Chapter Fourteen
How Extensions of New Substance Concepts are Fixed
How Substance Concepts Acquire Intentionality

'14.1 What Determines the Extensions of New Substance Concepts?

In the first section of this chapter I will use the results of the last chapter to explain more exactly how the extension of a substance concept is fixed. I will be concerned, especially, with how the extensions of new substance concepts, acquired directly on first meeting with their referents, are fixed. The rest of the chapter will be devoted to fitting the theory of substance concepts defended here into the more general theory of intentional representation developed in Millikan (1984, 1993a).

Evans concluded, about the man with the memory of the ball he was unable to identify, that the man did not have the capacity to think of that ball at all, but only to think of a ball ('13.4). But, I have argued, the question whether he could think of that individual ball doesn't turn on whether he was actually able to reidentify it. It doesn't turn on whether his situation was right for reidentifying it. It depends, rather, on whether his thought was produced by his cognitive systems in such a way as to have, as its first assigned function, that it be coidentified, specifically, with thoughts of that particular ball. And to that question the answer would seem to be yes.

As Evans describes the case, when the man was looking at the ball he understood it to be an individual ball, indeed, one that happened to be steel and shiny. It is not in question, then, whether he had the general ability to think of individual balls. Presumably at that time he applied a relevant sort of primary-substance (individual-object) template to the ball and was conceptually ready to track it for purposes of collecting certain sorts of information about it. He had various skills in place for tracking individual physical objects, and some understanding of what might be learned about this particular physical object. The cognitive representation produced by seeing the ball **C**the thought it produced**C** was thus designed to be taken up by an interpreting system having, among other functions, the function of conceptually tracking and reidentifying this particular ball. Had the system tracked and reidentified this particular ball, it would have been working entirely in accordance with principles it was already designed (selected for, trained or tuned) to instantiate.[1] Thus the man's idea of the ball was a fully intentional cognitive representation of it. The fact that he also saw, but then forgot, a similar ball at another time does not change that matter. Nor is the matter changed by the fact that in this case he couldn't perceptually discriminate that ball from the other ('14.1). Nor is it changed by the fact that no one happened to show up later to explain to him which ball it was ('13.4). Similarly, if I spot a new kind of lizard in the grass, one that is completely unfamiliar to me, and propose to find out what I can about its species, granted that the general abilities I have already acquired with regard to tracking lizard-like species are adequate, my concept of this species may already be completely determinate in extension.

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1 In the terminology of (Millikan 1984) it would have been performing an "adapted proper function." For details on the derivation of adapted proper functions, see also (Millikan in press b).

Also, any new substance concept that I acquire just by remembering the name of that substance and understanding in what general category it falls (Chapter 6), may immediately have a perfectly determinate extension. I have an ability to recognize this same name when I encounter it again. Suppose then that the name has a determinate referent in the public language. This requires that others in the language community, past or present, have or have had an ability to recognize this referent, and have sometimes or do sometimes broadcast information about it by using this name. I then have the (fallible) ability to identify this as being information about the same. My concept has the same referent as the public term, and by holding the steadying hand of language, I have the ability to learn how to extend my conception of this referent to include nonlinguistic means of identifying it. Thus Burge (1979, 1982) is right that what I mean by a term may depend directly on what others in my language community mean by it, indeed, that what I am thinking of can depend on what others mean.

Contrast these cases with one where an apparent cognitive representation has no referent at all. In one place Evans remarks that "[a]n informational state may be of nothing: this will be the case if there was no object which served as input to the information system when the information was produced" (1982, p. 128).[2] Similarly, it certainly is possible that the cognitive systems should sometimes be triggered to produce apparently intentional representations, apparent concepts, by sources entirely foreign to any proper use of them. It is possible to seem to perceive and to seem cognitively to represent objects that are not objects at all. That is, there is no way that the cognitive systems could proceed to reidentify an intentional object in this case that would constitute these systems proceeding in accordance with principles they were designed to instantiate.

As it first begins to develop, then, a substance concept may have a completely determinate extension, or it may be determinate that it has no extension at all. Between these two possibilities are others in which the germ of a substance concept might develop normally from here in any of several ways. These are the cases in which a reference has yet to be "focused," (Perner 1998) thus hovering between possible extensions (¶6.3).

