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Information, Function, and Representation: Fodor vs. Millikan

Scott Shaffer

Every mental phenomenon is characterized by what the Scholastics of the Middle Ages called the intentional (or mental) inexistence of an object, and what we might call, though not wholly unambiguously, reference to a content, direction toward an object (which is not to be understood here as meaning a thing), or immanent objectivity. Every mental phenomenon includes something as object within itself.
—Brentano¹

In the late 19th Century, Brentano revived the issue of intentionality. His goal was to distinguish the mental from the physical. In more recent years, precedence has shifted to the project of naturalization—the attempt to explain intentional states, states that represent, indicate, or in some other way *are about something*, in natural terms.

Explaining how meaning and intentionality can arise from purely physical systems is a daunting task, but a necessary one if we are to move beyond the Cartesian view of the mind-body problem. In other words, if the mind really is just an extension of the physical body, we should be able to explain intentional states in non-intentional terms. Many

¹ Franz Brentano, *Psychology from an Empirical Standpoint*, (London: Routledge and Kegan Paul, 1973) 88.

philosophers of the analytic tradition have spilled oceans of ink trying to clear the issue up. Two schools of thought within the analytic tradition have received the most attention in their attempts to explain intentional states in natural terms: the information (or causal) theory, and the biosemantic theory.

Fred Dretske captures the intuitive appeal of the informational approach when he writes,

expanding metal indicates a rising temperature (and in this sense means that the temperature is rising) whether or not anyone, upon observing the former, comes to the latter... If we are looking for the ultimate source of meaning... here, surely, is a promising place to begin.²

With his asymmetric dependence theory, information theorist Jerry Fodor seeks to provide a theory of content that provides sufficient grounds for a mental token "X" to mean exactly the object X that caused the token "X" (and thus solve the disjunction problem) and shows why it is harder than it sounds.

Ruth Garrett Millikan rejects the informational tradition's focus on the causal relations between represented states of affairs and representational states of mind. Instead, Millikan focuses on the normal conditions that surround representations, and the functions they serve in these normal conditions. This change in focus corresponds with her emphasis on the consumption of representations rather than their production.

The Crude Informational Account

A crude informational theory of mental content could be formulated as follows: a mental token "X" means external

² Fred Dretske 1986, "Misrepresentation" in *Mental Representation: A Reader*, ed. Stephen P Stich and Ted A. Warfield, (Oxford: Basil Blackwell Press, 1994), 157-173.

state X if (and only if) “X” is caused by X, and thus contains information about X. The intuitional appeals of this theory, as well as its grave problems, are plainly obvious.

First, its attractive qualities. The theory is simple. It connects the represented state to the representational state through a direct route, causation. If we are considering the simplest acts of perception as paradigm cases of representation, then this theory seems to fit. For example, suppose a can of soda is sitting in front of me. Rays of light bounce off this can and into my eyes, which in turn transform the rays of light into information that my brain interprets, and from this information, creates a representation of the can. Thus, the representational “can” in my mind means (or refers to, or indicates, or is about) the actual can on the desk in front of me.

While some intuition seems to be captured by the crude informational theory, namely that it is important that some representational states (“cans”) be caused by represented states (cans), it cannot be the whole story. We misrepresent things. If I turn the light in this room off, and someone replaces the can of soda with a can of beer, it is likely that this can of beer will still cause a “can of soda” token in my mind. If both a can of beer and a can of soda can cause the “can of soda” token, then it seems to be the case that the “can of soda” token means *either* a can of soda *or* a can of beer. This is the disjunction problem.

Dretske’s Bacteria

Errors and misperceptions raise the disjunction problem for informational theories of content that purport to connect the meaning of a token “X” to the information that it carries about an object X. Dretske showed that representational systems that rely solely upon natural signs (meaning-sub-n) do not constitute authentic meaning because

they lack the capacity for misrepresentation.³ Dretske illustrates this point with a thought experiment regarding simple bacteria. In this thought experiment, the bacteria's only perceptual faculty are "magnetosomes," organs which reliably determine magnetic north and whose evolutionary purpose is to direct the bacteria towards the nearest geomagnetic pole, so they can swim downwards, away from the toxic, oxygen-rich surface water.

