

Liberal Representationalism: a Deflationist Defense*

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Abstract

The idea that only complex brains can possess genuine representations is an important element in mainstream philosophical thinking. An alternative view, which I label 'liberal representationalism', holds that we should accept the existence of many more full-blown representations, from activity in retinal ganglion cell^os to the neural states produced by innate releasing mechanisms in cognitively unsophisticated organisms. A promising way of supporting liberal representationalism is to show it to be a consequence of our best naturalistic theories of representation. However, several philosophers and scientists have recently argued against this strategy. In the paper I counter these objections in defense of liberal representationalism.

1 Introduction

'Representation' is a central notion in biology and cognitive science. It is also one of the most controversial. To a first approximation, representations are *intentional* states. A representation is a state that *stands for* or *is about* another entity and which can be *accurate* or *inaccurate* depending on how the world turns out to be. There are fairly undisputed cases of entities that should count as representations and some that should not. In general, beliefs and desires belong to the former group and rocks and tables to the latter. In this essay I would like to focus on the subset that lies between these two extremes. For instance, activity in the ganglion cells exiting the retina, firing patterns in the Lateral Geniculate Nucleus or the male dragonfly's neural state when it spots a female being around. For simplicity, in what follows I will refer to these controversial cases of representations as 'C-states'.

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Are C-states genuine representations? This is a remarkably difficult question, which can be addressed from different perspectives. Nonetheless, there seems to be a straightforward way of giving a positive answer: first, provide a set of conditions that must be met for any entity to qualify as a representation (if possible, by appealing to non-representational properties) and, secondly, show that C-states satisfy these conditions. Following Burge (2010), I will call this way of vindicating the representational nature of these states 'deflationism'. The goal of this essay is to defend this project from recent objections.

The paper has two main parts. First of all, I put forward deflationism, which purports to argue that many C-states are representations. In that respect, it is worth stressing that although many have argued against deflationism, a detailed description of this view, the objections and the dialectical situation is still missing. In the second part, I present the three most common objections against this strategy (which I call the 'Exclusion', 'Contrast', and 'Reductio' arguments) and argue that they are all wanting.

2 The Deflationist Strategy

Deflationism is a view on what I call 'C-states', which is a subset of the entities that lie between uncontroversial cases of genuine representations and undisputed examples of non-representations.¹ This category is supposed to encompass various sort of entities. On the one hand, from the perspective of cognitive science, it includes neuronal activity in V1, in photoreceptor cells or in the primary somatosensory cortex, among others. These are unconscious brain events, which seem to reliably correlate with very specific environmental features (e.g. changes in light intensities). On the other hand, from a biological perspective, C-states also include the internal states of cognitively unsophisticated organisms, i.e. organisms that clearly lack any kind of complex brain, like amoeba, flatworms or mosquitoes. To have a particular example in mind, think about the well-known case of sticklebacks, which display aggressive behavior against red-bellied organisms. This is usually explained by appealing to the fact that during mating season males tend to exhibit a conspicuous red patch under their belly (Tinbergen, 1960). The stickleback's brain state that elicits this vigorous response is a paradigmatic example of C-state. It is produced by an innate releasing mechanism which elicits a fixed action pattern given a sign stimulus. Most of the examples I will discuss below will have a similar structure.

Obviously, these various states differ in significant ways. Nonetheless, there are two features that justify my grouping them together under a single category. First, all of them are *coupled*, that is, they are states that are usually triggered by a very specific cue and have a tight connection with an output system (Sterelny, 2003). For instance, neuronal activity in early visual processing tends to be elicited by particular stimuli (e.g. a specific shape) and they tend

¹I will not assume that 'C-state' refers to a substantial category in any metaphysically loaded sense. In particular, C-states might not constitute a natural kind or any other sort of scientifically relevant property.

to cause a similar kind of response upstream (Cummins and Poirier, 2004 p. 24). Likewise, releasing mechanisms in cognitively unsophisticated organisms provide very determinate responses to specific cues (e.g. stickleback’s aggressive reaction to red bellies). The second reason is that many discussions on the notion of representation have tended to indistinctively address examples of these kinds (e.g. Burge, 2010; Millikan, 1984; Ramsey, 2007; Rescorla, 2013). Indeed, most of the arguments I will consider below indifferently apply to them. Thus, a joint consideration is hard to avoid.

Now, the claim I would like to examine in this paper is what I shall call ‘liberal representationalism’ (LR, for short):

LR Many² C-states are representations.

Why should we think LR is true? A first motivation is based on a fact on which foes and friends of LR agree: scientists often claim that C-states are representations.³ Many have already pointed out that as a matter of fact many cognitive scientists suggest that C-states are indeed representational states (Eliasmith, 2000; Kandel et al., 2000; Palmer, 1999). Ryder (2009, p. 18), for instance, claims that ‘in the neuroscientific literature, the term ‘representation’ is often used just in case there is a neural ‘detector’ of some type of environmental stimulus, which need not be particularly unruly’. An illustrative example is Palmer (1999, p. 86), who describes retinal activity as follows:

The complete set of firing rates in all receptors of both eyes therefore constitutes the first representation of optical information within the visual system. This retinal representation is complicated by the distribution of receptors.

In contrast, Burge (2010, p. 356), who opposes LR, claims:

An example of a non-representational image is a two-dimensional pattern of retinal registrations of light intensities.

LR is also often presupposed in ethology. For instance, scientific explanations of hymenoptera navigation usually employ representational notions:

Given that bees and ants can memorize at least two different routes simultaneously, it seems important to determine whether such routes are mapped in a common frame of reference. This is relevant because it is related to the spatial representation that insects might acquire and store in their nervous systems (Giurfa and Capaldi, 1999, p. 237).

²Since the category of C-states is not well-defined, it would be odd to assert that *all* C-states are representations (in fact, some could misinterpret this claim as constituting a stipulative definition of C-state). In any case, I assume that the claim that *many* C-states are representations is still very controversial (see below).

³Nonetheless, it should also be noted that sometimes representational notions are not used. Indeed, in principle one could provide a complete explanation of the stickleback’s behavioral pattern in purely non-representational terms. Whether this is in fact a problem will be discussed in section 3.1. Here I am just trying to provide some motivations for LR.