Also, as has been a central theme of this book, if the content of any substance concept proceeds actually to be misidentified, and the mistake is not corrected, so that information about two things is bound together as though they were one, although the representation is not empty, it is at least to a degree equivocal. Correctly identifying a substance in thought has the logical form of contributing to the solution of a coordination problem or, say, of directing one light ray toward a focus with others. Identifying correctly is like focusing the eyes. When both eyes are open but not focused on the same thing, neither eye sees anything clearly, but when both are focused on the same thing, then both see, both see the same, and both see clearly.

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2 On Evans use of the term "information" see Appendix A.

'14.2 Intentional Representation

According to Russell's principle, thinking of something is always grounded in some sort of "acquaintance" in the Russellian sense implying a kind of knowledge of what that thing is. There is no such thing as an object of thought the identity of which is unknown to the thinker. It cannot be that I first think of something and subsequently grasp (or fail to grasp) what it is I am thinking of. This claim is correct, I have argued, for conceptual thought, so long as we understand knowing what one is thinking of as a fallible ability, compatible with the possibility that one can make mistakes about the object of one's thought ('13.5 and '13.6). What I am thinking of conceptually is not determined prior to my ability to reidentify, though it is determined prior to my actual acts of identifying, which may not properly express that ability.

Russell's principle is mistaken, however, if "thought" is understood to cover all forms of mental representation. It is mistaken if taken to be required of intentionality generally. Conceptual representation is marked off by requiring a matching capacity to reidentify its content, but not all intentionality involves concepts. Perception, for example, may have content that the perceiver has no need or ability to reidentify. A full treatment of these more general claims about intentionality is offered in (Millikan 1984, 1993a). Here I will abbreviate only some aspects of that work, enough to show how the claims about substance concepts fit into the overall picture of intentional representation sketched in the earlier essays.

Natural information, as this notion has usually been understood, is contained in an output signal pattern that covaries with the pattern of input from some source of information, through some physical medium or "channel," according to physical law. I call this sort of information "informationL" ("L" for "law").[3] This is not the sense of "natural information" used in most of this book, that sense being explained in Appendix B, but it is likely to be familiar to the reader, so I will use it as a starting point in explaining the general notion of intentional representation.

InformationL is ubiquitous, both in animate and inanimate nature. It has, merely as such, nothing to do with intentionality, nor is it, just as such, of any use to an organism. There are certain conditions, however, under which an output signal containing informationL about a configuration at its source is also an intentional representation of that configuration. To make this the case, the signal carrying informationL has to carry this information "intentionally" in the following sense. It must carry it in accordance with the natural purpose or function of some transmitting or relaying mechanism, a mechanism that has been selected or trained for exactly that job.

If a mechanism has been selected or trained for the job of producing or relaying a certain kind of informationL, that will be because some cooperating or coordinate

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3 This is roughly the way in which Dretske, Fodor and Gibson use the term "information." For discussion, see Appendix B

mechanism, perhaps another phase of the same mechanisms, has a use for this informationL. But informationL, arriving from the environment, relayed through an animal's sensory organs to its brain, arriving in a certain code or vehicle, cannot be of use to the animal unless the animal is designed or has learned to be guided by this sort of vehicle in ways appropriate to the configuration at the information's source. That is, informationL is of no use to an organism unless it can be "interpreted" through the arousal of inner or outer activity of the organism that is appropriate to the state of affairs the information concerns. In sum, informationL that is embodied in an intentional representation is produced or channeled in accordance with the proper functioning of some designed mechanism, where a further proper function of that mechanism is to cooperate with a corresponding "interpreting" mechanism to guide that interpreter in accomplishing some (ultimately practical) function or functions beyond, under the circumstances represented.

Now let me generalize this idea. Only some mechanisms designed to produce intentional representations are designed to do so by producing or transmitting natural informationL. This may well be how direct perception of the spatial layout of the immediate environment is normally accomplished for purposes of direct action guidance. Gibson was probably right about that. But this is not, for the most part, how cognition is accomplished. In its more general form, intentional representation requires only that there be a mechanism designed to produce items bearing a certain correspondence to the distal environment, correspondence in accordance with some definite rules ("semantic rules"), which items ("intentional representations") are to be used to guide another system (the "interpreter") in the performance of certain of its functions.

