A Proper Understanding of Millikan[1]

Justine Kingsbury
University of Waikato

Ruth Millikan's teleological theory of mental content is complex and often misunderstood. This paper motivates and clarifies some of the complexities of the theory, and shows that paying careful attention to its details yields answers to a number of common objections to teleological theories, in particular, the problem of novel mental states, the problem of functionally false beliefs, and problems about indeterminacy or multiplicity of function.

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1. Introduction

Teleosemantic theories provide an account of the content of mental states in terms of the proper functions of either mental states themselves or the mechanisms that produce them. The proper function of something is (roughly) what that thing is supposed to do. The function of my heart is to pump blood: the function of my can-opener is to open cans. Something may have a proper function that it fails to perform—my can-opener continues to have the function of opening cans even if it is so badly damaged that it cannot do so. The thought that lies behind teleosemantics is that misrepresenting involves the failure of something, perhaps a representation or perhaps a representation-producing mechanism, to perform its proper function.[2]

If teleological theories of content are to be naturalistic, as they are intended to be, they need to come with a naturalistic account of what it is for something to have a function. Most teleosemanticists adopt an etiological account of functions, according to which the function of something is (roughly) what earlier things of its type have done which has contributed to their survival and reproduction, the doing of which thus explains the current presence of the thing.[3] The function of my heart is to pump blood because pumping blood is what the hearts of my ancestors did which contributed to the survival and reproduction of my ancestors, and thus contributed to the persistence of hearts of that type in the population, and which thus explains my possession of such a heart.

Teleological theories of content face a number of challenges which other theories of content do not. They must explain how *novel* beliefs and desires can have content, when content is determined by function and function is determined by the history of other things of the same type. They must explain how functions can determine content when a single thing can have multiple functions and when there can be multiple descriptions of the same function. And they must explain how, if proper function determines content, there can be beliefs that appear to function properly even when false (for example, unrealistically positive beliefs about the believer's popularity and competence).

In this paper I will show that simple teleological theories fail to meet these challenges, and explain how Ruth Millikan's more sophisticated teleological theory succeeds in meeting them.[4] My aim is to motivate and clarify some of the often misunderstood complexities of Millikan's theory, and to show that paying careful attention to the details of the theory yields answers to a number of common objections to teleological theories.[5]

2. Simple Teleological Theories

According to the simplest teleological theory of content for desires, the content of a desire is the state of affairs it has the function of bringing about. My desire to eat chocolate is that desire rather than some other one because the state of affairs it is supposed to bring about is my eating chocolate.

There are three candidate simple teleological theories of content for beliefs. One is that the content of a belief is the state of affairs it has the function of covarying with. Another is that the content of a belief is the state of affairs that must obtain if the belief is to perform the function of participating in processes which lead to the fulfilment of desires. And the third is that its content is the state of affairs that is not a necessary but a sufficient condition for its performing that function. Consider, for example, my belief that it is going to start raining soon. On the first view, the function of that belief-type is to be tokened when and only when rain is imminent, so imminence of rain is what it is about. On the second and third views, the function of my belief is to participate in inferences that lead to behaviour which leads to the satisfaction of my desires, such as taking an umbrella when I go out so as to satisfy my desire to stay dry. On the second view, the claim is that the imminence of rain is a necessary condition for the belief's doing this, whereas on the third view, the claim is that the imminence of rain *guarantees* that the belief will do this.[6]

Each of these simple theories of belief content has obvious flaws. The function of a belief cannot be to be tokened when and only when a certain state of affairs obtains. On an etiological account of functions, the function of a thing is what earlier things of its type have *done* which has contributed to the persistence of the type. Covariance with a certain state of affairs is not an *effect* that a belief has; thus it is not the right kind of thing to be a function.[7] So much for the first view.

Suppose then that the function of a belief is to participate in inferences that lead to the satisfaction of desires. No state of affairs that is a plausible candidate for being the content of the belief is either a necessary or a sufficient condition for the performance of that function. Your beliefs can help to satisfy your desires by accident, even when they are false: for example, suppose that I wrongly think it is going to rain and take my umbrella, and fortuitously my umbrella protects me from the spray from a burst water pipe, thus satisfying my desire to stay dry. This shows that the imminence of rain is not a *necessary* condition for the performance of the function of the belief. And sometimes (often, in fact), the truth of your beliefs is not enough to guarantee the satisfaction of your desires. If you are tied to the railway tracks and a train is coming, having only true beliefs about your situation (and even having *all* the relevant true beliefs) may not be enough to guarantee the satisfaction of your desire to survive the experience. So the satisfaction of the truth conditions of a belief is not *sufficient* for its performing the function of participating in inference processes which lead to the satisfaction of desires.[8]

In addition to these problems, the challenges mentioned earlier are equally problematic for all three versions of the simple teleological theory. One problem is that the theory seems to imply that *novel* beliefs and desires cannot have content. If the content of something is determined by its function, and its function is determined by the evolutionary history of earlier things of its type, a belief which no-one has ever had before cannot have content because there are no earlier things of its type.

