

And, with Braithwaite's definition of "believe," it would be difficult to preserve the distinction which, apparently, we ought to make between *believing* a proposition and *acting upon* it (see Chapter One, Section 2). I have proposed detailed criticisms of a number of such definitions of "believe" in "Sentences about Believing," *Proceedings of the Aristotelian Society*, LVI (1955–1956), 125–48. Some of

the difficulties involved in defining *purpose* nonintentionally are pointed out by Richard Taylor in "Comments on a Mechanistic Conception of Purpose," *Philosophy of Science*, XVII (1950), 310–17, and "Purposeful and Nonpurposeful Behavior: A Rejoinder," *ibid.*, 327–32.

14. C. K. Ogden and I. A. Richards, *The Meaning of Meaning*, 5th ed. (London, 1938), p. 71.

A Recipe for Thought

Fred Dretske

1. If You Can't Make One, You Don't Know How It Works

There are things I believe that I don't know how to say—at least not in such a way as to make them come out true. The title of this section is a case in point. I really do believe that, in the relevant sense of all the relevant words, if you can't make one, you don't know how it works. I just don't know how to specify the relevant sense of all the relevant words.

I know, for instance, that a person can understand how something works and, for a variety of reasons, still not be able to build it. The raw materials are not available. She can't afford them. He is too clumsy or not strong enough. The police won't let him. I also know that a person may be able to make one and still not know how it works. He doesn't know how the parts work. I can solder a snaggle to a radzak, and this is all it takes to make a gizmo, but if I do not know what snaggles and radzaks are, or how they work, making one isn't going to tell me much about what a gizmo is. My son once assembled a television set from a kit by carefully following the instruction manual. Understanding next to nothing about electricity, though, he still had no idea of how television worked.

I am not, however, suggesting that being able to build one is sufficient for knowing how it works. Only necessary. And I do not much care about whether you can actually put one together.

It is enough if you know how one is put together. But, as I said, I do not know how to make all the right qualifications. So I won't try. All I intend by my provocative claim is that philosophical naturalism is motivated by a constructivist model of understanding. It embodies something like an engineer's ideal, a designer's vision, of what it takes to really understand how something works. You need a blueprint, a recipe, an instruction manual, a program. That goes for the mind as well as anything else. If you want to know what intelligence is, you need a recipe for creating it out of parts you already understand.

In speaking of parts one already understands, I mean, of course, parts that do not already possess the capacity or feature one follows the recipe to create. One cannot have a recipe for a cake that lists a cake, not even a small cake, as an ingredient. One can, I suppose, make a big cake out of small cakes, but recipes of this sort will not help one understand what a cake is (though they might help you understand what a *big* cake is). As a boy, I once tried to make fudge by melting caramels in a frying pan. All I succeeded in doing was ruining the pan. Don't ask me what I was trying to do—change the shape of the candy, I suppose. There are perfectly respectable recipes for cookies that list candy (e.g., gumdrops) as an ingredient, but one cannot have a recipe for *candy* that lists candy as an ingredient. At least it won't be a recipe that tells

you how to make candy or helps you understand what candy is. The same is true of minds. That is why recipes for thought can't have interpretive attitudes or explanatory stances among the ingredients—not even the attitudes and stances of others. That is like making candy out of candy—in this case, one person's fudge out of another person's caramels. You can do it, but you still won't know what candy is.

2. Information and Intentionality

In comparing a mind to candy and television, I do not mean to suggest that minds are the sort of thing that can be assembled from kits in your basement or kitchen. There are things, including things one fully understands, things one knows how to make, that cannot be assembled that way. Try making Rembrandts or one hundred dollar bills in your basement. What you produce may look genuine, it may pass as authentic, but it won't be the real thing. You have to be the right person, occupy the right office, or possess the appropriate legal authority in order to make certain objects. There are recipes for making money and Rembrandts, and knowing them is part of knowing what money and Rembrandts are, but these are not recipes you and I can use. Some recipes require a special cook.

This is one (but only one) of the reasons it is wrong to say, as I did above, that if you cannot make one, you do not know how it works. It would be better to say, as I did earlier, that if you do not know *how* to make one, or *how* one is made, you do not fully understand it.

