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Title: Do Constancy Mechanisms Save Distal Content?

Abstract: In this journal, Schulte (2018) develops a novel solution to the problem of distal content: by virtue of what is a mental representation about a *distal* object (say, a snake) rather than a more *proximal* cause of that representation (say, a snake-shaped retinal impression)? Schulte maintains that in order for a (sensory-perceptual) representation to have a distal content, it must be produced by a *constancy mechanism*, along with two other conditions. I raise three objections to his solution. First, a core component of Schulte's solution is just a restrictive version of Dretske's (1986) solution, but Schulte gives no argument for his restriction. Second, his proposed solution to a disjunction problem (his 'naturalness' condition) is *ad hoc*. Finally, his 'far-out' version of the distality problem is not a version of the distality problem at all. I conclude that Dretske's solution is preferable to Schulte's.

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Keywords: Teleosemantics; content indeterminacy; distal content; biological function; constancy mechanisms.

I. SCHULTE’S SOLUTION

In this journal, Schulte (2018) presents a novel solution to the problem of distal content, or the ‘distality’ problem (sometimes called the ‘horizontal’ problem in contrast to the ‘vertical’ problem; see below). This is one of several indeterminacy problems for certain approaches to naturalized semantics. The problem can be illustrated through what Fodor (1987: 99) calls the ‘crude causal theory’ of meaning. According to the crude causal theory, the *content* of a type of representation is whatever reliably *causes* the representation to be tokened. So, my mental representation of a cow is about cows – it means *there’s a cow* – since cows reliably cause that type of representation to be tokened. The problem is this: why isn’t the representation about some more proximal stimulus, some causal intermediary between the cow and my brain? Why doesn’t the representation mean, *there’s a cow-shaped retinal impression*, instead of (or in addition to) *there’s a cow*?

Though nobody accepts the crude causal theory, the same problem surfaces for more refined accounts. Consider a version of teleosemantics, namely, Neander’s *producer teleosemantics* (Neander 2013; 2017; for variations on this theme, see Dretske 1986; Jacob 1997; Schulte 2012; Garson forthcoming, Chapter 12). This view holds, *roughly and at its most basic*, that a representation type *R* is about content *C* just in case there’s a mechanism that has the function of producing *R*s in response to *C*s (Neander 2017: 151). The theory can be clarified by using the toad’s worm-detector mechanism. There’s a cluster of cells in the toad’s midbrain that’s reliably activated by worms. These are the

T5(2) cells. We want to say that activation of the T5(2) cell is about worms; it means *there's a worm* – or something in that neighborhood (and setting aside other indeterminacy problems). According to Neander, the reason that T5(2) activation is about worms is because there's a mechanism (which includes the optic nerve among other neural structures) that has the *function* of producing T5(2) activations in response to worms.

To be precise, Neander actually thinks the right content ascription is, *there's a small elongated object moving in a direction that parallels its longest axis*. Others think it means, *there's an edible snack*. Still others think it means, *there's a worm*. Which is the right content? This is the 'vertical' problem of indeterminacy. But the vertical problem is different from the distality problem. When we argue about the vertical problem, we're assuming that the *object* of the toad's representation is the worm; we just disagree about which *property* it represents the worm as having. The distality problem is the problem of how it is that a representation can be about a distal object at all, rather than a more proximal object like the retina.

The distality problem arises for producer teleosemantics in the following way: while the perceptual mechanism in question certainly has the function of producing T5(2) activations in response to worms, that mechanism *also* has the function of producing T5(2) activations in response to *worm-shaped retinal impressions*. That's just how the selected effects theory of function (which underlies her account) pans out. Intuitively, this latter content ascription should be excluded. But how?

Neander (2013; 2017) developed an innovative solution to distality that exploits 'informational asymmetries' between candidate contents. She observed that the distal object (the worm) is linked to the representation (the T5(2) activation) by a chain of causes (a stream of photons, a worm-shaped retinal impression, a pattern of optic-nerve jiggling). She re-describes the links in this chain in terms of an *informational* relationship: if *C* is more distal than *Q*, then *Q* carries information about *C*, but not vice versa. (So, a worm-shaped retinal impression carries information about a worm but not vice versa.) Framed in these terms, we should say that between two candidate contents, *Q* and *C*, if *Q* carries information about *C*, and not vice versa, then *C* is the right content (Neander 2017: 222).