The second problem is that if we accept the etiological account of proper function and the claim that mental states have functions at all, mental states appear to have a multiplicity of proper functions. To use an example of David Papineau's, my desire to eat something sweet does not just have the function of bringing it about that I eat something sweet; it also has the function of bringing it about that I ingest sugar, and the function of increasing metabolic activity, and ultimately, the function of helping me pass on my genes. The teleosemanticist needs some principled way of picking out which function determines content.

The third problem is that arguably there are beliefs that perform functions in spite of or even because of their falsity. Following David Papineau (1993), I shall call these functionally false beliefs. For example, having falsely positive beliefs about your own abilities, future prospects and degree of control over your life appears to be beneficial, within limits. (See for example Taylor, Collins, Skokan and Aspinwall, 1989.) *Hugely* exaggerated beliefs about your own competence do not tend to have good consequences; if I think I am a good enough pianist to make a career of it when in fact I can scarcely play a scale, I am likely to embarrass myself. But I am also likely to revise my beliefs in consequence; hugely exaggerated beliefs about your own competence tend to be corrected by failures. Positive beliefs about your own competence which are only slightly exaggerated, however, tend to have good consequences; the belief that you are good at something will often

nudge your performance upwards, whether or not you are actually as good at it as you believe. And people who believe they are competent and popular tend to be happier and to cope with stress better than people who do not, whether or not the beliefs are true, and happy people, apparently, are physically healthier than unhappy people as well as being less likely to throw themselves under buses.

What is the problem for teleosemantics? Teleosemantics requires there to be some connection between the function of a belief and its truth condition, but one might argue that beliefs like these have functions which they perform independently of whether they are true. Suppose, for the sake of argument, that the tendency to have falsely positive beliefs about oneself is an evolved tendency: suppose that it is because my ancestors had a slightly higher opinion of themselves than was really justified that they out-reproduced the equally competent people who were realistic about their abilities, and passed on the tendency to have an exaggeratedly high self-opinion to me. Suppose also that it was by making my ancestors happier and more confident that the falsely positive beliefs contributed to their reproductive success. The function of these beliefs, then, is to increase my degree of happiness and confidence, which they can do whether or not they are true. So investigating their functions and the conditions under which they perform them will not give us their content.

3. Millikan's Theory

Ruth Millikan's theory differs from the simple teleological theory in a number of important respects, and I shall argue that it contains the resources to solve these problems. Millikan's story about belief-content does not involve beliefs having the function of covarying with their truth conditions, nor does she claim that the obtaining of the truth condition of a belief is either necessary or sufficient for the performance of some other function of a belief. Rather, she claims that the obtaining of the truth condition of a belief is a *Normal condition* (see Section 3.1 below) of the belief's performing certain functions. And the combination of the notion of *derived proper functions* (3.1) with a story about compositionality (3.4) provides solutions to the problems of novel beliefs and desires, multiplicity of functions, and functionally false beliefs.

3.1. Some Millikanian Terminology

Millikan thinks that the mechanisms that produce propositional attitudes have proper functions, and that propositional attitudes themselves have functions *derived* from the functions of those mechanisms. The mechanisms have proper functions in virtue of their evolutionary history—these are what Millikan calls *direct* proper functions. And if a mechanism has the function of producing some item and has

further functions that go beyond the production of that item, the item has those further functions as its derived proper functions. For example, the patterns on a chameleon's skin have no direct proper function, because they are not copies of earlier patterns. However, they have a proper function derived from the proper function of the mechanism that produces them.

The chameleon's pigment-changing mechanism has the proper function of altering the pattern on the chameleon's skin to match the surface it is sitting on, thus enabling the chameleon to escape detection by predators. Given a particular surface, the pigment-changing mechanism has the *adapted proper function* of making the skin match *that* surface: for example, if the chameleon is on a surface which is green and brown blotched, the adapted proper function of the mechanism is to produce a green and brown blotched skin pattern. The resulting skin pattern is called an *adapted device*.

Adapted devices have derived proper functions. The green and brown blotched skin pattern inherits from the mechanism which produces it the proper function of enabling the chameleon to escape detection by predators. The pattern can have a derived proper function even if no chameleon has ever displayed precisely that pattern before. This is not the case with things that have direct proper functions. Direct proper functions depend on the history of things of the same type; if X does not belong to a lineage of things of the same type, then X cannot have a direct proper function.