Some objects are constituted, in part, by their relationships to other objects. Rembrandts and one hundred dollar bills are like that. So are cousins and mothers-in-law. That is why you can't build my cousin in your basement while my aunt and uncle can. Though there is a recipe knowledge of which is necessary for understanding what it takes to be my cousin, it is not a recipe *you* can use to build what it enables you to understand. The mind, I think, is like that, and I will return to this important point in a moment.

It is customary to think of naturalistic recipes for the mind as starting with extensional ingredients and, through some magical blending process, producing an intentional product: a thought, an experience, or a purpose. The idea behind this proscription of intentional ingredients seems to be that since what we are trying to

build—a thought—is an intentional entity, our recipe cannot use intentional ingredients.

This, it seems to me, is a mistake, a mistake that has led otherwise sensible philosophers to despair of ever finding a naturalistic recipe for the mind. It is a mistake that has given naturalism an undeserved bad name. The mistake is the same as if we proscribed using, say, copper wire in our instruction manual for building an amplifier because copper wire conducts electricity—exactly what the thing we are trying to build—an amplifier—does. But there is nothing wrong in listing copper wire in one's recipe for building an amplifier. An amplifier recipe is supposed to help you make (and, thus, understand) how things amplify electricity, not how something conducts electricity. That is why you get to use conductors of electricity as components in a recipe for building an amplifier. Conductors are eligible ingredients in amplifier recipes even if one does not know how conductors manage to conduct. An eligible ingredient, once again, is an ingredient, a part, a component, that does not already have the capacity or power one follows the recipe to create. That is why one can know what gumdrop cookies are, know how to make them, without knowing how to make gumdrops or what, exactly, gumdrops are.

The same is true for mental recipes. As long as there is no mystery—at least not the *same* mystery—about how the parts work as how the whole is supposed to work, it is perfectly acceptable to use intentional ingredients in a recipe for thought, purpose, and intelligence. What we are trying to understand, after all, is not intentionality, *per se*, but the mind. Thought may be intentional, but that isn't the property we are seeking a recipe to understand. As long as the intentionality we use is not itself mental, then we are as free to use intentionality in our recipe for making a mind as we are in using electrical conductors in building an amplifier or gumdrops in making cookies.

Consider a simple artifact—a compass. If it was manufactured properly (don't buy a cheap one), and if it is used in the correct circumstances (the good ones come with directions), it will tell you the direction of the arctic pole.¹ That is what the pointer indicates. But though the pointer indicates the direction of the arctic pole, it does not indicate the whereabouts of polar bears even though polar bears live in the arctic. If you happen to know this fact about polar bears, that they live in the arctic, you could, of course, figure out where the polar

bears are by using a compass. But this fact about what you could figure out *if you knew* does not mean that the compass pointer is sensitive to the location of polar bears—thus indicating their whereabouts—in the way it indicates the location of the arctic pole. The pointer on this instrument does not track the bears; it tracks the pole. If there is any doubt about this, watch the compass needle as you move the polar bears around. It won't even wiggle.

Talking about what a compass indicates is a way of talking about what it tracks, what information it carries, and a compass, just like any other measuring instrument, can track one magnitude without tracking another even though these conditions co-occur. Talk about what instruments and gauges indicate or measure creates the same kind of intensional (with an “s”) context as does talk about what a person knows or believes. Knowing or believing that *that* is the north pole is not the same as knowing or believing that *that* is the habitat of polar bears even though the north pole is the habitat of polar bears. If we use intensional (with an “s”) discourse, referentially opaque contexts, as a guide to intentional (with a “t”) phenomena, then we have, in a cheap compass, something we can buy at the local hardware store, intentionality. Describing what such an instrument indicates is describing it in intensional terms. What one is describing with these intensional terms is, therefore, in this sense, an intentional state of the instrument.