Dretske attempts to use this thought experiment as a primitive example of misrepresentation. These bacteria can be "fooled" into coming to the surface, and consequentially destroying themselves, by placing a magnet near the surface of the water. However, Dretske concludes that this instance of self-destruction is not a result of misrepresentation, but of a breakdown in the normal correlations upon which the bacteria's sensory mechanisms depend (specifically, the connection between magnetic north and *geomagnetic* north), because while it is obvious that in such a circumstance there is something wrong, there is "no reason to place the blame on the sensory mechanism, no reason to say that it is not performing *its* function."⁴ Misrepresentation only occurs, then, when the mistake occurs within a more complex organism with a multiplicity of mechanisms of detecting a property. A system that has a more genuine kind of meaning must have more than one stimulus that is sufficient to cause the token "X". However, a circumstance in which a token of "X" can be caused by non-X Y's forces the crude causal theorist to the unacceptable conclusion that "X" means *X or Y*. But this violates our intuition that "means" is univocal; naturally, we want "X" to mean X and only X.

³ Dretske, 157-173.

⁴ Dretske, 166.

Fodor's Theory of Asymmetric Dependence

Jerry Fodor attempts to provide a satisfying informational theory of mental content. This theory must deal with the disjunction problem as Dretske presents it—that is the same thing as saying that the theory must concede that “X” tokens are sometimes caused by non-X physical states, while at the same time maintaining that “X” means X and only X. Another issue in contemporary philosophy of mind is what is known as Brentano's problem, the allegedly insoluble problem of explaining how a physical object can have an intentional state. The quest to provide a solution to this problem is the main goal of the naturalization project, a project that Fodor strongly supports. He claims that to provide a naturalized theory of content would be to explain how meaning can arise out of entirely non-meaningful physical bits.

With his asymmetric dependence theory, Fodor takes on both the disjunction problem and Brentano's problem. Fodor claims that his asymmetric dependence theory provides naturalistic, atomistic criteria that are sufficient conditions for a token “X” to mean X (and not *X or Y*). In his colloquial first approximation of his theory, he solves the disjunction problem as it relates to cow-caused “cow” tokens and cat-caused “cow” tokens. He says:

“[C]ow” means *cow* and not *cat* or *cow or cat* because *there being cat-caused “cow” tokens depends on there being cow-caused “cow” tokens, but not the other way around*. “Cow” means *cow* because, as I shall henceforth put it, non-cow-caused “cow” tokens are *asymmetrically dependent upon cow-caused “cow” tokens*.⁵

⁵ Fodor, Jerry 1990: “A Theory of Content, II: The Theory” in *Mental Representation: A Reader*, eds. Stephen P. Stich and Ted A. Warfield, (Oxford: Basil Blackwell Press, 1994), 188.

In the final exposition of his asymmetric dependence theory, Fodor lists the criteria (with the exception of criterion 4) as follows:

1. X causes "X"s is a law.
2. Some "X"s are actually caused by X's.
3. For all Y not = X, if Y's qua Y's actually cause "X"s, then Y's *causing* "X"s is asymmetrically dependent on X's *causing* "X"s.
4. Some "X"s are actually caused by non-X's. (robustness condition)

The "robustness condition" is not included in Fodor's list of criteria when he restates his theory in *A Theory of Content II: The Theory*, but he touts his incorporation of the robustness of meaning as a main virtue of his theory and claims that "what's *really* wrong" with the teleological theory is that it underestimates this robustness; "in actual fact, 'cow' tokens get caused in *all sorts* of ways, and they all mean *cow* for all of that."⁶ He also claims that "the dependence of Cs on Bs is robust only if there are non-B-caused Cs." This inclusion of robustness and, by the same token, exclusion of inherent normativity can be seen as a reaction to what Fodor sees as the over-normativity of teleological theories of content.

Fodor claims that while the disjunction problem is caused by errors, it is really a problem about the difference between information and meaning.⁷ Information is ubiquitous; certain kinds of spots carry information about measles, clouds carry information about the weather, and smoke carries information about fire. This is not to say that smoke means (non-naturally) anything about fire; it is merely a natural sign, and no intentionality is involved. Fodor's theory captures this sentiment. Even though fire causing "smoke" tokens could be a law, it is a law that depends

⁶ Fodor, 181.

⁷ Fodor, 181.

asymmetrically upon the laws that fire causes smoke and that smoke causes “smoke” tokens. Were fire not to cause smoke, or smoke not to cause “smoke” tokens, then the fire-“smoke” connection would be broken, but there are no such dependencies of the fire-smoke or smoke-“smoke” laws on the fire-“smoke” law.