A *Normal explanation* is an explanation of how, historically, a type of thing has performed its proper function. For any proper function and type of object that has that proper function, there will be more proximate and less proximate Normal explanations. Where R is a type of object and F is the function of objects of that type:

> [the most proximate Normal] explanation is the *least detailed* explanation possible that starts by noting some features of the structure of members of R, adds some conditions in which R has historically been when it actually performed F—these conditions being uniform over as large a number of historical cases as possible—adds natural laws, and deduces, i.e., shows in detail without gaps, how the setup leads to the performance of F (Millikan 1984, 33).

For example, the most proximate Normal explanation of how human hearts perform the function of pumping blood will refer to the structure of the heart, the presence of a circuit of blood vessels leading to and from the heart, and the electrical impulses that stimulate the heart. It will not refer to the *source* of those electrical impulses, or the source of the oxygen supply to the heart, although a less proximate Normal explanation might. The *Normal conditions* for the performance of a mechanism's proper function are the conditions that must be mentioned in the most proximate Normal explanation of the proper functioning of that mechanism.

In the case of adapted devices such as a particular skin pattern on a chameleon, the Normal explanation for the performance of their functions cannot in general be an explanation of how ancestral devices of the same type have historically performed

their function, since for an adapted device there may not have been any ancestral devices of the same type.

> The Normal explanation for proper performance of an adapted proper function is . . . a *general* explanation that tells how it happens that the device produces or does things that bear certain relations to its adaptors. For example, a Normal explanation of how a chameleon's color arrangers produce brown and green splotches is a general explanation of how these mechanisms produce skin patterns that match what the chameleon sits on, hence derivatively an explanation of the occurrence of these splotches (Millikan 1984, 43–44).

3.2. The Proper Functions of Mental States

The function of a desire, for Millikan as for the simple teleological theorist, is to help cause its own fulfilment; that is, to bring about a certain state of affairs. Millikan's view of the proper functions of beliefs is also very similar to that of (some versions of) the simple teleological theory: for Millikan, one of the proper functions of a belief is "to participate in inferences in such a manner as to help produce fulfilment of desires" and another is "to participate in inferences to yield other beliefs" (Millikan 1986, 67). The differences become apparent only when we consider Millikan's story about how it is that mental states have these functions, and her view of how the functions of mental states relate to their content.

For Millikan, the proper functions of mental states are derived from the functions of the mechanisms that produce them. The relationship between our belief-fixing mechanisms and a particular belief is like the relationship between the chameleon's pigment-changing mechanism and a particular skin pattern produced by it. The pigment-changing mechanism has the proper function of producing skin patterns that match the background in order to camouflage the chameleon; likewise, a belief-fixing mechanism has the function of producing beliefs that stand in a certain relationship to the world in order to bring about the fulfilment of desires and the formation of other beliefs. Given a particular background, the chameleon's pigment-fixing mechanism has the adapted proper function of producing a particular skin-pattern: given a particular (external and internal) environment, a belief-fixing mechanism has the function of producing particular beliefs. The skin-pattern inherits those proper functions of its producer that go beyond the production of the skin-pattern; it has the derived proper function of enabling the chameleon to escape detection by predators. A belief inherits those proper functions of its producer that go beyond the production of the belief; it has the derived proper function of participating in inferences that will bring about the fulfilment of desires.

It is a Normal condition for the chameleon's skin pattern's performing its proper function that it actually does match the background. If the pattern is brown and green splotched and the background is grey, the pattern will not perform its proper function unless it does so by accident. Unless the pigment-changing mechanism has performed *its* proper function (producing a pattern which matches the back-

ground), the pattern cannot perform its proper function in accordance with a Normal explanation. Likewise with beliefs; the mechanism that produces the belief must perform one of *its* proper functions (producing a belief which stands in the right relationship to the world) if the belief is to perform its proper function (participating in inferences which lead to the fulfilment of desires) in accordance with a Normal explanation.

What is this "right relationship" between a belief and the world? Put briefly (and question-beggingly, since this relationship is supposed to form the basis of a naturalistic account of the content of beliefs), it is the relationship that holds between a belief and the world when the belief is *true*. Consider my belief that there is coffee in the mug in front of me. When the belief is functioning properly, it participates in processes like this one. I want coffee, and I believe that there is coffee in the mug. Because of this, I drink the contents of the mug, and my desire for coffee is satisfied. This last stage, the satisfaction of my desire, will not (usually) happen unless there actually is coffee in the mug—that is, it will not happen unless my belief about the contents of the mug is a true belief.

Setting aside for the moment worries about functionally false beliefs, we can say that a belief does not perform its function unless it is true. At least, it does not perform its function *in accordance with a Normal explanation* unless it is true. Drinking some synthetic but appropriately caffeinated substance that tastes exactly like coffee might assuage my desire for coffee, but the Normal explanation of the performance of the proper function of my belief that there is coffee in the mug does not refer to the presence of such a substance; rather, it refers to the presence of coffee.