It is worth emphasizing that this is not derived or in any way second-class intentionality. This is the genuine article—*original* intentionality as some philosophers (including this one) like to say. The intentional states a compass occupies do not depend on our explanatory purposes, attitudes, or stances. To say that the compass indicates the direction of the arctic pole is to say that the position of the pointer depends on the whereabouts of the pole. This dependency exists whether or not we know it exists, whether or not anyone ever exploits this fact to build and use compasses. The intentionality of the device is not like the intentionality of words and maps, borrowed or derived from the intentionality (purposes, attitudes, knowledge) of its users. The power of this instrument to indicate north *to* or *for us* may depend on our taking it to be a reliable indicator (and, thus, on what we believe or know about it), but its *being* a reliable indicator does not depend on us.

Intentionality is a much abused word and it

means a variety of different things. But one thing it has been used to mean is some state, condition, activity or event, whose description generates an opaque context, a context in which coextensional terms cannot be automatically substituted for one another. This is what Chisholm describes as the third mark of intentionality.² Anything exhibiting this mark is about something under an aspect. It has an aspectual shape.³ The compass needle is about the arctic under one aspect (as the location of the north pole) and not others (as the habitat of polar bears). This is the same way our thoughts can be about a place under one aspect (as where I was born) but not another (as where you were born). If this is, indeed, one thing that is meant by speaking of a state, condition, or activity as intentional, then it seems clear that there is no need to naturalize intentionality. It is already a completely natural phenomenon, a pervasive feature of our physical world. It exists wherever you find dark clouds, smoke, tree rings, shadows, tracks, lightning, flowing water, and countless other natural conditions that indicate something about how the rest of the world is constituted.

Intentional systems, then, are not the problem. They can be picked up for a few dollars at your local hardware store. We can, therefore, include them on our list of ingredients in our recipe for building a mind without fear that we are merely changing the shape of the candy. What we are trying to build when we speak of a recipe for building a mind is not merely a system that exhibits intentional properties. We already have that in systems that are in no way mental. Rather, what we are trying to build is a system that exhibits that peculiar array of intentional properties that characterizes thought. We are, in particular, trying to build systems that exhibit what Chisholm describes as the first mark of intentionality, the power to say that so-and-so is the case when so-and-so is not the case, the power to misrepresent how things stand in the world. Unlike compasses, these fancy items are not to be found on the shelves of hardware stores. For them we need a recipe.

3. Misrepresentation

Let us be clear about what we are looking for, what we seek a recipe to create. If we are trying to build a thought, we are looking for something that can not only say that *x* is *F* without saying *x* is *G* (despite the co-extensionality of “*F*” and

"G"⁴), thus being about *x* under an aspect, we are looking for something that can say this, like a thought can say it, even when *x* is not *F*. Without this, we have no naturalistic understanding of what it is we think, no theory of meaning or content. For meaning or content, the what-it-is one thinks, is, like intelligence and rationality, independent of the truth of what one thinks. So a recipe for understanding misrepresentation is, in effect, a recipe for constructing meanings and, therefore, genuinely intelligent systems.

Jerry Fodor has recently focused attention on what he calls the disjunction problem for naturalistic theories of mental representation.⁵ The problem is one of explaining how, in broadly causal terms, a structure in the head, call it *R*, could represent, say, or mean that something was *F* even though a great many things other than something's being *F* are capable of causing *R*. How can the occurrence of *R* mean that something is *F* when something's being *F* is only one of the things capable of causing *R*?⁶ For someone trying to formulate an information-based recipe for thought, this is, indeed, a vexing problem. But I mention the problem here only to point out that this problem is merely another way of describing the problem of misrepresentation. For if one could specify a recipe for building systems capable of misrepresentation—capable, that is, of saying that something was *F* when it wasn't—then one would have a recipe for meaning, a recipe for constructing structures having a content that was independent of causes. For anything that can misrepresent something as being *F* is, of necessity, something whose meaning is independent of its causes, something that can mean *cow* even when it is caused by a horse on a dark night. It is, therefore, something whose meaning is less than the disjunction of conditions capable of causing it, something whose meaning (in the words of Antony and Levine⁷) is "detached" from causes. A naturalistic recipe for misrepresentation, then, is a recipe for solving the disjunction problem.⁸ One way of solving problems is to show that two problems are really, at bottom, the same problem. So we are making progress.