Schulte notes a problem for Neander's solution. Neander insists, in several places, that the content of a sensory-perceptual representation should be some configuration of surface properties of an object, rather than 'hidden' properties. As I mentioned earlier, Neander thinks that T5(2) cell activation has the content, *there's a small elongated object moving parallel to its longest axis* (a surface property) rather than, *there's a nutritious snack* (a hidden property). But her solution doesn't always yield surface contents. Schulte comes up with a thought experiment to show that Neander's solution allows sensory-perceptual representations to be about hidden properties and not just surface properties. Suppose there's an insect that turns red whenever it eats potassium. Suppose toads try to catch these insects only when they're red, and the evolutionary reason for that is that toads need potassium in their diets. Then, plausibly, we could say that the toad's midbrain activation means, *there's a potassium-rich snack*. After all, the mechanism that causes the midbrain activation has the function of producing such activation in response to potassium-richness. Furthermore, the surface property of being red carries information about the hidden property of being potassium rich. So Neander has some work to do. She either needs to modify her informational solution to distality, or embrace the consequence that sensory-perceptual representations can be about inner, 'hidden' properties.

The failure of Neander's solution motivates Schulte's three-pronged account. Schulte accepts the basic framework of producer teleosemantics, that is, that a (sensory-perceptual) representation is about some content so long as there's a mechanism that has the function of producing that representation in response to that content. Further, he thinks, in order for a (sensory-perceptual) representation to have a distal content, the representation has to be produced by a *constancy mechanism* (as recently popularized for philosophers by Burge 2010). (He adds two other conditions, a 'naturalness' condition and an 'immediacy' condition, to be discussed shortly.) A constancy mechanism is a cognitive mechanism that lets us track a stable feature of an object despite wildly varying sensory input. Consider size constancy. As an object moves toward and away from you (like a tennis ball), it seems to have roughly the same size, even though the size of its retinal impression is jumping around wildly. The same goes for brightness constancy. A white sheet of paper appears white whether you take it outside in bright daylight or into a dimly lit room. Its perceived brightness is constant despite wildly varying levels of illumination. Put simply, a constancy mechanism is a mechanism that produces tokens of one and the same representation type, *R*, in the face of massively varying sensory inputs.

Here's how constancy mechanisms help save distal content. Suppose *R* is produced by a constancy mechanism. Let's suppose *R* tracks the actual size of an object, irrespective of the size of its retinal impression. What is *R* about? On the face of it, we can't say that *R* is about any *particular* retinal impression (say, a circular retinal impression that occupies 2 degrees of my visual field in a certain location). That's because *R* is indifferently tokened by many other sorts of retinal impressions (say, a circular impression that occupies 1 degree of my visual field in different location). It would seem, at first glance, that the only non-arbitrary way of specifying *R*'s content is to say that *R* is about the distal object itself. As Schulte (2018: 361) puts it, '…T5(2) activation is produced in response to very different retinal stimulation patterns under different circumstances...the only external state that qualifies as a normal cause of T5(2) excitation…is the distal state'.

There are two other conditions on his solution, a 'naturalness' and an 'immediacy' condition. I'll come back to these in more detail later, but a short sketch is warranted here. Schulte recognizes that his appeal to constancy mechanisms, taken alone, can yield disjunctive contents. That is, someone might argue that *R* isn't about a property of the distal object (namely, the actual size of the object) but a disjunctive property of my retina (namely, the property of my retina being activated in region *r1* or region *r2* or region *r3…*). So, he stipulates that *R*'s content must be its 'most natural (least disjunctive) normal cause'. That is, if we're trying to decide which of two content attributions to accept, and one attributes a highly-disjunctive content, and the other a less-disjunctive content, we should prefer the latter.