3.3. A First Approximation of Millikan's Theory of Content

For Millikan, as for the simple teleological theorist, the content of a desire is the state of affairs that comes about when the desire performs its proper function. My desire to eat is a desire to eat rather than a desire to drink because, when that desire performs its proper function, it participates in processes that lead to my eating rather than drinking.

When it comes to belief-content, however, Millikan's theory diverges from the simple teleological theory. The content of a belief, for Millikan, is some part of the Normal conditions for the performance of its proper function. Since the function of a belief is to participate in inferences that will lead to the satisfaction of desires and the formation of other beliefs, Normal conditions for its performance include the believer's having desires, having other beliefs and having certain inferential abilities. They also include certain conditions in the world outside the believer's head, and *these* are the conditions that are relevant to the determination of content. It is a Normal condition for the proper functioning of my belief that there is coffee in the cup that there actually is coffee in the cup. That is why it is the belief *that there is coffee in the cup.*

Note that a Normal condition for the performance of a function is neither a necessary nor a sufficient condition for the performance of that function. It is a condition that figures in the most proximate Normal explanation of how the function has historically been performed. That explanation covers most but not necessarily all occasions on which the function has been performed. If I see a bright green chameleon sitting on a brown log and, taking pity on it, move it onto a matching patch of grass, the pigment-changing mechanism has enabled the chameleon to avoid detection by predators by the highly irregular method of making the chameleon completely fail to blend in with its surroundings. A Normal explanation does not have to cover such cases.

3.4. Millikan's Full Theory of Content

We now have the resources to give a quick Millikanian answer to the question about novel beliefs. There are two ways in which things can acquire functions, for Millikan. One is by being the direct products of selection processes like natural selection. The other is by being the products of those products. So if learning mechanisms have direct proper functions, the beliefs that they produce can have proper functions in the second way—*derived* proper functions. And (like the chameleon's novel skin pattern) something can have a derived proper function even if it is something new under the sun.

However, this gets us only part of the way. Say that my belief that it is going to rain has a function which it only performs when it actually *is* going to rain, and that it has that function because the mechanism that produces it has the function of producing beliefs that bear a relationship to the world that will enable them to participate in processes which lead to the satisfaction of my desires. There still remains the question, which arises most obviously when the belief in question is a novel one: why does the mechanism have the function of producing precisely *that* belief in *that* circumstance?

The answer to this question appeals to a mapping relation between mental states and states of affairs. Millikan does not claim that mental states have content simply in virtue of having some function or other; many things have functions without having content. Rather, mental states have content in virtue of performing their functions in a certain kind of way. Beliefs and desires are representations, and to perform their functions they have to be used as such by their consumers, the mechanisms which use them.

For a consumer to perform its function by using a mental state *as a representation*, two conditions must be met. Firstly, the mental state must be mapped onto a state of affairs by a certain mapping rule. Secondly, it must be part of a representational system. "Represented conditions are conditions that vary, depending on the *form* of the representation, in accordance with specifiable correspondence rules

that give the semantics for the relevant *system* of representation" (Millikan 1989, 286–287).

Representations are produced in order to be used by cooperating devices.

> In the case of [desires], it is a proper function of the interpreter device, as adapted by the [desire], to produce conditions onto which the [desire] will map in accordance with a specific mapping function of a kind to be described below. . . . In the case of [beliefs], the Normal explanation of how the [belief] adapts the interpreter device such that it can perform its proper functions makes reference to the fact that the [belief] maps conditions in the world in accordance with a specific mapping function of a kind to be described below (Millikan 1984, 97).

There are, of course, *many* mappings from mental states onto states of affairs. One way to look at the project of coming up with a theory of content is as a search for some principled reason to choose one mapping relation over all the others. For Millikan, the relevant mapping rule is the one that explains the evolutionary success of the representational system.

Millikan's illustration is the bee dance. Bees perform dances which cause watching bees to set off in a direction which bears a certain relation to the orientation of the dance, and, all going well, to find nectar there. Transformations of the dance "correspond one-to-one to transformations of the location of nectar relative to hive and sun."

> Which mapping rule (which transformation correlation) is the relevant one to mention—which rule determines what the dance represents—is quite obvious. This rule is determined by the evolutionary history of the bee. It is that in accordance with which the dance must map onto the world in order to function properly in accordance with a Normal explanation, or, what is the same, in order that the mechanisms within watching bees that translate (physicist's sense) the dance pattern into a direction of flight should perform all of their proper functions (including getting the bees to nectar) in accordance with a Normal explanation (Millikan 1986, 78–79).