For this problem artifacts are of no help. Although clocks, compasses, thermometers, and fire alarms—all readily available at the corner hardware store—can misrepresent the conditions they are designed to deliver information about, they need our help to do it. Their representational successes and failures are under-

written by the purposes and attitudes of their designers and users. As representational devices, as devices exhibiting a causally detached meaning, such instruments are not, therefore, eligible ingredients in a recipe for making thought.

The reason the representational powers of instruments are not, like their indicative (information-carrying) powers, an available ingredient in mental recipes is, I hope, obvious enough. I will, however, take a moment to expand on it in order to set the stage for what follows.

Consider the thermometer. Since the volume of a metal varies lawfully with the temperature, both the mercury in the glass tube and the paper clips in my desk drawer carry information about the local temperature. Both are intentional systems in that minimal, that first, sense already discussed. Their behavior depends on a certain aspect of their environment (on the temperature, not the color or size, of their neighbors) in the same way the orientation of a compass needle depends on one aspect of its environment, not another. The only relevant difference between thermometers and paper clips is that we have given the one volume of metal—the mercury in the glass tube—the job of telling us about temperature. The paper clips have been given a different job. Since it is the thermometer's job to provide information about temperature, it (we say) misrepresents the temperature when it fails to do its assigned job just as (we say) a book or a map might misrepresent the matters about which they purport to inform us. What such artifacts say or mean is what they have the job of indicating, and since you do not lose your job—at least not immediately—merely by failing to successfully perform your job, these instruments continue to mean that a certain condition exists even when something *else* causes them to perform. Meanings are causally detached from causes for the same reason that functions are causally detached from actual functioning. This is why thermometers can, while paper clips cannot, "say" something false about temperature.

But, as I said, thermometers can't do this by themselves. They need our help. We are the source of the job, the function, without which the thermometer could not say anything false. Take us away and all you have is a tube full of mercury being caused to expand and contract by changes in the temperature—a column of metal doing exactly what paper clips, thumb tacks, and flag poles do. Once we change our attitude, once we stop investing informational trust in it, the instrument loses its power to misrepresent.

Its meaning ceases to be detached. It becomes merely a purveyor of information.

4. Natural Functions

Though representational artifacts are thus not available as eligible ingredients in our recipe for the mind, their derived (from us) power to misrepresent is suggestive. If an information-carrying element in a system could somehow acquire the function of carrying information, and acquire this function in a way that did not depend on our intentions, purposes, and attitudes, then it would thereby acquire (just as a thermometer or a compass acquires) the power to misrepresent the conditions it had the function of informing about. Such functions would bring about a detachment of meaning from cause. Furthermore, since the functions would not be derived from us, the meanings (unlike the meaning of thermometers and compasses) would be original, undervied, meaning. Instead of just being able to build an instrument that could fool us, the thing we build could, quite literally, itself be fooled.

If, then, we could find naturalistically acceptable functions, we could combine these with natural indicators (the sort used in the manufacture of compasses, thermometers, pressure gauges, and electric eyes) in a naturalistic recipe for thought. If the word “thought” sounds a bit fancy for the contraption we are assembling, we can describe the results in more modest terms. What we would have is a naturalistic recipe for representation, a product that would have, quite apart from its creator’s (or anyone else’s) purposes, attitudes, or thoughts, a propositional content that could be false. If that isn’t quite a recipe for *bérnaise sauce*, it is at least a recipe for a passable gravy. I’ll come back to the *bérnaise sauce* in a moment.

What we need in the way of another ingredient, then, is some process whereby elements can acquire, on their own, an information-carrying function. Where might we find these natural processes? There are, as I see it, two possible sources: one phylogenetic, the other ontogenetic.