In direct opposition, Rescorla (2013 p.95) argues:

Ethologists frequently write that the waggle dance 'encodes spatial information', that aspects of the dance 'represent' location, that the honeybee navigates by deploying mental 'symbols', and so on. As Burge (2010, p. 492-598) notes, however, we can easily paraphrase this representational talk by citing reliable correlations, biological functions and the like.

Of course, the mere fact that scientists use this notion cannot be taken as decisive evidence in favor of LR. They could be employing these expressions metaphorically or as a *façon de parler*. Nonetheless, I assume that this is at least a first motivation for taking LR seriously.

The main argument for LR that will be discussed here pursues a different strategy. Indeed, it is based on a truism: whether C-states qualify or not as representations utterly depends on what representations are. Thus, to establish the truth or falsity of LR, we would first need to know what distinguishes representations from non-representational states. Fortunately, there is a substantive body of literature addressing this question, usually classified as 'naturalistic theories of representation' (Adams and Aizawa, 2010; Neander, 2012; Shea, 2013). This category encompasses a whole range of theories (causal, informational, teleological,...), which seek to explain the phenomenon of intentionality in naturalistic terms. Here 'naturalism' should be understood as the claim that intentionality is not a fundamental aspect of the world, i.e. that intentional states can be explained in terms of non-intentional states and processes. As a first approximation, naturalistic theories hold that for any representation R, 'R represents S' is true in virtue of some (complex) non-intentional state of affairs being the case.

Now, for our purposes, it is important to distinguish two kinds of naturalistic accounts: semantic and metasemantic theories. Semantic theories assume that some states are representations and purport to explain why they have the content they do (see Fodor, 1990; Neander, 2013). That is, assuming that R is a representation, what determines that it represents one thing rather than another? In contrast, metasemantic theories seek to explain what makes it the case that certain states are representational at all (Millikan, 1984; Chemero, 2000; Schulte, 2015). To put it in a slightly different way: for any state R, semantic theories try to explain why R means S rather than S*, while metasemantic theories seek to elucidate why R means something at all.⁴ The objection I discuss in this paper is exclusively directed at metasemantic naturalistic theories.⁵

⁴What I call 'metasemantic theories' is labeled by Cummins (1989) 'theories of meaningfulness' and by Ramsey (2007) 'theories of representation'. I hasten to add that by drawing this distinction I do not intend to suggest that these two issues are independent, or even that one can satisfactorily address one of them without providing an answer to the other. I merely appeal to it because it is essential to understand the scope of the arguments considered in this paper. Unfortunately, semantic and metasemantic approaches have rarely been explicitly distinguished in the literature on naturalistic theories of content.

⁵This is what Ramsey (2007, p. xv) calls, meeting the 'job description challenge': 'explain-

There are obviously different naturalistic theories of content. Here I will concentrate on sender-receiver teleosemantic theories⁶ for two main reasons. First of all, they are probably the most promising and sophisticated metasemantic theories of representation. Secondly, and partially for the previous reason, they also are the primary target of the arguments discussed here. According to teleosemantics, representations are states within a sender-receiver system (a system composed of a mechanism *sending* or *producing* certain states and a mechanism *receiving* or *consuming* them) such that each of these systems is endowed with certain biological functions (Chemero, 2000; Millikan, 1984, 1993; Godfrey-Smith, 1996, 2006; Shea, 2007). Representational systems are functional sender-receiver systems. The function of the producer is to generate a state R (the *representation*) when another state obtains (the *representatum*) and the function of the consumer is to produce a certain effect when R is delivered. Thus, as a first approximation, according to teleosemantics:

TELEOSEMANTICS R is a representation iff R stands within a sender-receiver structure, such that the biological function of the sender is to produce R when a certain state obtains and the biological function of the receiver is to produce an effect when R is produced.⁷

The notion of function is usually understood etiologically: the function of an item is the effect of past items of the same type that explains why they were selected for. Functions are selected effects (Millikan, 1989; Neander, 1991). For instance, the function of the pineal gland is to secrete certain hormones because this is the effect that explains why pineal glands were selected for (and, consequently, why nowadays organisms possess them).

Let me illustrate the theory with two examples. Think again about sticklebacks. Sticklebacks possess an internal mechanism whose function is to produce a neuronal state when there is a red belly in front of them (a sender), and a motor system that has the function of eliciting an aggressive behavior when it receives this internal signal (a receiver). Thus, according to teleosemantics the stickleback's neuronal state is a representation, because it is an intermediate state between a functional sender and a functional receiver, and it probably

ing how a physical state actually fulfills the role of representing in physical or computational process – accounting for the way something actually *serves* as a representation in a cognitive system.'

⁶For simplicity, I will often drop the first part of the name and simply call them 'teleosemantic theories'. Nonetheless, the reader should bear in mind that there are some teleosemantic theories in which the notion of sender-receiver system does not play any crucial role. According to some of them, a sender is not required (Cao, 2012; Stegmann, 2009; but see Artiga, 2014) and according to others receivers are unnecessary (Dretske, 1995; Neander, 2013; Schulte, 2015). Although I present a particular version of the theory in order to discuss the objections in some detail, I think the arguments provided in this paper could be used by all teleosemanticists.

⁷Of course, this is a only rough simplification of the theory. Additional conditions might include a cooperation requirement, a more precise specification of the the sender-receiver mechanisms or the existence of certain states of affairs accounting for the success of the receiver. See section 3.3.

means something like *there is a rival male*.⁸

A parallel reasoning can be used to argue that activity in the thalamus, for instance, is a representation. Some structures within the thalamus have the function of generating a specific firing pattern when there is a dark spot in a particular region of the visual field and there are further mechanisms downstream (for instance, certain structures in V1) whose function is to use this activity in order to accomplish other tasks (e.g. identifying edges). Consequently, on SR-Teleosemantics they seem to qualify as genuine representations.