The situation as regards the contents of human beliefs is analogous. Our evolutionary history picks out a particular mapping from beliefs onto states of affairs. It is the mapping in accordance with which beliefs must map onto the world if the consumers of the beliefs are to perform their functions in accordance with a Normal explanation. Beliefs, like bee dances, do not map piecemeal onto states of the world. Different bee dances are systematically related to each other, and the states of affairs onto which they map are similarly systematically related to each other. We can describe the relationship between two bee dances in terms of the transformation (for example rotating it 180 degrees) which would turn the one into the other, and we can describe the relationship between the two nectar locations onto which the two dances map in terms of the transformation which would map the one onto the other.

Likewise with beliefs; beliefs are systematically related to each other, and the states of affairs onto which they map are systematically related in a way that (to speak loosely) mirrors the relations between the beliefs. The kinds of transformation involved, in the case of belief, are ones like the substitution of one concept for another, or the substitution of one time-index for another, or both, as in the rela-

tionship of my belief that the sky is now blue to my belief that yesterday the sky was grey. The transformation of the world that corresponds to that transformation is the replacement of one *property* by another and a retreat of one day into the past. It must be emphasised that this talk of transformations does not involve any *changing* of one belief into another or one state of affairs into another. The relevant sense of "transformation" is the mathematical one; to say that one geometrical figure can be transformed into another by (for example) reflecting it in a mirror placed in a certain position is simply a way of describing the relationship between the two geometrical figures.

Millikan also uses the bee dance to explain how the mapping relation works for desires. There is a mechanism in the watching bee that has the function of producing an action that is related in a certain way to the dance the bee sees. The bee sees a particular dance, and this mechanism causes it to fly a certain distance in a certain direction. The distance and direction are functions (in the mathematical sense) of the form and orientation of the dance. The mapping rule specifies the relation that is supposed to be produced by that mechanism between the dance and the state of affairs of the interpreting bee finding nectar a certain distance and direction from the location of the bee dance.

Likewise with desires. Desire-producing mechanisms have the function of producing desires that will cause actions that will bring about certain states of affairs. There is a content-determining mapping from desires onto states of affairs they have the function of producing. The relevant mapping is the one that the *consumers* of desires have the function of bringing about between desires and the world. And the consumers of a desire are the mechanisms that use the desire as a representation of the way the world should be and aim at making it that way; the mechanisms that perform inferences and cause behaviour.

Millikan's talk of mapping has caused some unease.[9] One reason for this is that it leads rather naturally to talk of beliefs "mirroring" or "picturing" or "being like maps of" the world. Millikan seems unconcerned by such locutions; she even indulges in them herself. But as Fodor points out (Fodor 1991, 295), picture theories of meaning are out of fashion, and deservedly so. The content of a picture is less determinate than the content of a mental state; if I had a thought that was a picture of John standing, it would be impossible to say which of many particular beliefs it was, and so it would be impossible to say what its truth conditions were. (See Fodor 1975, 180.) Also, one might think that for something to be a picture of something else it is necessary that it resemble it, but surely when I think about green triangles there is nothing like a green triangle to be found anywhere in my head.

It is clear, however, that Millikan's theory is not a picture theory in any sense that would render it vulnerable to such objections. My belief that snow is white need not resemble the whiteness of snow, on the Millikanian story, nor need it have anything much else in common with a picture of snow that represents snow as

white. All that the mapping story requires is that the belief should be related to other beliefs in a way which is isomorphic with the way in which the states of affairs the beliefs are about are related to each other. And this isomorphism does not involve anything so crude as thinking that if I believe that the cat is on the mat, my MAT representation must be below my CAT representation. Firstly, we are concerned with how whole beliefs are related to each other and not with how the components of a belief are related to each other. Secondly, it is not required that the relation between two beliefs should be the same relation as the relation between the states of affairs to which they correspond. All that is required is that the overall pattern be the same. The resemblances, if such you want to call them, between beliefs and states of affairs are highly abstract, and occur at the level of whole suites of actual and possible beliefs and whole suites of actual and possible states of affairs. The claim is simply that there are isomorphisms between systems of beliefs and systems of states of affairs.

A second worry is that it looks as though the appeal to mapping might undermine the status of Millikan's theory as a naturalistic theory of content. Beliefs get to have content only if they are used as representations, and what it is for something to be used as a representation involves it mapping onto a state of affairs according to the right mapping rule, but isn't "mapping" itself intentionally loaded? (See for example Godfrey-Smith 1988, 559.) The foregoing discussion shows, I hope, that such worries are unfounded; the sense of "mapping" in question is a purely mathematical one.

4. Problems Solved

The Millikanian apparatus presented in Section 3 provides the resources to answer the questions posed earlier. How can novel beliefs have content? What are we to say about beliefs that appear to have been selected for corresponding to a state of affairs other than the one they are about? Which of the functions of a desire determines its content?