If the heart and kidneys have a natural function, something they are supposed to be doing independently of our knowledge or understanding of what it is, then it presumably comes from their evolutionary, their selectional, history.⁹ If the heart has the function of pumping blood, if that is why it is there,¹⁰ then, by parity of reasoning, the senses (depending on actual selectional his-

tory) might have an information-providing function, the job of “telling” the animal in whom they occur what it needs to know in order to find food and mates and avoid danger. If this were so, then, the natural function of sensory systems would be to provide information about an organism’s optical, acoustic, and chemical surroundings. There would thus exist, inside the animal, representations of its environment, elements capable of saying something false. Though I have put it quite crudely, this, I take it, is the idea that inspires biologically oriented approaches to mental representation.¹¹

There is, however, a second, an ontogenetic, source of usable (in naturalistic recipes) functions. Think of a system with needs, certain things it must have in order to survive.¹² In order to satisfy those needs it has to do A in conditions C. Nature has not equipped this system with a mechanism that will automatically trigger A in conditions C. There is, in other words, no instinct to A in circumstances C. Maybe C is a condition that has only recently appeared in this animal’s natural habitat. Think of C as an attractive (to this kind of animal) mushroom that is quite poisonous. The animal has the sensory resources for picking up information about (i.e., registering) the presence of C (it looks distinctive), but it does not have an instinctive, a genetically hard-wired, reaction to C. It can perceive C, but it has not yet learned to avoid C. We could wait for natural selection to solve this problem for the species, for the descendants of this animal, but if the problem—basically a coordination problem—is to be solved at the individual level (if *this* animal is to survive)—learning must occur. Some internal sign or indicator of C—the animal’s sensory registration of C—must be made into a cause of A. Control circuits must be reconfigured by inserting this internal sign into the behavioral chain of command. Short of a miracle—the fortuitous occurrence of A whenever C is encountered—this is the only way the coordination problem can be solved. The internal indicators must be harnessed to effector mechanisms so as to coordinate output to the conditions they carry information about. Learning of this kind has the same results for the individual as do the longer-term evolutionary solutions for the species: internal elements that supply needed information acquire the function of supplying it by being drafted into the control loop because they supply it.¹³ They are there, doing what they are doing, *because* they supply this information.

Obviously this ingredient, this source of natural functions, cannot be ordered from a spare parts catalog. There is nothing one can squirt on a temperature indicator that will give it the function of indicating temperature, nothing we can rub on photo-sensitive pigment that will give it the job of detecting light. If something is going to get the function, the job, the purpose, of carrying information in this way, it has to get it on its own. We can't give it.¹⁴ If the only natural functions are those provided by evolutionary history and learning, then, no one is going to build a thinker of thoughts, much less a mind, in the laboratory. This would be like building a heart, a real one, in your basement. If hearts are essentially organs of the body having the biological function of pumping blood, you can't build them. You can wait for them to develop, maybe even hurry things along a bit by timely assists, but you can't assemble them out of ready-made parts. These functions are results of the right kind of history, and you cannot, not *now*, give a thing the right kind of history. There is a recipe for building internal representations, but it is not a recipe you or I, or anyone else, can use to build one.

5. The Disjunction Problem

There are reasonable doubts about whether a recipe consisting of information and natural teleology (derived from natural functions—either phylogenetic or ontogenic) is capable of yielding a mental product—something with an original power to misrepresent. The doubts exist even with those who share the naturalistic vision. Jerry Fodor, for instance, does not think Darwin (or Skinner, for that matter) can rescue Brentano's chestnuts from the fire.¹⁵ Teleological stories about intentionality, he says, do not solve the disjunction problem. Given the equivalence of the disjunction problem and the problem of misrepresentation, this is a denial, not just a doubt, that evolutionary or learning-theoretic accounts of functions are up to the task of detaching meaning from cause, of making something say COW when it is caused by something other than a cow.¹⁶

I agree with Fodor about the irrelevance of Darwin for understanding mental representation. I agree, however, not out of a general skepticism about teleological accounts of meaning, but because I think Darwin is the wrong place to look for the functions underlying the kind of *mental* representations (beliefs, thoughts, judg-

ments, preferences, and their ilk) that explain *action*—the sort of voluntary or deliberate behavior for which we typically have reasons. I expect Darwin to help us understand why people blink, reflexively, when someone pokes a finger at their eye, but not why they (deliberately) wink at their friend. There are probably internal representations (of objects approaching the eye) involved in the blink reflex, representations that have an evolutionary origin, but these are not the sort of representations (beliefs, purposes, and intentions) at work in explaining why we wink at a friend or pack for a trip. If we are looking for a naturalized semantics for thought, the sort of representation that helps explain action, we will have to get our teleology from somewhere else. Darwin won't help us because Darwin is concerned with precisely those behaviors the explanatory mechanisms for which are genetically determined—precisely those behaviors that are not voluntary.