As a result, it seems that TELEOSEMANTICS lends support to LR. The conditions that determine the existence of a representational state according to this theory are satisfied by many C-states. Hence, this naturalistic theory of content can back up the intuition expressed by many scientists that sensory states and the brain states of cognitively unsophisticated organisms are indeed representations. Following Burge (2010), I will call this way of defending LR 'deflationism', which can be stated as follows:

DEFLATIONISM

1. TELEOSEMANTICS \rightarrow LR
 2. TELEOSEMANTICS
- \therefore Therefore, LR.

So that is the situation: we have a widespread scientific assumption (that C-states are representations) and we also possess a philosophical theory of what representation are that underpins this usage. It looks like one of those rare situations in which both philosophy and science converge, so one could think that an optimistic stance would be entirely justified. Unfortunately, within philosophy the idea that the deflationism is flawed and LR are *not* representations is becoming mainstream. The arguments for that claim will be examined in the second part of the paper.

But how could one resist DEFLATIONISM? On the one hand, trying to dispute premise 1, that is, the claim that TELEOSEMANTICS entails something like LR, is unlikely to succeed. Premise 1 seems to be a common ground in this debate. Similarly, an attempt to block the argument by objecting to premise 2 is also problematic. There are at least three reasons why seeking to undermine DEFLATIONISM by directly attacking TELEOSEMANTICS is likely to fail. First, whether some teleosemantic theory is utterly successful is an extremely complicated question, as a substantive body of literature on this topic certifies (McDonald and Papineau, 2006; Neander, 2012, Ryder et al, 2012; Shea, 2013). Thus, although it is of course possible that all these theories are wrong, presupposing this fact in order to undermine DEFLATIONISM is a very unstable

⁸A much disputed question in the literature on naturalistic theories of content is how this function should be described: whether the brain state stands for *red belly*, *male stickleback*, etc.. Since these questions are complex and not directly relevant for the paper, I will leave them aside.

position. Secondly, since probably we will not find any knockdown argument in favor or against this theory in the foreseeable future, dialectically speaking this strategy is unlikely help the debate on liberal representationalism move forward. I take it that any argument that does not challenge the argument by directly confronting TELEOSEMANTICS would be much more powerful and interesting. Finally, even if teleosemantic theories are false, there could still be another naturalistic theory of content on which a similar deflationist strategy could be developed, given that extant alternatives to teleosemantics are also very likely to entail LR (e.g. Fodor, 1990; Prinz, 2000; Usher, 2001; Eliasmith, 2003; Scarantino, 2013). Thus, if the anti-deflationist followed this strategy, she would need to make sure that no naturalistic theory of representation can be satisfactorily worked out. For these reasons, it seems that directly confronting the premises of DEFLATIONISM is not very promising.

So how could anti-deflationists proceed? I think two main strategies have been pursued in the literature. First, anti-deflationists could employ a *reductio ad absurdum*: one could argue that if both premises (TELEOSEMANTICS \rightarrow LR and TELEOSEMANTICS) are true, then certainly LR would follow, but also some extremely implausible consequences. This what I call the 'Reductio Argument', which will be discussed in section 3.3.

Secondly, anti-deflationists could construct an argument based on some uncontroversial properties of representations. For instance, probably all contenders accept that R is a representation only if R has truth or accuracy conditions (Burge, 2010, p. 317, Neander, 2012), only if R's truth or accuracy conditions play a significant role in the individuation of the state (Burge, 2010; Millikan, 1993; Rescorla, 2013, p. 91) and only if the fact that R is a representational state has some explanatory purchase (Burge, 2010; Shea, 2007).⁹ Now, since supporters and critics of LR accept these claims, if anti-deflationists could show that C-states lack any of these properties, they would possess a strong argument against LR. More precisely, the strategy can be stated as follows:

1. A state is a representation only if it has P
 2. C-states lack P
- Therefore, C-states are not representations

I think it is obvious that this argument would be much more powerful than any objection based on the outright denial of TELEOSEMANTICS. If P is a widely accepted property, then this is a conclusion that teleosemanticists would also be committed to. Furthermore, note that if this strategy succeeds, it would not only put pressure on LR but also on TELEOSEMANTICS. LR would be shown to be a wrong prediction of this naturalistic theory. As a result, anti-deflationists would have a straightforward *modus tollens* against teleosemantics. What I call

⁹The fact that there are various claims all disputants accept also shows that this is not a mere terminological quibble concerning the word 'representation'. Substantive issues depend on whether C-states actually qualify as representational states.

the 'Exclusion Argument' and the 'Contrast Argument' are instances of this strategy.

In the remainder of this essay I will critically examine the Exclusion, the Contrast and the Reductio argument against DEFLATIONISM.

3 Anti-Deflationism

3.1 The Exclusion Argument

The first objection I would like to consider is the Exclusion Argument. Here is a statement of this reasoning in a recent and influential book:

In the cases of some sensory states—non-perceptual ones—saying that the states have veridicality conditions would add nothing explanatory to what is known about discriminative sensitivity and the biological function of the sensitivity. (...). Veridicality conditions can be imposed. But invoking them gains no empirical traction, yields no empirical illumination. In such cases, there is no reason to believe that there are representational states. (Burge, 2010, p. 395, see also 318).

The argument is succinct, so let me spell it out in more detail. First of all, Burge claims that some C-states (non-perceptual sensory states) can be explained in non-representational terms (e.g. by appealing to discriminative sensitivity and biological functions). Secondly, he argues that a representational description of these states would add nothing explanatorily to a purely non-representational description. The additional claim that these states are representations does not make any significant explanatory contribution. Finally, since it is common ground in this debate that representational ascriptions must play some useful explanatory role, this is taken to imply that these C-states are not representations.¹⁰

Rescorla uses a parallel reasoning when discussing a famous example involving marine bacteria (Dretske, 1986). These anaerobic organisms use the position of an internal magnetosome which orients towards the geomagnetic north to move to oxygen-free water. According to Rescorla (2013, p. 94):

As Burge, (2010, 300) notes, we can offer a detailed biochemical theory of magnetotaxis (...). Truth-conditional attribution contributes no explanatory force to a purely biochemical explanation. For instance, we gain no explanatory power by saying that magnetosome

¹⁰Here is another quote that contains a similar reasoning in the context of magnetotaxis (explained below): 'Everything in the example can be explained using the notion of biological function (with respect to oxygen poverty), normal environmental conditions, and sensory discrimination (with respect to magnetic forces). Adding an odd use of the term 'representation' contributes nothing to explanation, and does not independently illuminate representation'. (Burge, 2010, p. 300).

orientation is inaccurate in those cases where the reliable correlation with oxygen-poverty fails. As applied to magnetotaxis, truth-conditional locutions are an explanatory flourish, not a serious contribution to good explanation.

