 'gavagai problem', which Quine (1960) developed to argue from the indeterminacy of translation to the indeterminacy of meaning and reference. In Quine's (1970) later work, the argument is extended from linguistic utterances to mental states.[1] It can also be readily detected in the undermining of the theory-neutrality of perception, which has rendered the distinction between *seeing* and *seeing as* obsolete (Churchland 1988; Hanson 1958; Kuhn 1962), clearing the way for theories of science and meaning as historically relative. Since the existence of a theory-neutral basis for a rational choice among alternative theories was rejected, it was held that scientific theories are incommensurable.

Semantic constructivism attacks realism on the ground that there is no direct way to set up the relation between the terms of representations and the entities to which they purportedly refer. That relation can only be indirect, mediated through causal relations between these entities and our behavior. The relation can only be interest dependent. Since these relations ground terms or representations by fixing their referents, reference becomes theory dependent (Brandom 1996).

Note that constructivism's theses entail that one could not in principle ever know whether perceptual demonstratives and scientific terms refer to real entities and features in the world. They are mute as to whether there exists a mind-independent world. Some constructivists could be indirect epistemological realists, that is, they could hold that the immediate objects of perception are always (or at least typically) mental experiences. On this view, any perceptual access to the external or mind-independent world is robustly indirect.

It is in this way that the notions of reference, perception, and realism become interwoven. For realism to fight back, realists must undermine both epistemological and semantic constructivism. Against epistemological

[1] 'To expect a distinctive physical mechanism behind every genuinely distinct mental state is one thing; to expect a distinctive mechanism for every purported distinction that can be phrased in traditional mentalistic language is another. The question whether the foreigner really believes *A* or believes rather *B*, is a question whose very significance I would put into doubt. This is what I am getting at in arguing the indeterminacy of translation' (Quine 1970, 180–181).

constructivism, realists must show that perception, or some stage of it, is not theory laden. Since theories are broadly construed as conceptual frameworks, the realists must show that perception (or some part of it) is not conceptually mediated, that is, that it is conceptually encapsulated. More specifically, they must show that some of the contents of perception are not affected by the concepts that the perceiver may possess. Since, in the brain, contents are abstract entities carried by neural/mental vehicles, the above requirement is transformed into that of showing that the perceptual states are not modulated by conceptual/cognitive states, which, in cognitive-science parlance, means that they are not cognitively penetrated. Note that if realists succeed in this task, they will show that some perceptual pick-up of the world does individuate and track objects and features in the environment. This would be tantamount to saying that perception can secure an interest-free reference to some aspects of the world, most likely to those aspects that are important to our species and which our perceptual systems have evolved to pick up. Thus, in arguing for the theory-neutrality of perception, realists also argue against a part of semantic constructivism.

To bring their argument home, realists must examine closely the relevant scientific evidence, because it is empirical argumentation, and not philosophical speculation, that could determine whether perception or some part of it is conceptually encapsulated or cognitively impenetrable. It is also scientific research that will show what information can be represented during that stage of perceptual processing. This is important because realists have to surmount Sellars' (1956) critique of the 'myth of the given', and Churchland's (1988) view that even if there is some rigidity and theoretical neutrality at an early stage of the perceptual process, this 'pure given', or sensation, is useless in that it cannot be used for any 'discursive judgment', since sensations do not have truth-values, and are not semantically contentful states. Only 'observation judgments' can do that, they claim, because they have content. Their content is a function of a conceptual framework and, hence, such judgments are theory laden. Thus, realists must show that the conceptually encapsulated content of perception is rich enough to be epistemologically interesting, that is, to allow them to build their case against constructivism and relativism by showing, for example, how discursive judgments, which constitute unarguably the empirical data used in testing and evaluating scientific theories, are constrained by the content of the theory-neutral stage of the perceptual process. This, in turn, would require both an account of how one comes to know the referents of her perceptual demonstratives and an account of

the process of conceptualization that eventually takes place and enables perceptual judgments (for it is one thing to be able to individuate and track objects and features in the environment and another thing to be able to know these objects and features). Finally, science is important to showing whether the cognitively impenetrable or conceptually encapsulated content of perception is content at the personal level, that is, content of which the perceiver can be aware, or at the subpersonal level.