Nonetheless, wherever we get the teleology, Fodor thinks it won't solve the disjunction problem and is, therefore, hopeless as an account of thought content. I disagree. I have tried to supply the details in *Explaining Behavior* so I won't repeat myself here. Let me here mention only a crucial point. An historical theory of content is not, as Fodor thinks, restricted to assigning content in terms of the objects or conditions that actually figured in the development of the representation. If R, a COW indicator, gets its function of indicating cows by "exposure" to only Jersey cows, this does not mean that R means (has as its representational content) JERSEY COW. Whether it means COW, JERSEY COW, or, perhaps, simply ANIMAL, will depend (as Fodor likes to say) on the counterfactuals. In indicating that yonder object is a Jersey cow, R also indicates that it is a cow and, therefore, an animal. It indicates all these things. But though R carries all these pieces of information, a developmental theory of content identifies what R has the function of indicating—hence, what R represents—with that particular piece of information that was causally relevant in the selectional process by means of which R was recruited for causal duties. Was it JERSEY COW, COW, or, perhaps, simply, ANIMAL, the indication of which led to R's recruitment as a determinant of system output? The answer to this question is an answer to the question, "What does R represent?" and it requires an evaluation of the counterfactuals that Fodor thinks relevant to a determination of content.

6. The Recipe

What we have, then, is the following recipe for making a thought. It does not give us a very fancy thought—certainly nothing like the thoughts we have every day: that tomorrow is my birthday or that I left my umbrella in the car. But one thing at a time. The recipe will do its job if it yields *something*—call it a “protothought”—that has belief-like features. We can worry about the fancy trimmings later.

RECIPE FOR THOUGHT: Take a system that has a need (see footnote 12) for the information that F, a system whose survival or well-being depends on its doing A in conditions F. Make sure that this system has a means of detecting (i.e., an internal element that indicates) the presence of condition F. Add a natural process, one capable of conferring on the element that carries information F the function of carrying this piece of information. Of course, you don’t just “add” this process the way you add spices in a recipe for lasagna. Adding the function is more like *waiting* for dough to rise. There is nothing you can do but sit back and hope things develop in the right way. And just as you cannot put yeast in just anything and expect it to rise (it doesn’t work in sand), you cannot put indicators of F in just anything having a need for this information and expect it to spontaneously generate representations of F. You need a system with the capacity to reorganize control circuits so as to exploit this information in achieving coordination of its behavior with the conditions (F) it is getting information about. These are pretty special sorts of systems, to be sure. They are systems capable of learning. I have no doubt that living systems of a certain level of complexity are the only ones able to perform the trick. However special they might be, though, they needn’t be systems that already possess powers of representation. In requiring systems of this sort, therefore, we are not using tainted ingredients in our recipe for thought.

If all goes well, when the process is complete, the result will be a system with internal resources for representing (with the associated power of misrepresenting) its surroundings. Furthermore, that this system represents, as well as what it represents, will be independent of what we know or believe about it. For we, the cooks, are not essential parts of this process. The entire process can happen spontaneously and, when it does, the system will have its own cache of *original* intentionality.

7. Rationality: The Functional Role of Thought

Whether this is really enough to have supplied a recipe for thought depends, of course, on just what one demands of thought. What does it take to be a thought? If all it takes is possession of content, then, perhaps, we have supplied a recipe of sorts. But the product is pretty disappointing, a mere shadow of what we know (in ourselves and others) to be the fullest and richest expression of the mind. What I have described might, after all, be realized in a snail. What we want (I expect to hear) is something more, something exhibiting the complex dynamics, both inferential and explanatory, that our thoughts have. To have a thought about cows it isn’t enough to have an internal, completely isolated, cow representation. To be a cow thought this representation must actually do what cow thoughts do. It must be involved in reasoning and inference about cows; it must (together with cow-directed desires) explain cow-related behavior. It must, together with cow-desires, rationalize cow-directed attitudes.