Again, the first idea is that a satisfactory explanation of this mechanism can be provided by appealing to biochemical (i.e. non-representational) states and processes. Thus, supplementing this account with a representational description is uninformative and has no explanatory purchase. Given a biochemical description, adding the claim that they are representations with accuracy or truth-conditions yields no explanatory benefits. And since a standard assumption in this debate is that attributions of representations must have some explanatory value, Rescorla concludes that it is wrong to attribute representations to bacteria.

This is an extremely common argument (see, for instance, Bermudez, 2003, p. 6-9; Newen and Bartels, 2007, p. 294, Sterelny, 1995; Pylyshyn, 2007, p. 75; Ramsey, 2007, ch. 4; Schulte, 2015). The objection is both apparently simple and powerful. Here is my reconstruction:

EXCLUSION

1. An entity is a representation only if assuming this fact has some explanatory value.
 2. C-states can be completely explained by assuming a set of non-representational properties and relations (reliable correlations, biological functions, etc.).
 3. If an entity can be completely explained by assuming a set of non-representational properties and relations, then assuming that it involves representations has no explanatory value.
- \therefore Therefore, C-states are not representations.

Let me elaborate on each of the premises. First of all, premise 1 simply asserts the standard assumption that representational attributions need to substantially contribute to some explanation. Although the exact way of spelling out this contribution is a hotly disputed issue, it is widely agreed that there must be some value to it.

Premise 2 holds that a complete explanation of C-states can be provided in non-representational terms (by appealing to discriminative sensitivity, biological function, causation, etc.). There are two compelling motivations for this premise. Firstly, one of the defining properties of C-states is that they are simple and *coupled*, i.e. they are usually triggered by a very specific cue and have a tight connection with an output system. Thus, there seems to be no barrier to their full explanation in causal and functional terms. The second reason (which is specially relevant for us) is that premise 2 seems to follow from TELEOSEMANTICS and the claim that TELEOSEMANTICS \rightarrow LR. Suppose that one embraces the deflationist strategy and holds that most C-states are representations because

they can be naturalized with TELEOSEMANTICS. Since TELEOSEMANTICS claims that intentional properties are reducible to non-intentional properties, it entails that for every representation it is always possible to provide an explanation in non-representational terms. In other words, the deflationist is committed to the view that any C-state can be fully explained in terms of non-representational states and processes. Consequently, deflationists cannot deny that for any event that C-states are supposed to explain, a complete explanation can be provided in non-representational terms. Therefore, they are forcefully committed to 2.

Finally, premise 3 asserts that, if a full explanation can be provided in non-representational terms, then the additional claim that this entity is a representation has no explanatory import. This claim seems to be backed up by some sort of exclusion principle. Here is a way of motivating it: imagine we want to explain an event *e*, e.g. why it rained over Paris last Monday, and we are provided a set *S* of states and regularities involving wind conditions, atmospheric pressure, temperature and so on. Moreover, suppose that *S* includes any feature that we require for a complete explanation of *e*; it mentions the exact position of clouds, the precise forces acting on them and so on. It seems that, given that *S* includes everything that is required for a satisfactory explanation of the event, anything outside *S* is superfluous and hence unexplanatory. For instance, if a complete explanation of that event can be provided in terms of physical conditions, God's intentions would be explanatory irrelevant. God's willingness is not called for. Using Burge's expression, this hypothesis 'yields no empirical illumination'. As a consequence, we would have good reasons for rejecting this explanation. Similarly, if a complete explanation of C-states can be provided in non-representational terms, then it seems that giving them a representational status provides no interesting insight. The result is EXCLUSION, whose conclusion is that LR is false.

How could a deflationist reply to this argument? I just argued that premise 2 follows from the truth of TELEOSEMANTICS and TELEOSEMANTICS→LR. Nonetheless, I think the other two premises can be questioned. Although I will have something to say about 1, I think the most controversial claim is 3. In particular, this premise fails to take into account the reductive nature of naturalistic theories of representation. Let me explain.

The truth of 3 depends on a hidden premise. In general, a full explanation in terms of G excludes an explanation in other terms only if both explanations are independent. Suppose for instance that we identify two properties, F and G, in the sense that for any *x*, *x being F* just consists in *x being G*. If G and F are the very same property, the fact that an explanation in terms of G can be provided in a given context does not preclude an explanation in terms of F (Jackson and Pettit, 1990, p.116-7). Since they are not independent, these properties are immune to the problem of explanatory exclusion. As Kim (1989, p. 86) suggests, 'a certain instability exists in a situation in which two distinct events are claimed to be nomologically equivalent causes or explanations of the same phenomenon; stability is restored when equivalence is replaced by identity or some asymmetric relation of dependence.' The idea that identity can secure the explanatory value of F and G seems to be a standard philosophical assumption

(Bennett, 2007, p. 325; Robb and Heil, 2014; Yoo, 2016).

To avoid confusions, it is important to stress that in our discussion what plays the role of F and G are representational properties and complex functional properties (having certain functions, mechanisms, etc...). In other words, we are examining whether an explanation in functional terms excludes an explanation in representational terms.¹¹ The claim is simply that if *x being a representation* is not independent from (can be reduced or supervenes on) a functional property, then it is unclear that a functionalist explanation excludes a representationalist one.

Consequently, the argument needs to presuppose that the two explanations are independent. That is:

IND An explanation in representational terms is independent from an explanation in non-representational terms (i.e. in terms of discriminative sensitivity, biological function, causation, etc..).

Unless IND is assumed, 3 fails to hold. So rejecting IND is sufficient for blocking EXCLUSION.

Are explanations in representational terms independent from explanations in non-representational terms? Let us now consider naturalistic theories such as TELEOSEMANTICS. These approaches are usually conceived as reductive theories (MacDonald and Papineau, 2006, p. 3; Millikan, 1984). Their main goal is to identify representational facts with a complex set of non-representational facts like biological functions, sender-receiver systems or informational relations. As we said earlier, these accounts try to argue that for any representation R, 'R represents S' is true in virtue of some (complex) non-intentional state of affairs being the case. Thus, if TELEOSEMANTICS (or some other naturalistic approach) is true, the property *being a representation* and the reducing properties (e.g. *standing within a sender-receiver structure with such and such functions*) are not independent in the sense required by IND.¹² In fact, IND is precisely the straightforward denial of naturalistic theories of representation. Consequently, if TELEOSEMANTICS (or some other reductive theory of representation) is true, IND should be rejected and EXCLUSION does not go through. That is:

1. If TELEOSEMANTICS is true, the property *being a representation* can be reduced to non-representational properties.
2. For any properties F and G, if F can be reduced to G, an explanation in terms of F is not independent of an explanation in terms of G.