However, it is not enough for the realist to show that perception or some part of it is cognitively impenetrable to top–down conceptual influences. Perception may be conceptually modulated and, thus, theory laden, even if it is not penetrated by top–down cognitive/conceptual effects, by having concepts built into the perceptual system itself. To solve the problem of the underdetermination of the distal object and percept by the retinal image, our perceptual system employs a set of hard-wired principles reflective of the geometry and the physics of our environment (see Spelke's 1990 'object principles', Burge's 2010 'formation principles', and Raftopoulos' 2008, 2009, 'operational constraints'). Since the contents of these principles consist of concepts, arguably perception inherently contains concepts and, thus, even though it is not affected by the concepts in the higher cognitive systems, it is conceptually structured. In addition, at least some of the processing principles reflect some sort of 'theory' about the world that our perceptual systems have constructed in their evolutionary development to cope successfully with their environment.

A realist might also wish to explore another position that could complement the aforementioned strategy and which would draw support from a recent revival of the old Gibsonian theory of direct or ecological perception, according to which our perceptual systems retrieve all the information they need so that we could interact with the environment in realistic situations (hence the term 'ecological') in a direct, cognitively, and conceptually free way. The recent revival is often described under the terms 'situated' and 'embodied' perception, that is, the view that perception is not, primarily, a passive contemplation of the world but an active engagement with it by persons, with bodies, who act always within a specific situation and with specific needs and purposes. This brings the role of action into the picture, and paves the way to new strategies to explore the ways perceptual demonstratives have their reference fixed. At a first glance one might think that this is a thorny road for the realist to take, since appealing to actions on the environment that aim to satisfy the needs of an organism seems to render reference-fixing all the more dependent on the interests of the organism. However, this would overlook the fact that our

on-line interactions with the environment are effected by our dorsal system, which functions entirely independently of any cognitive/conceptual interference. It also neglects the fact that many of our interests are natural and objective relative to certain environments. If the realist could show how perceptual reference could also be fixed through the interplay and coordination of perception and action that takes place along the dorsal system she would have gained considerable ground. Furthermore, in view of the fact that the dorsal system mediates our on-line immediate interactions with the environment, and that the processing along the dorsal path is not modulated in any way from top–down cognitive information, the realist has the opportunity to argue from the success of an organism's action to the adequacy of the representations formed in the dorsal system. The dorsal system processes information for guiding actions and locating objects in space.

It goes without saying that the realist would have to accept that different organisms with different needs – and, thus, with perceptual systems that have evolved differently – would cut up the world differently (cf. Letvin et al. 1959). The view that species-different organisms cut the world at different junctures – that is, the view that in perception only certain features are selected and that this selectivity is an inherent part of perception as it has been shaped by evolution and learning – does not imply that perception depends on conceptual schemes and, thus, that it is theory laden. It just suggests, in Vision's (1998, 411) words, 'that we [different species] are certain kinds of information processing engines and not others'.

Should the realist succeed in these initial moves, she would have also answered semantic constructivism, for she would have shown how conceptually unmediated reference to observable entities and their features is possible. However, this does not by itself answer the other semantic-constructivist thesis, namely the claim that the relation between the theoretical terms of our scientific theories and the entities to which they purportedly refer must depend on our theorizing and ground the theoretical terms in the entities to which they refer by fixing their referents. Thus, reference becomes theory dependent.

The situation gets more complicated for the realist if she takes into account the fact that our theories consist essentially of models of reality and, as such, are abstracted from, and partial descriptions of, the real systems that the theories purport to explain. As such, they are idealizations of the real world. Being idealizations, they naturally give rise to the question, to what sort of entities or processes do the theoretical terms of the sciences

refer? To what entities do the phrases 'harmonic oscillator', 'ideal gass', or various constructs in the models of nuclear physics, refer?

The strategy that the realist had to follow to rebut epistemological constructivism is not available to her in this case. For if it is conceivably possible to show that perceptual demonstratives can refer directly, meaning without conceptual mediation, to entities in the world, it is unquestionable for the realist that the burden of reference of theoretical terms rests with the theory and its concepts, in the sense that what they refer to is largely determined by the theory in which they feature. Furthermore, some theoretical terms are transtheoretical in the sense that they can refer to the same entity even though they may occur in different theories. Similarly, different terms in the same or different theories may refer to the same entity. Even though these two conditions have an inherent, minimal realistic flavor, it is no easy task for the realist to construct a realist theory of reference, given the two predominant 'models' of reference-fixing, to wit, the descriptivist and the causal theories of reference. The problem is that both views of reference-fixing face well-known problems that largely stem from their respective demands that pure descriptions or bare causal chains should be sufficient to ground reference.