Still, *even when* we restrict contents to a representation's 'least disjunctive' normal cause, there will sometimes still be a multiplicity of contents to choose from, some more proximal than others. Consider Schulte's thought experiment in which bugs turn red when they're filled with potassium, and toads have evolved mechanisms for snapping at red bugs. There are two equally 'natural' (non-disjunctive) contents to choose from: *there's a red speck* or *there's a potassium-rich snack*. In such cases, he says, we should prefer the more 'immediate' cause of the representation, namely, the red speck.

II. CONSTANCY MECHANISMS AND MAPPING FUNCTIONS

Schulte notes that others have appealed to constancy mechanisms in thinking about representation, specifically Dretske (1981), Sterelny (1990), and Burge (2010) (see his *fn*. 29). One might think, in fact, that the solution he offers is very similar to Dretske's (1986), to be discussed shortly. But Schulte emphasizes their divergence. According to Schulte, when Dretske *first* discussed constancy mechanisms, in 1981, he accepted a purely causal-informational version of semantics; he hadn't accepted teleosemantics yet. By 1986, when Dretske embraced teleosemantics, he'd dropped the appeal to constancy mechanisms and focused on association mechanisms instead. Moreover, Schulte adds two further conditions, the naturalness condition and the immediacy condition. Still, though they differ, it's worth comparing the two, since I think Dretske's comes out ahead.

Dretske (1986:32) admits that if there's an organism with only a single mechanism for detecting the presence of some distal object *F* (say, a bacterium with an inner magnet for detecting geomagnetic north, or a worm with a cluster of photosensitive cells under its skin for detecting light), then there's no principled solution to distal content, 'no clear and unambiguous capacity for misrepresentation at this level'. But suppose our organism has two different mechanisms for detecting some external object *F*. Here's the picture. Our distal object, *F*, produces at least two different proximal stimuli, *S1* and *S2*. (Let's suppose that *S1* is a retinal impression and *S2* is an auditory impression.) *S1* is sufficient, all by itself, to cause a downstream representation, *R*. So is *S2*.

Now we ask ourselves, what is *R* about? What is its content? *R* is surely not about *S1*, since it's just as much 'about' *S2*. Nor is it about *S2*, since it's just as much 'about' *S1*. At first glance, the only non-arbitrary thing to say is that *R* is about *F* itself. So, all one needs to get Dretske's solution going is a mechanism that implements a many-one mapping function from sensory inputs to representational outputs: a 'cognitive mechanism that transforms a variety of different sensory inputs…into one output-determining state' (35).

Constancy mechanisms, as Schulte describes them, just represent one specific way of implementing this general mapping function that Dretske describes. That's because the whole *point* of a constancy mechanism is to make sure that the representation that's ultimately tokened can be triggered by many different configurations of sensory stimuli. The reason constancy mechanisms are merely *one* way to achieve this mapping, but not the only way, is that constancy mechanisms (from what I can gather) are restricted to single-modal representations. That is, the representations that a constancy mechanism churns out belong to a single sensory modality, like vision. A representation that tracks the actual size of an object, rather than its retinal size, is still a *visual* representation. The same goes for brightness. All of the standard examples of constancy mechanisms that I know of yield single-modal representations.

Dretske explicitly says, however, that his general mapping requirement can yield *either* single-modal *or* multimodal representations: ‘this may be because the organism is equipped with two sense modalities, each…sensitive to *F*, or because a single sense modality exploits different signs…of *F*’ (33). For example, a representation of a rattlesnake, one that can be produced indifferently by visual, auditory, or tactile impressions, isn’t restricted to a single modality.

There’s nothing wrong, in principle, with the fact that a component of Schulte’s solution is a special case of Dretske’s. The problem is that the argument Schulte gives for the part of his solution involving constancy mechanisms is *just* the argument that Dretske gives for his more general one. Compare Dretske: ‘if we think of the detection system described above as having the function of enabling the organism to detect *F*, then the multiplicity of ways of detecting *F* has the consequence that certain internal states (for example, *R*) can indicate…that *F* is present without indicating anything about the intermediate conditions…that ‘tell’ it that *F* is present’ (34). But Schulte provides no argument for this additional restriction – so it’s unmotivated.