4.1. Novel Beliefs

Suppose that I am the first person ever to believe that there is play-dough stuck to my computer mouse. Then we cannot say that the belief has any function in virtue of the history of beliefs of its type, because there have been no other beliefs of its type. We can say that the mechanism that produced the belief has a function—the function of producing beliefs that map onto the world in a certain way. But how does that particular belief get to be supposed to map onto that particular state of affairs, given that there have been no such beliefs before?[10]

The answer appeals to a rule in accordance with which belief-consumers require beliefs to map onto the world. The rule in question is the one according to which beliefs have historically mapped onto the world which has enabled the consumers of beliefs to perform their functions, and thus contributed to the survival and reproduction of the believers. And the rule applies to more beliefs than there have ever actually been. Belief is systematic. The belief that there is play-dough on the computer mouse bears certain relations to other beliefs (for example other beliefs about play-dough, other beliefs about computer mouses, and other beliefs about things being on other things). The state of affairs of there being play-dough on the computer mouse bears certain relations to other states of affairs (for example those involving play-dough, those involving computer mouses, and those involving things being on other things). That belief maps onto that state of affairs because the network of actual and possible beliefs is isomorphic with the network of actual and possible states of affairs, and the position of the belief in its network corresponds to the position of the state of affairs in its network.

4.2. Problems with Desires

The same method can be used to solve some obvious problems with the teleological theory of desires. One can have novel desires as well as novel beliefs. One can also have desires which never play any role in bringing about their own satisfaction: wanting it to stop raining, for example. These are problems for the simple teleosemanticist, but not for Millikan. There is a particular evolutionarily-selected-for mapping rule which maps desires onto states of affairs, and it covers more desires than have ever actually helped to cause their own satisfaction.

A further and more difficult problem is multiplicity of function. The desire to eat something sweet has presumably, when it has performed its proper function, caused the desirer to ingest sugar, thus raising the desirer's blood sugar level, thus giving the desirer extra energy, thus contributing to the desirer's surviving and reproducing. All of these are functions of the desire, according to the etiological account of functions. It has also, in doing these things, caused the desirer to eat sweet things. But there is a problem: if the causal chain we are interested in is the one that culminates in reproductive success, the taste sensation that actually satisfies the desire looks like an epiphenomenon. (See Figure 1.)

Consider what happens when my desire for something sweet causes me to eat chocolate. Qua sugar-containing substance, the chocolate raises my blood sugar level and leads to the other effects on the list. Qua sweet substance, the chocolate provides a particular taste sensation, which is what I desire. In the environment in which our mental capacities evolved, all the sweet things did contain sugar, so having a desire that caused the eating of sweet things did reliably lead to the raising of the desirer's blood sugar level, increased energy, and so on. But the effect of the desire that satisfies it is not the effect that enhances our reproductive prospects.

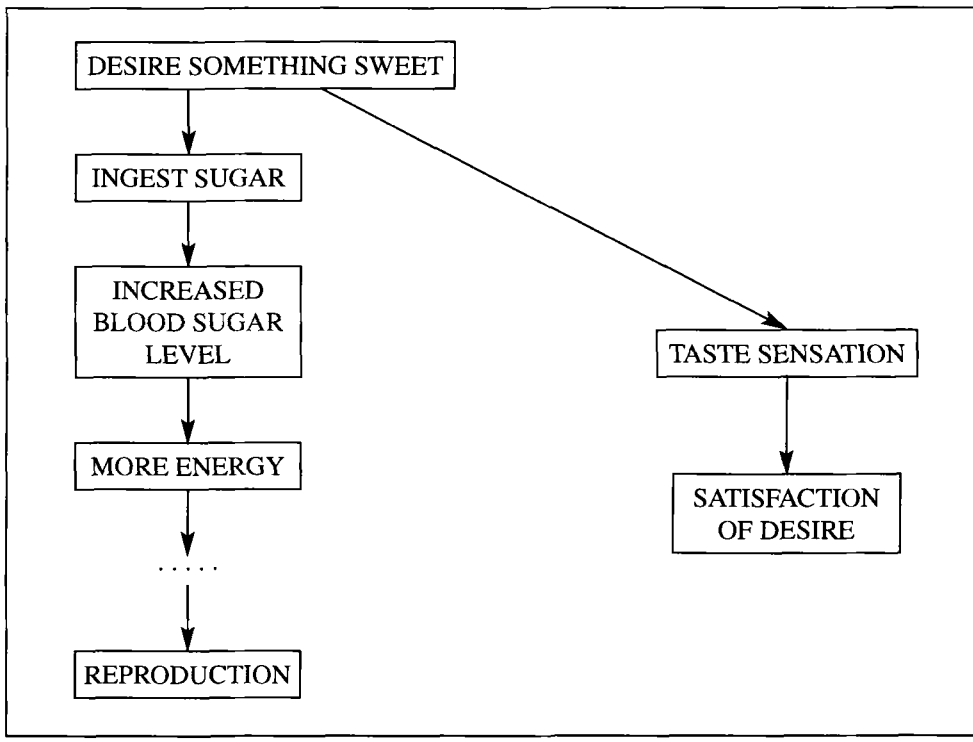

Figure 1. The arrows are causal arrows.