There is validity to this complaint. If we are going to make a thought we want the product to both look and behave like a thought. What we have so far devised may have some of the features of thought. At least it has a representational content or the sort we associate with thought. There is, however, nothing to suggest that our product will behave like a thought. Why, then, advertise the recipe as a recipe for thought? I have, after all, already conceded that there may be representations of this sort, mechanisms in the body having an indicator function, that are not *mental* representations at all. When the underlying functions are phylogenetic (e.g., in the processes controlling various reflexes), the representations are not thoughts. They have a content, yes, but they do not behave like thoughts. They do not, for instance, interact with desires and other beliefs to produce intelligent and purposeful actions. Why, then, suppose that when the functions are ontogenetic, when they develop in learning, the results are any better qualified to be classified as mental? As genuine thought? An edge detector in the visual system might have the function of detecting edges and, for this reason, represent edges, but it is not—surely not for this reason alone—a thought about edges.

Since I have addressed this issue elsewhere,¹⁷ I will merely sketch the answer. A system that acquires, in accordance with our recipe, and in

its own lifetime, the power to represent the objects in its immediate environment will also, automatically, be an intelligent system, one capable of behaving in a rational way. To see why this is so, consider the process by means of which an indicator of F acquires the function of providing the information that F and, thereby, becomes a representation of F. In order to become the thought that F, this element must acquire the job of providing information about the F-ness of things. The only way it can acquire this function is by doing (i.e., causing) something—e.g., helping to bring about behavior A in condition F—that is beneficial to the organism when it wants or needs to do A. If the things this element causes are not useful or beneficial in some way, if they do not contribute to the satisfaction of the system's needs and desires, why should the element be selected to cause them? To acquire the function of indicating F, to become (thereby) a representation of F, therefore, a structure must play a part in the production of behavior that is rational from the point of view of the organism's well-being. An internal representation of F becomes a representation of F in a process in which what it causes is, in this sense, a *reasonable* response to F. According to this recipe for thought, nothing can become the thought that F without contributing to a rational response to F, a response that is appropriate given the system's needs and/or desires.

Something not only becomes the thought that F by assisting in the production of an intelligent response to F, it assists in the intelligent response to F precisely *because* it signifies that condition F exists. That is, not only do thoughts that F conspire to produce intelligent reactions to F, they produce these reactions to F because they have an F-content. It is their content, the

fact that they are F (not G, H, or K) indicators that explains why they are causing what they do. Had they been indicators of some other condition, a condition unrelated to a useful outcome, they would not have been selected for producing a response to F. This, it seems to me, vindicates, in one fell swoop, both the explanatory and rationalizing role of content. We do not need independent "rationality constraints" in our theory of content. Rationality emerges as a by-product in the very process in which representations are created.

Our recipe, then, yields a product with the following features:

1. The product has a propositional content that represents the world in an aspectual way (as being F rather than G even when Fs are always G).
2. This content can be either true or false.
3. The product is a "player" in the determination of system output (thus helping to explain system behavior).
4. The propositional content of this product is the property that explains the product's role in determining system output. The system not only does what it does because it has this product inside it, but it is the propositional content of this internal product that explains why the system behaves the way it does.
5. Though the system *can* behave stupidly, the normal role of this product (the role it will play when it is doing the job for which it was created in the conditions in which it was created) will be in the production of intelligent (need and desire satisfaction) behavior.

Our recipe gives us something that is beginning to both look *and behave* like thought.

NOTES

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An early version was presented at the annual meeting of the Society for Philosophy and Psychology, Montreal, 1992. I used an enlarged form of it at the NEH Summer Institute on the Nature of Meaning, codirected by Jerry Fodor and Ernie LePore at Rutgers University in the summer of 1993. There were many people who gave me useful feedback and helpful suggestions. I am grateful to them.

1. I leave aside distracting complications having to do

with the difference between magnetic and geographic poles.