¹¹In contrast, the traditional Exclusion Argument about mental causation concerns the relationship between mental properties and physical properties. Many want to resist this kind of reduction for various reasons (e.g. Fodor, 1997; Block, 1997), but this is orthogonal to our present discussion. The question at issue is whether representational properties can be reduced to functional properties. This reduction is fully compatible, for instance, with the multiple realizability of representations or mental states.

¹²Some people might hold that supervenience of intentional states and on non-intentional entities suffice for rendering IND false. If this is so, then even a non-reductionist interpretation of naturalistic theories would be in position to block EXCLUSION.

- Therefore, if TELEOSEMANTICS is true, an explanation in representational terms is *not* independent from an explanation in non-representational terms (i.e. IND is false).

Now, I previously argued that IND needs to be assumed for premise 3 of EXCLUSION to hold. Consequently, if TELEOSEMANTICS entails the falsity of IND, it also undermines the EXCLUSION argument.

Let me put the argument in a more intuitive form. A standard objection against LR presupposes that if one can fully explain a set of events without assuming that x is a representation, then x is not representation. However, this principle is not generally true when *being a representation* is reducible to a set of properties G and G is required for a complete explanation. If instantiations of F are identical to instantiations of G , the fact that you can explain any event without appealing to F does not mean that F is not instantiated. Given that they are not independent properties, an explanation in terms of one of them does not exclude an explanation in terms of the other.

I think this is the main reason why EXCLUSION fails to provide a compelling reason for abandoning LR. Nonetheless, suppose one is not convinced by this argument. Imagine one thinks that even if F reduces to G , the fact that one can provide an explanation in terms of G excludes explanations in terms of F . I think one could also question premise 1 of EXCLUSION ('an entity is a representation only if assuming this fact has some explanatory value'). Certainly, we want a theory that vindicates the idea that in general the fact that an entity is a representation has some explanatory value. However, it would be far too strong to require that in *every* context the fact that something is a representation must have an explanatory privilege over alternative explanations. For example, in the context of simple mechanisms and for certain explanatory purposes, it might be more useful to appeal to non-representational states and processes. This is fully compatible with its actually being a representation, if this is what our best theory of representation predicts. As soon as the explanatory value of central cases of representation is warranted, I don't see why in every instance this perspective must be preferred to alternative explanations. Indeed, it is hard to think of any other property that exhibits this privileged status.

Finally, let me clarify the dialectical situation. I just argued that EXCLUSION presupposes the falsity of TELEOSEMANTICS. This is significant for at least three reasons. First of all, those putting forward the exclusion argument have failed to see that their argument *assumes* (rather than shows) that TELEOSEMANTICS (and LR) are wrong. This, I think, is already a striking result. Secondly, I argued in section 2 that the anti-deflationist needs an argument that does not presuppose the rejection of TELEOSEMANTICS. Finally, I doubt this sort of objection will help the debate move forward. If the analysis provided here is right, the success of EXCLUSION depends on the truth or falsity of TELEOSEMANTICS. However, we already knew that the truth of LR will utterly depend on the truth or falsity of TELEOSEMANTICS. Thus, EXCLUSION fails to provide any illuminating insight.

3.2 The Contrast Argument

I just argued that explanatory exclusion is unlikely to boost a compelling argument against DEFLATIONISM. An alternative strategy is to look for a property that all representations have, but is lacking in C-states. More formally, the strategy pursued by many can be interpreted as instances of the following reasoning:

CONTRAST

1. A state is a representation only if it has P
2. C-states lack P
 - Therefore, C-states are not representations.

In other words, the idea is to argue that C-states are not representations by *contrasting* them to genuine representations, which have a property that C-states lack (for a clear statement of this strategy, see Fodor, 1986, p. 6). This is why I call it the 'Contrast Argument' or, simply, CONTRAST.

Now, it should be obvious that there are many properties distinguishing C-states from other entities, so to meet the challenge one needs to do more than simply identifying one of them. The point of the argument is to find some property F that satisfies these three conditions:

- (C1) F is possessed by obvious cases of genuine representations
- (C2) F is missing in C-states
- (C3) F is somehow relevant for representational attributions

C1 and C3 are supposed to justify premise 1 of the Contrast Argument and C2 premise 2. Thus, the ideal version of the argument would appeal to a property that clearly and uncontroversially satisfies these three requirements. Unfortunately, anti-deflationists usually disagree on the properties that justify ascriptions of representations (even if they agree on the fact that C-states lack them). Thus, one cannot provide a general reply against them. Instead, I will present some paradigmatic arguments and argue that they fail to satisfy at least one of these conditions.

First, some arguments do not to comply with C2. Here is, for instance, what Ramsey (2007, p. 142) says about C-states being representations (which roughly correspond to his 'receptor representations'):

A potential worry about my analysis is that I'm employing a double standard, using one set of criteria for defending the value of IO-representation and S-representation, but adopting much tougher standards for the receptor notion. (...) But this worry is misplaced. The problem with receptor representations is not that the systems that allegedly use them can be given a purely causal-physical, non-representational characterization. Rather, the problem is that the

theoretical frameworks that invoke them, despite various mischaracterizations, actually assign to them a non-representational role. Serving as a structure/state that is reliably triggered by some other condition, or that is recruited to cause something to happen whenever a specific condition obtains, is to play a role that, as such, is not representational in nature.