We want our theory of content to deliver the result that our desire to eat sweet stuff is a desire to eat sweet stuff, not a desire to eat sugar. There is no doubt that my desire to eat sweet stuff is satisfied by eating sugarless candy. When the desire causes me to eat sugarless candy, it is the environment that has played up, not my desires or the way in which they interact with my beliefs to cause behaviour. A formerly reliable correlation between sweetness and sugar content has broken down.

How do we pick out the content-determining function of my desire to eat something sweet from all of its other functions? For Millikan, it is the state of affairs onto which the *consumers* of the desire are supposed to map the desire. Consider what looks like the chief competitor for the role of content-determining function; the desire's function of causing me to ingest sugar. The performance of that function does enable the performance of the functions of some of my internal mechanisms—for example, the digestive system. But the digestive system does not use the desire as a representation. The systems that use the desire as a representation—the consumers—are the mechanisms which perform inferences and cause behaviour. When these mechanisms use the desire as they are supposed to, they put it together with beliefs about what is sweet and where the nearest location of it is, and

cause behaviour—opening my desk drawer and extracting chocolate, or getting up, locking my office and walking to the cafeteria over the road.

There may now appear to be a circularity problem. As Fodor puts it, if Millikan really thinks that the desire to become rich and famous has the function of helping one become rich and famous, or in this case, if she really thinks that the desire for sweet things has the function of making one eat sweet things, "isn't that because she's sort of sneaked a look at the intentional object of the want?"[11] If the only way to determine the proper function of a desire is by looking at its intentional object, Millikan's entire theory seems to be in trouble, insofar as it is supposed to be a naturalistic account of content. The content of beliefs is determined by the Normal conditions for the performance of certain functions that are described in terms of the satisfaction of desires. The content of desires is determined by their proper functions, which are described in terms of their satisfaction conditions. But "satisfaction" is itself an intentional term; if this is to be a naturalistic account, it looks as though there had better be another way to identify the proper function of a desire.

I think there is less of a problem here than meets the eye. The proper function of a desire, for Millikan, is to bring about a particular state of affairs. The easiest way for us to identify *which* state of affairs is by looking at the intentional object of the desire. However, it is not that the function is *defined* in terms of the intentional object of the desire; the function is simply to bring about state of affairs X. There is no circularity; there is just an epistemic problem about how we find out what state of affairs X is. The epistemic problem is real, but it does not undermine Millikan's claim to naturalism.

The epistemic problem is not specific to the proper functions of mental states. How do we *ever* identify the proper function of something? In general, we don't have access to the details of the evolutionary history that (on Millikan's account) determine function. The best we can do is look at what the thing in question does now, and the ways in which it seems to contribute to the success of the organism it belongs to, and hypothesise about which of these activities are the ones that historically were responsible for the survival and proliferation of things of this type.

4.3. Functionally False Beliefs

Now consider beliefs whose performance of their function does not seem to depend on their truth; for example, exaggerated beliefs about one's own popularity and competence. These beliefs appear to perform a function even when false. If they genuinely do, it seems that we cannot say that the mapping that holds when they perform their function maps them onto their truth conditions. One attempt at an answer is to say that in such cases, whatever functions the belief is performing it is not performing qua representation. If, in these cases, the consumers are not using the

belief as a representation, then the functions being performed are irrelevant to the determination of content. This might be the case here—perhaps the beliefs in question (or rather, we should now say, the "beliefs" in question) just have the function of making you feel happy.

However, consider a different example: consider the false beliefs about the degree of pain experienced in labour that women who have given birth allegedly possess. It is easy to see how the tendency to form such beliefs might be selected for; if the actual degree of pain is such that it might discourage a woman from having any more children, then it will tend to contribute to her reproductive success if she does not accurately represent to herself the degree of pain experienced. But then, if the belief that childbirth is not extremely painful is performing its function when it contributes to someone's decision to try to get pregnant again, it looks as though the truth condition of the belief is not among the Normal conditions for its performing its proper function.

In this case, the belief that childbirth is not extremely painful appears to be functioning as a representation. It participates in inferences and decision-making processes, and it participates in them as a representation of the world, albeit one which is false.