Now an enormously important feature of designed mechanisms is that they do not always accomplish the functions for which they were designed. Many mechanisms designed either by natural selection or by learning manage to perform their assigned tasks only occasionally. Only occasionally does the slap of a beaver tail on the water actually perform its proper function of saving the beaver's relatives from a danger. In part, this is because its timing only occasionally corresponds to the timing of any real danger. Mechanisms designed to produce intentional representations that correspond by a rule to the distal environment can have these functions yet frequently fail. Compatibly, mechanisms designed to produce intentional representations may be designed to do so, not by the use of channels of natural informationL, where output form corresponds to input form in accordance with natural law, but by the use of quite unreliable statistical methods (see appendix B). The output of the system may correspond to the distal environment just often enough to be more useful than if the organism had no such system in place at all.

What makes intentional representations "represent" their intentional objects is thus quite different from what makes photographs "represent" their subjects. Intentional representations represent what they would need to correspond to for their interpreting mechanisms to use them productively in accordance with design. If they fail to correspond in this way but the interpreting mechanisms are guided by them in the normal way, the result will be unproductive. It is unproductive for beavers to waste energy and

time diving under when there is no danger present. It is unproductive for a worker bee to fly off in the direction a bee dance says unless there is nectar in that direction. But that the intentional representation needs to correspond to the world by a certain rule in order to be productive does not imply that there exists any method by which it can be produced that would guarantee this correspondence. It does not imply, for example, that there must be some method by which its object could always be discriminated from all other objects in accordance with natural law. To represent something it is not necessary that one be able to tell it from all other things.[4]

4 For discussion, see Appendix B.

The "correspondence" that a system producing intentional representations is designed to establish between these representations and their representeds can be thought of as an abstract isomorphism, in this way. Transformations (in the abstract mathematical sense) of the representations correspond to transformations of what is represented, such that different representations map different representeds in a systematic or "productive" way. Intentional representations have, as such, not ordinary extensions but truth conditions.[5] They are not analogous to names or open sentences. Rather, intentional representations always make claims.[6] If they did not make claims, they could not be such as to guide activity appropriately given the existence of their extensions. About danger, for example, there is nothing to be done, nor is there anything to be done about here or about now. But about there is danger here now there may well be something to be done. Similarly, about nectar fifty yards southeast of here there is nothing to be done, unless one reads this as an assertion that there is nectar fifty yards southeast of here.

'14.3 Conceptual and Non-conceptual Intentional Representations

5 More accurately, they have satisfaction conditions. I have omitted discussion here of representations that are imperative rather than indicative. See (Millikan 1984 Chapter 6).

6 Indicative ones do. See note 5 above.

As I have just described it, the intentionality of an intentional representation need not involve concepts of any of the things referred to in its truth conditions. Neither the beaver nor its relatives need a concept of danger **C**a way of collecting together information that regards just danger, as such, over time**C** in order to produce appropriate beaver slaps or to respond to them appropriately by diving under. Similarly, an animal's perception of the spatial layout of its immediate environment for purposes of moving about in it, avoiding obstacles, getting through passages, climbing up things or over things and so forth, need not involve any concepts. Being guided by perception of a tree so as to avoid it as you run by does not require a concept of it, not even merely as an obstacle. You need not be collecting together information about it, nor about trees or obstacles generally, for future use, nor need you be making any inferences concerning these objects based on previous experience. You might be doing so, of course, but you need not. Certainly, say, a deer need not. There can be mental representation, then, without a grasp of the identity of what is represented, hence without knowing what is represented. To suppose otherwise, I suggest, is to relapse into a "passive picture theory of conception" (compare '8.1). Knowing what one is mentally representing requires the ability to track it conceptually, to mark its identity with sameness markers, preparatory to using the information it bears in mediate inference or an analogue (Chapter 13). There is no reason to suppose this sort of marking is required for all uses of perception.[7]

On the other hand, very simple acts of identifying are involved in many nonconceptual tasks. In '10.2, I pointed out that any coordinations among sensory modalities, such as eye-hand coordination, and even the perception of depth using binocular vision, involve simple acts of coidentifying. Similarly, the ability to learn over time how to handle or behave in the presence of an individual, or a stuff, or a kind, requires the ability to reidentify that substance over a variety of encounters with it. Clearly the ability to grasp the identity of what is represented is crucial for routine uses of a great number of representations that are simpler than what one would naturally call "thoughts" or "judgments." When the direction of a sound alerts me to the direction in which a bird can be seen, I have (re)identified a location. I then know (minimally **C**see '4.3, '13.4) what direction the bird is in. When the look of a rope combines with its feel so that these jointly guide my activity of tying a knot, I (re)identify various parts of the rope. I know (minimally) what parts of the rope I am seeing and feeling. On the other hand, knowing what rope I am feeling as I coordinate its sight and its feel is not knowing whether it is the rope Sally was hunting for or the rope I used yesterday for tying the canoe. Similarly, seeing how far off the dart board is for purposes of learning, over a period of time, how to hit the bulls eye at that distance is not seeing how many feet off it is. And I can see how far the dart board is for throwing darts and also know how far off