An analogy will clarify the point. Suppose I argue that knowledge requires *true belief*, on the grounds that people can't know what's false and people can't know what they don't believe. Suppose you respond by arguing that knowledge requires *justified* true belief, on exactly the same grounds. We shouldn't accept your view over mine, until you provide added reasons for the restriction you impose on knowledge. But that's just the situation we're in when we compare Dretske's and Schulte's solutions.

Schulte might respond along the following lines: it's true that Dretske's mapping function is quite general. Specifically, the representations produced by constancy mechanisms are a proper subset of the representations produced by Dretske's more general mapping function. But that doesn't mean that Schulte's solution embeds an arbitrary or unmotivated restriction. Schulte is very explicit that his analysis applies to *sensory-perceptual* representations alone, and not the sorts of multimodal representations Dretske allows. So it's not that Schulte's solution contains an arbitrary restriction; it's just that Schulte's analysis has a narrower explanandum than Dretske's.

If that's right, then the disagreement between Schulte and me might boil down to a clash of philosophical methods. I think of generality as a virtue of a philosophical theory. In other words, suppose I want to understand what, say, functions are, and I state at the outset that I'm only interested in biological functions and not artifact functions, and I produce a plausible analysis of biological functions. Suppose you show that a gentle modification to my analysis will yield a more general analysis that accounts, plausibly, for *both* biological *and* artifact functions. Then, all things equal, your analysis is better, since it reveals a common essence underlying apparently different sorts of things. My analysis potentially obscures this common essence. That's where we are, I think, when we compare Dretske's appeal to a general mapping function and Schulte's (and for that matter, Sterelny's and Burge's) appeal to constancy mechanisms. Dretske's appeal to mapping functions has the virtue of generality.

III. SOLVING THE DISJUNCTION PROBLEM

As I noted earlier, Schulte realizes that his solution opens the door to disjunctive contents. In other words, if *R* is produced by a constancy mechanism, we *could* say that *R* represents the distal content, *C*. Alternatively, if we're willing to embrace disjunctive contents, we could say *R* represents a vast disjunction of proximal sensory stimuli instead, the S_i. But surely, *R* is about *C*, and not a disjunction of all of the sensory inputs that cause *R*. What to do?

Dretske observed the same problem and developed an ingenious solution to it, which centers upon association mechanisms (35). He points out that some creatures have the capacity to form new associations between proximal sensory stimuli and *R*. In other words, they have the ability to recruit new sensory stimuli as triggers for *R*. Suppose there's a kangaroo rat, and it can detect rattlesnakes using two different sensory modalities, sound and vision. It *also* has an association mechanism that allows it, over time, to recruit new sensory stimuli as local signs for rattlesnakes (say, olfactory stimuli). Now, in this rat, what's the content of *R*? We can't specify *R*'s content in terms of any finite disjunction of sensory stimuli. That's because the association mechanism introduces an open-endedness into the set of proximal stimuli sufficient for triggering *R*. It's true that, for any given organism at a given time, *R* can only be triggered by a finite disjunction of proximal stimuli. But if there's any *time-invariant* content, it can't be specified in that way (35). Rather the only non-arbitrary, time-invariant way to specify *R*'s content is to say that it's about the distal object (the snake).

Schulte recognizes the disjunction problem, but doesn't invoke Dretske's association mechanism to solve it. Instead, he imposes a new condition, the 'naturalness' condition. He says that, for *R* to be about *C*, not only must *R* be produced by a constancy mechanism, but *C* must be among *R*'s most *natural* causes. But what does naturalness amount to? It amounts to being non-disjunctive. So his solution to the disjunction problem amounts to stipulating that the content *C* should be non-disjunctive: '…we can solve the distality problem by identifying the content of a perceptual state with its *most natural* (least disjunctive) normal cause' (2018: 363). That seems right to me, but it also seems *ad hoc*. The solution doesn't fall out of some deep principle about how we attribute contents, or about the different kinds of creatures in the world. Dretske's solution achieves the same end, in a *non-ad-hoc* way, so it's preferable.