Beliefs have the content that they have because the relevant mapping rule maps them onto a particular state of affairs. Which is the relevant mapping rule is determined by what relation has historically been required to hold between sets of systematically related beliefs and sets of systematically related states of affairs in order for the consumers of beliefs to perform their proper functions. It does not matter if, on a particular occasion, a particular belief enables its consumer to perform its proper function even though the belief is false. What determines the content of the belief is not simply the conditions under which it performs its function: it is partly its position in a whole system of interrelated beliefs. The problem with functionally false beliefs, presumably, is that you might think that if they are genuinely *functionally* false—if possessing them when false has really contributed to the survival and reproduction of their possessors—then that suggests that the mapping rule that explains the maintenance and proliferation of the representational system is not in fact the one that maps beliefs onto their truth conditions.

This is a mistake, however: the conclusion would only follow if you thought that such beliefs are functional not merely in spite of but *because* of their falsity. Suppose that a function of the belief that childbirth is relatively painless is making women more likely to choose to have more children. It is not the case that a Normal condition for the performance of this function is the *painfulness* of childbirth. Rather, it does not matter how painful childbirth actually is; the function can be performed equally well regardless. Thus, you could not, even in principle, deduce the content of the belief that childbirth is not very painful by looking at the conditions that have historically obtained when tokens of this belief-type have

performed their proper function. You need the whole system of beliefs, in which that belief has certain relations to other beliefs about childbirth and other beliefs about what's painful, and the mapping function that relates these to the whole system of states of affairs. What it would take for functionally false beliefs to be a problem for Millikan's theory is that there should be a mechanism which produces false beliefs because they are false, which is not parasitic on mechanisms that produce representations because they are true. But neither of the examples discussed are of this type.

5. Conclusion

Millikan's sophisticated teleological theory has the resources to solve a number of problems which defeat simpler teleological theories of content. The introduction of the notion of Normal conditions for the performance of a function renders unnecessary any implausible claims about the satisfaction of the truth conditions of a belief being either necessary or sufficient for its performance of its function. The introduction of derived proper functions goes some way towards solving the problem of content for novel beliefs. The introduction of mapping completes the solution to that problem, helps to solves the problem of functionally false beliefs, and, along with an emphasis on what conditions are required for the *consumers* of representations to fulfil their functions in accordance with a Normal explanation, also provides an answer to worries about multiplicity of function.

Notes

1. So many people have provided helpful comments on earlier versions of this material that it is impossible to list them all: many thanks to all of them. Particular thanks to Ruth Millikan and Andrew Milne for early encouragement and feedback, and to Jonathan McKeown-Green and Tahua O'Leary for comments on the penultimate draft.
2. The term "proper function" was coined by Ruth Millikan in her (1984). I use it here to distinguish the teleosemanticist's sense of "function" from other uses of "function" according to which a thing's function must be something that it actually does. However, since proper functions are the only kind with which I am concerned in this paper, I will often simply call them "functions."
3. Etiological accounts of proper function are defended by, among others, Karen Neander (1991) and Paul Griffiths (1993).
4. Millikan's theory was first presented in *Language, Thought and Other Biological Categories* (1984), and has since been expanded upon in a series of papers, many of which are collected in *White Queen Psychology* (1995).
5. Note that I am not claiming that Millikan's approach is the only way for a teleosemanticist to respond to these objections. David Papineau provides putative solutions to all three of the problems discussed here in *Philosophical Naturalism* (1993), and discusses the indeterminacy issue further in Papineau 1998. Comparing his solutions to Millikan's is beyond the scope of this paper: however, it is worth noting that his solutions require apparently ad hoc additions to his

simple teleological theory of content, whereas solutions arise naturally out of Millikan's more sophisticated theory.

6. These different teleological theories of content for beliefs are suggested by different passages in David Papineau's 1987 and 1993.
7. Millikan makes this point in Millikan 1990, 127–128. Peter Godfrey-Smith makes the same point: "A thing's function is always something that it does; a function is always something like a *power*" (Godfrey-Smith 1989, 542.).
8. In the train track case, your beliefs are likely to play a role in inference processes, although these then fail to lead to action because of external constraints. This kind of situation is common. More controversially, perhaps it is also possible to have a true belief that plays no role at all in inference processes.
9. See for example Fodor, J.A. 1991, Godfrey-Smith, P. 1988, Price, C., 2001, 83–84.
10. To be more precise, it is not that the belief is supposed to map onto a certain state of affairs—that is not its function. But that it does so is a Normal condition for the performance of its functions. And producing beliefs that do map onto the world in accordance with the right mapping is a function of the producer of the belief.
11. Fodor 1990b, 67. Kim Sterelny makes the same point; how, he asks, can we exclude those conditions under which we *satisfice* as content-determining conditions, unless we question-beggingly do so by appealing to the content of the desire? (1990, 133).

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Justine Kingsbury
Department of Philosophy and Religious Studies
University of Waikato
Private Bag 3105
Hamilton
New Zealand
Justinek@waikato.ac.nz