Certainly, we all agree that the representational status of C-states depends on whether they play a representational role (Millikan, 2004, p. 17). However, what is at stake here is what is required for an entity to play this role. Arguably this question should be answered by our best theories of representation and, according to the naturalistic theories I'm discussing in this paper, C-states do satisfy this requirement. Thus, it is far from obvious that C-states lack this property. This strategy for providing a contrast argument fails to satisfy condition C2.¹³

Other objections fail to comply with C3. For instance, a widespread idea is that representational states must be decoupled, that is, they should not be triggered by a very specific cue or have a tight connection with an output system (e.g. Haugeland, 1998; Ramsey, 2007; Sterelny, 2003).¹⁴ This breadth of response is certainly a property of full fledged representations such as beliefs and desires and C-states trivially lack this property (since they are coupled by definition— see section 2). So this feature complies with the first two requirements. However, it is not obvious that it satisfies the third condition: why should we think being decoupled has anything to do with being a representation? It is unclear why this feature should be required (Fodor, 1986, p. 13; p. 20). In the rare occasions in which this claim is argued for, it is suggested that only decoupled states should qualify as genuine representations because a full explanation of coupled states can be provided in non-representational terms. However, this is a version of EXCLUSION and I just argued that it is unconvincing. Thus, it is far from obvious that this proposal satisfies C3.

Let me discuss a third way of developing a contrast argument (which some people might employ to defend a decouplability condition). Some hold that a distinctive property of representational states is the use of a diversity of stimuli in order to track the same distal stimulus (Burge, 2010; Sterelny, 1995; Schulte, 2015). When a distal entity is only detected through a single cue, then it

¹³To be fair to Ramsey, it should be said that he does provide other arguments against DEFLATIONISM. Nonetheless, most of them are instances of the EXCLUSION and REDUCTIO (see Ramsey, 2007, p. 126-148) so I think they utterly fail to undermine the deflationist strategy.

¹⁴One might find alternative definitions of 'decouplability'. For instance, Rowlands (2006) suggests: 'it is often thought that for an item to be regarded as genuinely representational it must be *decouplable* from its wider environment and, in particular, from the state of affairs that it purports to represent. The guiding insight is that whatever else a representation might be, it must be the sort of thing that can be used, by an organism, to guide its behavior in the absence of the feature of which it is a representation.' But how much decouplability is required? Rowlands (2006, p. 166) claims that 'there must be sufficient decouplability to satisfy the normativity constraint, but nothing more', where the 'Normativity constraint' refers to the signal's capacity to misrepresent. If this is the challenge, C-states can easily meet it. The sticklebacks's brain state can misfire if it is tokened in the absence of a red belly, so they are decouplable in this minimal sense. I take it that most authors require something stronger.

should not qualify as a proper representation. But why should we think this distinction has anything to do with representational status? Sterelny (1995) and, following him, Schulte (2015) provide a rationale that resorts to Jackson and Pettit’s distinction between robust-process and actual-sequence explanations. The distinction is most easily presented with an example. If we want to explain why FC Barcelona won the 2015 champions league, one could mention every pass of the game, the fact that Luis Suarez scored a goal in the first part, the foul against Messi, and so on, or one could instead appeal to the fact that FC Barcelona dominated the midfield and had a solid attack. Both kinds of explanations are equally legitimate and mention facts that led to the outcome that needs to be accounted for. Nonetheless, while the former specifies what happened in the actual world in much more detail, the latter provides more information about what would have happened in counterfactual scenarios. In close possible worlds, for instance, Luis Suarez fails to score the goal but someone else does, given FC Barcelona’s control of the midfield.

Relying on these distinction, Sterelny (1995, p. 259; 2015, p. 553) argues that there is an important difference between explanations in terms of C-states and explanations in terms of other states that should indeed qualify as representations. In both cases, one can always provide a robust-process and an actual-sequence causal explanation; nonetheless, a robust-process explanation of the occurrence of a C-state would mention the particular stimulus that elicits a given response, while a robust-sequence explanation of genuinely representational states would mention the more distal source.

To illustrate the contrast, consider the behavior of ants and piping plovers. Many ants such as the fire ant (*Solenopsis invicta*) or the Argentinian ant (*Linepithema humiles*) remove dead nest mates when they detect certain chemical cues, such as diglycerides or triglycerides. It is recently been found that living ants also emit these chemical molecules, but they are masked by the production of iridodials, dolichodials, and related compounds. Thus, according to the ‘chemical vital sign’ hypothesis, necrophoresis (the removal of dead fellows) is elicited by the absence of certain molecules associated to life (Choe et al. 2009, Sun and Zhou, 2013). This is a fairly automatic behavior; when extracts of dead ants were applied to live pupae, workers carried 90% of them to the refuse pile (Choe et al. 2009, p. 8251). Compare this behavior to the predator-detecting mechanism exhibited by piping plovers. Piping plovers (*Charadrius melodus*) are shorebirds that perform a distracting display when they detect a predator approaching, which is supposed to direct potential predators away from the nestlings. This behavior is sensitive to several environmental contingencies, such as the distance to the nest, the line of approach of the intruder or the level of threat (Ristau, 1991). Sterelny argues that a robust-causal explanation of the piping plovers’ behavior should mention danger approaching (the distal affair) rather than any particular stimulus (e.g. eagle-like shadow 300 feet away from the nest), since the latter is not robust; in close possible worlds, the same kind of distal event produces different stimuli and, nonetheless, it also causes a similar brain state and behavior. In contrast, he argues that a robust explanation of the ant’s behavior should mention the proximal stimulus. In close

possible worlds in which ants remove corpses, this behavior is always caused by the same stimulus. The ant does not seem to be sensitive to the presence or absence of a dead mate, but only to the local concentration of a certain chemical cue. Based on this contrast between causal explanations, Sterelny argues that representational states should be attributed to piping plovers, but not to ants. More generally, since a defining property of C-states is that they are elicited by very specific cues, they would not count as representations.

To this interesting suggestion two replies can be given. First, one could question whether differences in robust-process explanations actually reveal a contrast between representations and non-representations; it seems that one could equally interpret them as motivating a distinction between representations with different contents – representations of proximal stimuli in ants and representations of distal entities in piping plovers. I presume that some teleosemanticists might be willing to follow this path (e.g. producer-based teleosemantics – Neander, 2013). Thus, this proposal might fail to satisfy condition C3, since the difference in robust-process explanations might not establish a difference in representational status, but a distinction in representational content. Nonetheless, I admit this question is hard to settle. For this reason, I would like to press on a different issue: I will argue that this reasoning fails to identify a contrast between piping plovers and ants, because there is indeed an important robust-process explanation of the ant’s behavior that mentions the distal affair.