You might think that Dretske's solution is just as *ad hoc*, but it's not. He doesn't supplement his basic analysis with any further principles. He just points out that some creatures, *in fact*, have these association mechanisms, and if you're one of those creatures, the disjunction problem (i.e. why isn't *R* about a finite disjunction of proximal stimuli?) doesn’t come up. Put differently: it’s not as if Dretske has a theory of content, but the theory delivers the wrong results, so he supplements the theory with some new principle, and now he owes us a justification of that new principle. He’s just making an empirical observation that for some animals, the disjunction problem doesn’t raise its head. Of course, people have bickered with some of the details of Dretske’s solution (Loewer 1987; Dennett 1987; Neander 2017), but I’ve argued elsewhere that Dretske’s solution is fairly robust (Garson forthcoming, Chapter 12).

One might push on this point that Dretske’s solution actually is *ad hoc*, equally or more than Schulte’s. One might claim that Dretske’s solution actually yields *two* different sorts of contents, a *time-invariant* content (a snake) and a *time-variant* one (a finite disjunction of proximal sensory stimuli), and Dretske stipulates that only the *time-invariant* content matters. But I think this involves a subtle mistake about how contents are attributed (and since Dretske spoke that way, he was mistaken, too). What Dretske should have said is that it’s never the case, for some individual at a time, that the content of *R* is some finite disjunction of sensory stimuli. That’s because, in teleosemantics, content ascriptions are supposed to mirror function ascriptions. But there’s no species-wide mechanism that has the function of producing *R*s in response to some finite disjunction of sensory stimuli. Rather, there’s a mechanism that has the function of producing *R*s in response to whatever sensory stimuli the association mechanism happens to recruit. So any content ascription that’s couched in terms of a finite disjunction of sensory stimuli is mistaken.

IV. THE FAR-OUT DISTALITY PROBLEM

Schulte introduces one further condition, his ‘immediacy’ condition. This is supposed to resolve what Price (2001: 106) calls the ‘far-out’ version of the distality problem. A problem with Schulte’s solution so far (constancy mechanisms plus naturalness) is that it *still* yields multiple contents. Consider the bugs that turn red when they eat potassium. Here, there are two contents that are equally natural (non-disjunctive): *there’s a red speck*, and *there’s a potassium-rich snack*. Which is the right one? In this case, he urges us to pick the most immediate of the contents. Since *there’s a red speck* is more immediate than *there’s a potassium-rich snack*, we should choose the former.

I think this solution is plausible in its own right, but the problem he’s describing isn’t a version of the distality problem at all – given what I take that problem to be. It’s just a form of the vertical problem, which I mentioned in the introduction. The gist of the vertical problem is this: suppose we agree, for the sake of argument, that the toad’s T5(2) activation is about a distal object, specifically, a worm. What property does it represent that worm as having? Does T5(2) activation mean, *there’s a small elongated object moving in a direction that parallels its longest axis*, *there’s an edible snack*, or *there’s a worm*? In short, the vertical problem comes up when we agree about what the *object* of the representation is but we don’t agree about which *property* of the object is represented. The distality problem comes up when we can’t agree about what *object* is represented in the first place. In the far-out version of distality, we’ve already agreed that the object of the representation is a bug, and we’re trying to figure out which property the representation attributes to the bug. Again, that *is* a problem – but it's not a problem that a solution to distal content needs to solve.

Criticisms to one side, there's some real merit in Schulte's paper. Schulte raises a serious prima facie problem for Neander's solution and it's one that she and her followers would do well to take seriously. Moreover, the general *form* of Schulte's solution, which homes in on many-one mapping functions from sensory stimuli to representations, is the right way to go. My recommendation is that we retain Dretske's solution to distal content, and insert it into Neander's general approach to producer teleosemantics.

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