The task of the realist would be to examine the assumptions underlying these two theories of reference, and try to figure out a way to overcome their difficulties by revising or undermining the underlying assumptions. Having revised some of the assumptions, the realist might devise a new theory of reference that keeps the strengths of the two theories and leaves out their weaknesses. This usually presupposes that the new theory would be a combination of the two models, say a causal descriptivism. At this juncture the strategies open to semantic and epistemological realism may intersect. Raftopoulos and Muller (2006) and Raftopoulos (2009) have proposed such a causal 'descriptivist' theory for reference-fixing of the perceptual demonstratives that purports to render the fixing of the referents of these demonstratives direct, that is, conceptually unmediated and interest free, while evading the problems inherent to pure causal accounts of reference – most prominently the problem of which element of the relevant causal chain is the referent and the problem of explaining referential failure or misrepresentation. It claims to succeed in this by appealing to the non-conceptual content of perceptual demonstratives, which consists predominantly in spatio-temporal information, that acts as a 'description' that picks out the referent of the demonstrative. But it does not constitute a 'semantic fact' that allows it to function as a way to determine the same referent across perceptual contexts, as descriptions are supposed to do in

the Fregean tradition. In that tradition, whatever satisfies the description associated with a singular or predicate term is among the referents of the singular or predicate term, since the salient description is strictly context dependent and cannot function outside the specific context that has created it. That is, the content of the mental act of perceptual demonstration is idiosyncratic to the relationship of the viewer with the visual scene, which means that different viewers may use different information to parse a scene or that the same viewer may use different information to individuate the same objects, depending on the viewer's perspective on the scene. This entails that the *de re* relationship of the perceiver with a visual scene (a relationship that allows her to retrieve information about the scene from the scene itself and not from a description of it) is highly contextual. This, in turn, means that a *de re* perceptual mode of presentation determines reference given or within a certain context.

To put it differently, one should be careful to distinguish between a description used to individuate and track an object in a visual scene and a description used semantically to fix the referent of the relevant mental perceptual demonstrative, thus allowing someone with the same information to individuate the same object just by acquiring this information and without perceiving the scene. In perception, the former is certainly the case, not the latter. To be able to individuate the same objects on viewing the scene, another viewer is not required to have or understand anything about the information used by the first viewer to individuate the same objects in that visual scene; other information may be used, depending on the idiosyncratic relationship between the viewer and the referent of the perceptual demonstrative, since the list of properties that allow object individuation in a visual scene is heterogeneous and may differ from case to case. It is in this sense that the information used to individuate and track objects does not constitute a 'semantic' description of the referendum.

Although Campbell's account of demonstrative reference differs from Raftopoulos' (2009) and Raftopoulos and Muller's (2006) account in some important ways, Campbell argues for a similar solution to the problem of fixing the referents of perceptual demonstratives. Campbell insists that spatial and motion information about an object together constitute its mode of presentation in a perceptual demonstrative and that this mode or sense fixes the reference of the demonstrative by drawing attention to the object. He also insists that one should not associate the sense of the demonstrative with a description of the object's features and location. The role of location consists in providing the binding parameter for singling out objects, and not in providing some sort of descriptive identification of

the object. Location organizes the information-processing procedures that process information about that object. It is in this sense that 'the description completes the character of the associated occurrences of "dthat" but makes no contribution to content. It determines and directs attention to what is being said. … The semantic role of the description is pre-propositional; it induces no complex, descriptive elements to content' (Campbell 2002, 107).

Yet another way to fix reference without relying on conceptual individuation would be to do so by acting or behaving in specific ways with respect to an object in the immediate environment. In this case the actions of an agent or the behavior of an organism would fix the referent by an appropriate activity, e.g. grasping the object, touching it, or, as in the case of children, by shared gazes towards an object or event that is already individuated by standing out against a background. Indeed, pointing at an object, in the right context, may suffice to establish a referent.

The chapters in this volume address some of the problems discussed in this brief introduction. Some of them focus on the problem of the reference in perception and on the problem of the role of action in reference-fixing. The rest focus on the reference of the theoretical terms of scientific theories.

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