2. Roderick M. Chisholm, *Perceiving: A Philosophical Study* (Ithaca, NY, 1957).
3. This is Searle's way of putting it in *The Rediscovery of the Mind* (Cambridge, MA: MIT Press, 1992), p. 131, 156). As should be evident, I think Searle is wrong when he says (p. 161) that there are no aspectual shapes at the level of neurons. The sensory indicators in the brain are as much about the world (that we perceive) under an aspect as is the compass about the arctic under an aspect.
4. Despite even the *nomio* co-extensionality of "F" and

"G". That is, a thought that x is F is different than a thought that x is G even if F -ness and G -ness are nomically related in such a way that nothing can be F without being G . This, too, is an aspect of intentionality. In Dretske (1981, p. 173) I called this the 2nd order of intentionality. Although compasses (indeed, all measuring instruments) exhibit the 1st order of intentionality (they indicate that x is F without necessarily indicating that x is G despite the co-extensionality of " F " and " G "), they do not exhibit the 2nd order of intentionality. If (in virtue of natural law) x must be G when it is F , then anything indicating that x is F will thereby indicate that it is G . If polar bears *cannot* live anywhere but the north pole, then compasses, in indicating the whereabouts of the north pole, will indicate the habitat of polar bears. Compasses cannot, while thoughts can, "pry apart" nomically related properties.

My discussion has so far passed over this important dimension of intentionality. It deserves discussion, but the complications are too great to cover in a brief article.

5. *A Theory of Content and Other Essays* (Cambridge, MA; MIT Press, 1990).
6. In some cases, of course, an F will not even be *among* the causes of R since there are no F s (unicorns, miracles, angels, etc.). This is a problem that, for lack of space, I skip over.
7. Louise Antony and Joseph Levine, "The Nomic and the Robust," in *Meaning in Mind: Fodor and His Critics* (Oxford, 1991), 1–16.
8. Fodor (1990, p. 91) puts it a bit differently, but the point, I think, is the same: "Solving the disjunction problem and making clear how a symbol's meaning could be so insensitive to variability in the causes of its tokenings are really two ways of describing the same undertaking."
9. For the purpose of this essay I ignore skeptics about functions—those who think, for example, that the heart only has the function of pumping blood because this is an effect in which we have a special interest. See Searle's *The Rediscovery of Mind*, p. 238 and Dan Dennett's "Evolution, Error and Intentionality" in *The Intentional Stance* (Cambridge, MA; MIT Press, 1987).
10. This way of putting the point appeals to the view of natural functions advanced by Larry Wright in "Functions," *Philosophical Review* 82 (1973): 139–168, and *Teleological Explanation* (Berkeley, 1976).
11. E.g., Ruth Millikan, *Language, Thought, and Other Biological Categories: New Foundations for Realism* (Cambridge, MA, 1984) and "Biosemantics," *Journal of Philosophy* 86, no. 6 (1989); David Papineau, *Reality and Representation* (New York, 1987) and "Representation and Explanation," *Philosophy of Science* 51, no. 4 (1984): 550–72; Mohan Matthen, "Biological Functions and Perceptual Content," *Journal of Philosophy* 85, no. 1 (1988): 5–27; and Peter Godfrey-Smith, "Misinformation," *Canadian Journal of Philosophy* 19, no. 4 (December 1989): 533–50 and "Signal, Decision, Action," *Journal of Philosophy* 88, no. 12 (December 1991): 709–722.
12. This may sound as though we are smuggling in the back door what we are not allowing in the front: a tainted ingredient, the idea of a *needful* system, a system that, given its needs, has a use for information. I think not. All that is here meant by a need (for system of type S) is some condition or result without which the system could (or would) not exist as a system of type S . Needs, in this minimal sense, are merely necessary conditions for existence. Even plants have needs in this sense. Plants cannot exist (as plants) without water and sunlight (they can, of course, exist as collections of elementary particles without water and sunlight).
13. This is the short and fast version of the story I tell in *Explaining Behavior* (Cambridge, MA; MIT Press, 1988).
14. Though we can encourage its development by artificial selection.
15. Fodor, *A Theory of Content and Other Essays* (Cambridge, MA; MIT Press, 1990), p. 70.
16. I agree with Fodor (*ibid.*, footnote 35, p. 135) that the only normative quality a naturalistic theory of meaning has to explain is the quality of being able to mean something that isn't so. If we can solve the problem of misrepresentation—or, equivalently, the disjunction problem—we will have all the normativity we want.
17. *Explaining Behavior* (Cambridge, MA; MIT Press, 1988).