Objections to Fodor

In the final section of Adams and Aizawa’s essay “Fodorian Semantics,” they attack the heart of Fodor’s theory, the robustness of meaning. More specifically, they attack the usefulness of this part of the theory to the naturalization project. The robustness condition, in conjunction with the asymmetric dependence condition, is meant to circumvent the disjunction problem by accepting that non-X’s cause “X”’s as long as the non-X-“X” law is metaphysically asymmetrically dependent upon the X-“X” law. However, if this robustness is to explain true “X” tokens caused by non-Xs, in non-semantic terms, it surely fails. “So what could the explanation of the synchronic, asymmetric dependency be, if it involves nothing semantic? Nothing reasonable comes to mind.”⁸

The example of steak-caused “cow” tokens is illustrative of this objection. When one looks at a steak and thinks of a cow, asymmetric causal dependence has nothing to do with this robust tokening; the meaning of cow and steak must be introduced to the equation. For there is nothing about the “cow”-“steak” connection that is dependent upon the cow-“cow” connection; it is because “cow” *means* cow, not because “cow” *is caused by* cow, that “steak” and “cow” have any connection whatsoever. This

⁸ Fred Adams and Ken Aizawa 1990, “Fodorian Semantics,” in *Mental Representation: A Reader*, eds. Stephen P. Stich and Ted A. Warfield, (Oxford: Basil Blackwell Press, 1994), 223-242.

introduction of meaning through the back door violates the naturalization project, and thus does not solve Brentano's problem.

At first glance, it seems that the naturalization project and the disjunction problem are both important, but not interrelated; it seems that one could have a naturalized theory of content that does not solve the disjunction problem (such as the crude informational account), and a non-naturalized one that solves the disjunction problem (perhaps this asymmetric dependence theory). But conceding this would be to forget Fodor's treatment of the disjunction problem. He believes that it is a result of the confusion between information and meaning, so his solution to the disjunction problem hinges on his theory's success in solving Brentano's problem and the naturalization project. With Brentano's problem unsolved and the meaning-information gap still unexplained, the disjunction problem still stands as a fatal critique to the causal/informational theory of content.

Fodor attempts to avoid the disjunction problem by saying that meaning is (sometimes) a matter of metaphysical dependencies on *ceteris paribus* laws rather than just physical, causal relations. On the face of it, this seems to both answer the disjunction problem and incorporate intuitions that we have about the "robustness of meaning." However, after a closer look at the naturalization entailed by Fodor's theory, it is apparent that the "robustness of meaning" in fact sneaks meaning in through the back door, so to speak. This leaves Fodor without a clear distinction between meaning and information, which is the very distinction that he claims the disjunction problem demands clarified. Therefore, Fodor's asymmetric dependence theory does not solve the disjunction problem.

Millikan's Biosemantics

Ruth Garrett Millikan approaches the problem of intentionality from a slightly different angle. She sees the task of defining content-fixing circumstances for causal or

informational theories of content as impossible. Much more appropriate, according to Millikan, would be an appeal to the teleology, or function, of a biological system. In expounding on this move, she explores what it means for a system to use a representation.

Causal or informational theories of content (such as Fodor's) focus on the production of representations. If all of the conditions of Fodor's asymmetric dependence theory are met, then the representational system has allegedly successfully created a representation of X, the content of which is given by a causal story. But how did this system come to be a *representational* system in the first place?

Millikan notes that a number of other writers have said that what it means for a system to have representational status is for it to have a function to represent, detect, or indicate. But this function is more important than just a background assumption. The model of a representational system that Millikan uses includes two parts: a producer and a consumer. The producer part interacts with the external world and obeys rules which dictate the creation of representations. The consumer part takes these representations and determines an appropriate course of action. In this model, the method of production of representations is neither as interesting nor as important as the rules that the consumer follows to use these representations. Millikan argues that "a good look at the consumer part of the system ought to be all that is needed to determine not only the representational status but the representational content."⁹ Millikan suggests that we shift our focus from the production of representations to their consumption in order to understand their function, and thus their meaning.

⁹ Ruth Garrett Millikan, "Biosemantics," *The Journal of Philosophy* 86 no. 6 (1989), 286.

Examples in the Non-Human World

A biological structure's proper function is that effect of the structure which perpetuates the survival of the whole system. Millikan introduces two examples that illustrate a few peculiarities of proper functions. First, she writes about a community of beavers.¹⁰ In this community, whenever a beaver senses danger, it splashes the water with its tail. The other beavers know to interpret this action as a sign of danger and to take cover. The normal conditions—i.e., the circumstance in which the action performs its function and benefits the group—is that a danger is present. Millikan stresses that “normal,” the way she uses it, does not mean “usual” or “average.” The beavers could mistakenly splash, or cry “wolf,” twice as often as they signal an actual threat. The proper function of the splash-take cover response would still be to warn the community of danger. The normal conditions are the conditions that must be present for a specific function to be properly performed.