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7 In (Millikan 1984), I called intentional representations that did their jobs without their semantic values having to be identified "intentional icons," reserving the term "representations" for those whose values did need to be identified for them to perform properly.

the eye chart is in feet without knowing whether these are the same or different distances. Knowing what my inner representations are representing can be a relatively simple affair, involving minimal identifications, certainly not yet involving full-fledged cognition. This suggests that the distinction between perception and cognition is not a sharp one. There are gray areas between.

Perhaps something reminiscent of Evans' "generality constraint" ('13.3) marks off the level of true cognition in the sense of "thought" and "judgment" from more primitive and fundamental levels of mental representation and identification, in the following way. Perceptual representations that guide immediate action need to be rich in specific kinds of information, showing the organism's exact relations to a number of aspects of its current environment directly as they unfold during action. These representations may need to have variable structure of a kind that conforms closely to the variable structure of the organism-environment relations that need to be instantly taken into account. And because they need to be constructed quickly and reliably, they may be constructed by modular systems that are relatively cognitively impenetrable (compare Fodor 1989).[8] The first job of the more disinterested, more general-purpose, cognitive representations, on the other hand, is easy participation in mediate inference. This job makes different demands, there being no way to specify in advance in what specific kinds of inferences such a representation may need to be used. The information captured in cognitive representations is collected for whatever, if anything, it may happen to prove useful for. While the representations of perception need to be cast in highly structured multi-dimensional media suitable to the immediate purposes to which they are dedicated, cognitive representations should be cast in a simpler uniform medium that makes them easy to compare and combine.

Whether or not information can interact in inference depends not on its content but on its vehicle. Putting it graphically, if the first premise of an inference is represented with a mental Venn diagram and the second with a mental sentence, it is hard to see what inference rules could apply to yield a conclusion. Similarly, one might suppose, if the information coming in through the various senses were not translated into something like a common medium for the purposes of theoretical and practical inference, it could not interact in a flexible way. Evans' generality constraint requires that any subject of judgment might be thought with any relevant predicate. The requirement here would be twofold. First, every proposition should be represented such that it could be combined with any other having an overlapping content, so as to make suitable mediate inferences possible. Second, each should be represented such that new functional identity markers could be inserted wherever needed, thus facilitating expansion of one's grasp of identities in the cognitive domain.

'14.4 the Intentionality of Mental Terms for Substances

Intentional representations are produced by systems designed to align them with the

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8 Fodor thinks inference must be involved in this construction, however, whereas I do not.

world according to the semantic rules to which their interpreting devices are adapted or adjusted. The intentional content of an inner sign, what it is about, rests directly on how it is designed to be used by the organism that harbors it. We have seen that it isn't always necessary that these interpreting devices should identify the semantic values of an intentional representation in order to use it. Many intentional representations do their jobs properly without their contents being identified. But the very first function of any discursive or, as I shall say, cognitive representation is to be ready to participate in inferences. Thus the intentional content of the cognitive attitudes must rest directly on this primary function. A cognitive representation is dependent for its very intentionality on its interpreting mechanisms' ability to identify its intentional objects, to know what it represents (Chapter 13). This is the truth, I believe, in Evans' claim that where there is no concept of an object there can be no thinking of it. And it is the truth in the claim made by many philosophers of this century that thinking of a thing necessarily involves dispositions to make inferences concerning it, that intentionality is inseparable from rationality. The intentionality of cognition (but of cognition only) does happen to be inseparable from rationality.

Substance concepts used for cognition are designed for use in mediate inference. Inference moves, paradigmatically, from one cognitive attitude to another. Thus the functions of these substance concepts always require them to appear as elements in complete intentional representations having satisfaction conditions. A word, Frege said, has meaning only in the context of a sentence. Similarly, a discursive concept has a function only in the context of a complete cognitive attitude. That it has an intentional content, that it means anything, is entirely dependent on its capacity to participate in the creation of a variety of complete cognitive attitudes, that is, a variety of intentional representations, as these were described in '14.1.