Suppose we ask ‘why do Argentinian ants behave as they do?’. We all agree that there is an actual-sequence explanation mentioning the dead fellow, the presence of triglycerides, the absence of dolichodial molecules and the ant’s specific movements, among others. I think Sterelny is also right in holding that there is a robust-causal explanation that mentions the stimulus (and not the more distal state). In close possible worlds, ants perform the same behavior in the presence of triglycerides, whether there is a dead mate or not. However, there is also a robust-causal explanation that mentions dead ants and obviates the specific chemical cues that trigger this behavior in the actual world. For instance, there are (relatively close) possible worlds in which dead ants are removed by detecting fatty acids (as some scientists thought: Wilson et al, 1958; Howard and Tschinkel, 1976). Similarly, there are (relatively close) possible worlds in which dead ants are detected by their lack of movements. And so on. Now, in these worlds ants still behave as they do in the actual world (taking corpses out of the burrow) and there is a common cause: the presence of a dead ant.

Indeed, these counterfactual statements seem to capture something important about the actual world. On the one hand, ants are interested in dead mates being removed (not in triglycerides or oleic acid *per se*), in the sense that what explains the existence of this mechanism is the fact that it reliably leads to the removal of dead fellows. The evolutionary reason why ants perform this behavior when sensing certain chemicals is that they manage to remove dead fellows (triglycerides are harmless). On the other hand, mentioning the distal property enables interesting generalizations about other ant or hymenoptera species that use different cues to remove dead fellows. It is been suggested, for instance, that

some species of ants, bees and termites actually use oleic acids or tactile information as cues (Sun and Zhou, 2013, p. 314-5). The claim that they represent dead mates allows us to provide a unified explanation of various phenomena that would be hidden by a myopic focus on the cue triggering the behavior. Consequently, this analysis suggests that there is a robust-process explanation that mentions dead ants (distal property) and fails to mention triglycerides (the actual stimulus), and this perspective has significant explanatory virtues. Thus, the contrast between C-states and other states vanishes: in both cases there is a robust-process explanation that mentions distal features. Consequently, it is unclear that this reasoning identifies any distinctive property that C-states lack, i.e. it fails to satisfy C2.

Of course, one might complain that this robust-process explanations considers possible worlds with different evolutionary histories, while in the context of piping plovers the relevant counterfactual worlds are much closer. In other terms, possible worlds in which Argentinian ants expel dead mates by detecting a different property are much farther away than worlds in which piping plovers distract predators by using different cues. I think this is certainly true, but again, my point is that this contrast is irrelevant for representational status. Here is a way of showing why: if representational status depended on explanations being robust in that way, the very idea of innate representation would be jeopardized. Think, for instance, about the hypothesis that there is an innate module for spider recognition. Rakison and Derringer's (2008) performed a series of experiments, which suggest that 5-month-old infants are differentially sensitive to pictures of objects that look like spiders (small size, curved legs, elongated body,...) and suggest that humans have an innate basic perceptual representation of these insects. If that were true, a robust-process causal explanation of the occurrence of the representation that only considered close possible worlds in which humans have the same evolutionary history would mention the particular stimulus that elicits the response (small size, curved legs, etc..) – in the same way that robust-process explanation of the ant's behavior only mentions specific stimuli. In close possible worlds in which the evolutionary history is the same, this innate representation will be triggered by the very same specific cue (even if there is no spider around). Likewise, there is also a robust-process explanation that appeals to a distal entity (i.e. spiders) if one is also entitled to consider counterfactual statements involving different evolutionary histories. Therefore, if one claims that the robust-process explanations that determine representational status cannot take into account worlds with different evolutionary histories, some uncontroversial cases of human representation (such as innate representations) would fail to satisfy this requirement. In other words, if one claims that ants lack representations because one would have to change the evolutionary past in order for them to use a different cue, then the same reasoning would preclude attributing many innate representation to humans, which are also triggered by specific stimuli. However, there are uncontroversial cases of human innate representations, so this proposal fails to satisfy C1 stated above. Therefore, the idea that a successful Contrast Argument can be build using the notion of robust-process causal explanations seems to be misguided.

Summing up, none of the arguments considered here identifies a property that satisfies conditions C1, C2 and C3. Although for obvious reasons I cannot address all versions of this argument, I think this brief analysis of some paradigmatic examples tentatively supports the idea that so far the Contrast Argument has been unsuccessful.

3.3 The Reductio Argument

The final objection I would like to consider has sometimes been labeled 'pansemanticism' (Fodor, 1990). In contrast to the previous arguments, which seek to identify some property that genuine representations possess and C-states lack, this last objection has the structure of a *reductio ad absurdum*. Let us suppose that the two premises of deflationism hold, i.e. TELEOSEMANTICS \rightarrow LR and TELEOSEMANTICS are true. There are many entities (besides C-states) that would satisfy the conditions laid down in TELEOSEMANTICS; thus, they should qualify as representations. However, many of them are clear cases of non-representational states. Therefore, TELEOSEMANTICS must be wrong.

Different counterexamples have been offered, which are supposed to constitute clear cases of non-intentional states that are claimed to be representations according to TELEOSEMANTICS. Some of them are clearly wrong-headed. For instance, it is sometimes suggested that naturalistic theories of content imply that tree rings represent age, smoke represents fire or the earth's orbit represents the gravitational powers of the sun, but *this* is definitely not implied by any current sophisticated theory of content, such as Dretske (1988), Millikan (1984), Papineau (1993), Shea (2007) or Martinez (2013). None of these entities involve two mechanisms that have evolved as a sender-receiver configuration, in such a way that the etiological function of one of them is to produce an intermediate state whenever some other states of affairs obtain.