Second, Millikan introduces an example regarding a bee hive.¹¹ These honey bees perform “dances” to indicate to the rest of the hive the distance and direction to the source of nectar that they have found. The watching bees are the representation consumers. The normal conditions are that the distance and direction of the nectar are correlated with the tempo and orientation of the bee's dance. If the watching bees can successfully find the nectar the dancing bee was referring to, then the dance has fulfilled its function and successfully *represented* the location of the nectar.

Dretske's magnetosomic bacteria, on Millikan's view, make sense as representational systems. Earlier in this essay, we saw how this thought experiment presents a challenge to informational theories of content. By focusing on the consumption of representations and their normal conditions,

¹⁰ Millikan, 288.

¹¹ Millikan, 288.

the biosemantic account has no trouble giving a story explaining the representations (and misrepresentations) of the bacteria. The normal conditions for the bacteria's magnetosomes proper functioning are that the strongest magnetic field in the proximity of the bacteria be the geomagnetic field. If this condition is met, then the bacteria successfully use their representational apparatus to avoid the toxic, oxygen-rich surface water.

Belief and Function

Millikan considers the objection to the categorization of belief fixation and consumption as biological proper activities and the objection that her theory, when applied to belief fixation, is nothing more than naïve adaptationism. She concedes that “to believe that every structure must have a function would be naïve,”¹² implicitly lending credence to spandrel theory. However, she points to the ubiquity of intentionality and claims that it is as ridiculous to claim that

to suspect that the brain has not been preserved for thinking with or that the eye has not been preserved for seeing with—to suspect this, moreover, in the absence of any alternative hypotheses about causes of the stability of these structures—would be totally irresponsible.¹³

It is important to note that Millikan is not equating true beliefs with those acquired through the evolutionarily inherited belief-fixing mechanism. Like Quine, Millikan recognizes that our belief systems are underdetermined by actual experience.

Perhaps, given the difficulty of designing highly accurate belief-fixing mechanisms, it is actually advantageous to fix too many

¹² Millikan, 293.

¹³ Millikan, 293.

beliefs, letting some of these be false, rather than fix too few beliefs.¹⁴

While reflecting on the nature of our representations, Millikan stands in awe of how “radical and powerful”¹⁵ this evolutionary accidental accomplishment has been. She claims that the solution of mental representation was one which “cut to the very bone of the ontological structure of the world.” She also argues that “negation, and hence explicit contradiction, is dependent upon subject-predicate, that is, propositional, structure and vice versa.”¹⁶ Millikan’s mentioning of our structure of language is telling of a connection between her thesis and Steven Pinker’s in *The Language Instinct*.

Conclusion

Millikan’s theory of mental content is more intuitive and broadly applicable than Fodor’s. Since Fodor only offers sufficient conditions for intentionality, we cannot use his theory to determine which cases are not instances of representation, much less which systems are representational. Millikan’s claim that we can determine representational status and representational content by examining the representation consumers in any given system is very powerful.

However, her defense of belief-fixing mechanisms as proper functions is not convincing. If Millikan wishes to hold that all our beliefs are the product of a mechanism that exists because it is evolutionarily advantageous, and that this mechanism over-generalizes to create as many true beliefs as it can—at the cost of creating some false beliefs—then it seems her foundation for “Truth” is unstable. One could easily imagine that there are different mechanisms for acquiring different types of beliefs. We certainly do not

¹⁴ Millikan, 289.

¹⁵ Millikan, 294.

¹⁶ Millikan, 297.

acquire our moral, political, practical/common sense, and philosophical beliefs all in the same manner, nor do they require the same type or degree of verification (or corroboration) for their application. It might seem, then, that the type of beliefs Millikan is generating about intentionality and function are those most removed from verification through or corroboration with experience.

Her claim that our method of representation “cuts to the ontological bone” of the world is worrisome, too. The claim that the world comes pre-packaged in representable bits is certainly optimistic, to say the least. It echoes Bertrand Russell’s philosophy of logical atomism and Ludwig Wittgenstein’s *Tractatus Logico-Philosophicus*, both of which have been criticized by brilliant minds, including Wittgenstein himself. Richard Rorty was the latest and greatest critic of this view of language. In *Contingency, Irony, and Solidarity*, he reminds us:

The world does not speak. Only we do. The world can, once we have programmed ourselves with a language, cause us to hold beliefs. But it cannot propose a language for us to speak. Only other human beings can do that.¹⁷

However, this is perhaps more a critique of the analytic tradition as a whole than of either Fodor or Millikan’s theories in themselves.

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