Nevertheless, there are other alleged counterexamples that do address these more sophisticated theories. For instance, Sterelny (1995, p. 256) argues that teleosemantic theories are committed to saliva being a representation of food; saliva is produced by salivary glands and consumed by the digestive system, and it adapts the latter to the reception of food. Schulte (2015, p. 10) puts forward a similar example: when the osmolarity of our blood raises above a certain limit, the hypothalamus releases vasopressin, which is a hormone that travels to the kidney and 'causes an increase in the amount of water that is reabsorbed by the blood vessels, thereby lowering the osmolarity of our blood'. There seems to be a functional sender (hypothalamus), a receiver (kidney), an intermediate state (vasopressin circulating) which according to TELEOSEMANTICS would represent something like *high osmolarity*.¹⁵ Similarly, a reviewer suggested that blood oxygenation levels are intermediates between skeletal muscle motion and the

¹⁵It is worth pointing out that the conclusion of Schulte's argument is *not* that any naturalistic theory of representation entails that vasopressin is a representation of high osmolarity (after all, he proposes a teleosemantic theory himself that does not have this consequence). Rather, he suggests that any naturalistic theory that entails LR is also likely to imply that vasopressin is representation. That is, his *reductio* assumes TELEOSEMANTICS \rightarrow LR.

lungs, so they could also qualify as representations.

I think this is a sensible worry. However, for any of these examples three responses are available. First of all, it is important to stress that TELEOSEMANTICS just is a simplification of real teleosemantic theories. All of them add more conditions: a certain level of cooperation between the mechanisms (Milikan, 1984; Artiga, 2014), a more precise characterization of the systems that can play the role of senders and receivers, adding informational relations (Shea, 2007; Martinez, 2013, Neander, 2013) and so on. A full consideration of this argument would require a discussion of every counterexample and an assessment of the different teleosemantic views, which for obvious reasons cannot be carried out here. Nonetheless, I would like to briefly mention two conditions that could be added to TELEOSEMANTICS in order to restrict the set of representations.

The first idea has mainly been discussed in the context of genetics. It is well known that many biologists talk about genes carrying information about proteins (or phenotypes) and there has been some discussion on whether this sort of expressions should be taken at face value. The challenge has been to vindicate the idea that strands of DNA carry semantic information without falling into pansemanticism. Within this debate, a recurrent idea has been to appeal to the notion of arbitrariness, although various people have analysed it in different ways. Godfrey-Smith (2000, p. 33) claims that 'by "arbitrary," I mean that nothing about the chemistry of a particular amino acid is responsible for it corresponding to a particular base triplet', Maynard-Smith (2000) that 'all the reactions obey the laws of chemistry, as they must, but there is no chemical necessity about which inducers regulate which genes' and Sarkar (2000, p. 210) that 's can be viewed as a sign for r in the sense that the theory which provides the mechanisms by which s produces r allows that an s* different from s could have been the sign for r' (see also Sterelny, 2000, p. 198; Stegmann, 2004). Note that, if arbitrariness is defined in any of these ways, many C-states would count as arbitrary. For instance, many other brain states in sticklebacks could have mediated the connection between red things and aggressive behavior. In contrast, one might argue that the connection between saliva and digestion is much tighter (even if not necessary, of course). Accordingly, if any of these definitions could be worked out in detail and added to TELEOSEMANTICS as a further requirement, there could be a sense in which C-states are genuine representations and many other states are not.

An alternative proposal (which I hope to develop soon in more detail) is to appeal to the causal explanatory role of signals. The causal contribution that representations make to the success of the receiver is very different from the contribution of non-signals. The difference between giving food to someone and giving a food signal is that in the former case what actually accounts for the increase in fitness is the thing given, whereas in the latter what explains the boost in fitness is something else; the signal tells you when to act, but what mainly explains the success of the behavior is the thing represented. This idea might help to exclude some counterexamples; such as blood oxygenation levels. Of course, much more should be said to make this idea clear and plausible, but I hope it helps at least to show that there are various ways to enrich the simple

teleological theory defined in TELEOSEMANTICS, in such a way that LR still follows but the notion of representations is not trivialized.

Still, it would be naive to think that these modifications could rule out all alleged counterexamples. Even if bells and whistles are added to TELEOSEMANTICS, it might still follow that the set of representational states is significantly larger than we expected. At that point, however, I think the best strategy for the deflationist is to simply bite the bullet. Indeed, in many cases this might be a very sensible thing to do. For instance, as Schulte (2015) suggests (some refinement of) TELEOSEMANTICS probably entails that vasopressin and other hormones are representations. However, I do not take that to be a counterexample. Consider, for instance, what Aranda (2015, p. 11) claims:

In higher animals there are two main control systems exercising these functions [control and coordination]: the nervous system and the endocrine system. Whereas in the nervous system neurons form a network that spreads information rapidly through electrical signals in the case of the endocrine system there are chemical messengers called hormones.

Here hormones are compared to signals in the nervous system. Indeed, it is standard to say that hormones are signals that body organs send to each other. Accordingly, although that might still sound counterintuitive to some ears, accepting that these states are representations should not worry the deflationist. Once trees, smoke and planets are excluded, it still has to be shown that the remaining examples are as troublesome as many have assumed.

Finally, let us focus on the hardest cases, that is, those examples that can not be dealt with with the previous two strategies: modifying TELEOSEMANTICS does not suffice for excluding them and accepting they are genuine representations is clearly counterintuitive by all lights. A third reply is still available. Note that REDUCTIO is an argument against teleosemantic theories. Thus, even if this approach has some counterintuitive results, this is only one element in the full assessment of the theory. Whatever cost teleosemantic theories might incur with the alleged counterexamples should be weighted against their virtues (e.g. giving the right results in many cases, providing a unified theory of representation, etc.). Indeed, it is not obvious that one can even provide a general theory of representations that can account for the central cases but does not have some marginal counterintuitive results. Consequently, much more is needed to make the anti-deflationist case compelling. Although I think this a reasonable worry that needs to be addressed by naturalistic theorists, I very much doubt it can be used as a *reductio* of DEFLATIONISM.

4 Conclusion

The primary goal of this essay has been to defend DEFLATIONISM from several objections that have recently been gaining prominence. Obviously, much more work is required to show that C-states are indeed representational – for one

thing, one would need to work out a fully convincing teleosemantic (or, more broadly, naturalistic) theory of content. Nevertheless, I argued that popular arguments against this strategy are wanting. Given the widespread dismissal of the deflationist strategy, I think this is a significant outcome.

The paper also aimed at elucidating the structure of this entangled debate. Much too often philosophers have pursued some kind of anti-deflationist strategy without actually clarifying the different views at stake and the dialectical situation. So even if one think the replies provided here are less than fully convincing, I hope that at least this essay contributes to shed some light on the dispute. This is urgently required for the debate to move forward.

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