Functions and Mental Representation

Abstract
Causal theories of mental content typically unpack the normativity in the relation of representation by appealing to the teleological function of the representing state — or appropriately related ones. It has been argued that, if intentionality is to be explained in teleological terms, then the teleological function of a state cannot depend on its phylogenetical history, given the metaphysical possibility of a duplicate of an intentional being lacking an evolutionary history (Swampman). My aim in this paper is to review the replies that have been offered in the literature to this objection and to present a new argument that is immune to these replies.

Keywords: Teleosemantics; biological function; mental content; intentionality; Swampman

1 Intentionality and Representation
In the fruit shop in the corner of the street I see a box full of strawberries, I believe that strawberries are tasty and I want to eat strawberries. However, I know that, by this time of the year, strawberries are not very good and I decide to continue my walk. My belief and my desire in this example are about, or directed on, to, strawberries. Similarly, my desire to watch a movie is about movies and my belief that it is going to rain tomorrow is about rain. A theory of mental content attempts to explain the kind of relation that holds between our mental states and other entities of the world like strawberries, films or rain — their intentional objects. This relation is usually called representation. The mental state is the vehicle of representation (what does the representing) and what the mental state is about (what is represented) is its intentional content or simply its content.

Representations are not merely object of philosophical dispute; they are fruitfully postulated in, for example, cognitive sciences. Philosophers are worried about the nature of this kind of relation because it seems mysterious. Some philosophers (Chisholm, 1957) have doubted that there is room in a physical world for representations. The reason is that it looks like a plausible assumption that a physical relation requires their relata to be physical; however, mental states can have non-existing objects as their intentional objects, as in my niece’s desire for the Three Kings to bring her a lot of things next Christmas.
Furthermore, representations are normative: the content of our mental states legitimizes certain kinds of evaluation. For instance, if someone believes that Bonn is the capital of Germany she’s wrong, her belief is false. Similarly, perceptions are evaluated as veridical, illusory or hallucinatory depending on their content and their correspondence with the state of the world. It is unclear how such normativity is compatible with our understanding of the world in physical terms.

To dispel this kind of worries, naturalistic theories of mental content do not take representations as fundamental, and attempt to explain in virtue of what the relation of representation holds between the vehicle of representation and its content in terms compatible with materialism.

1.1 Functions and Representation

In the last thirty years there has been a renewed interest in the philosophy of mind in functions and functional explanation with the hope that the notion of biological function would contribute to an account of mental content. Where does this interest come from?

Although in the history of philosophy the prevailing idea was that mental states represent in virtue of their resemblance or similarity with their objects, this idea is no longer popular. In a seminal paper, Stampe (1977) initiates the interest in causal theories in the contemporary debate about mental content, precisely by showing the problems that resemblance theories have to face. In the first place, resemblance is a symmetrical relation, while representation is not. Whereas my mental state represents strawberries, it seems nonsensical to claim that strawberries represent my mental state. Secondly, Stampe stresses the role of causation for the relation of representation. He invites us to consider, for analogy, the case of a photograph of Judy, who has an identical twin called Trudy. Stampe convincingly argues that what makes it a photo of Judy rather than one of Trudy cannot be resemblance because Judy and Trudy are identical; but the photograph is about Judy and not about Trudy. Moreover, one can have a photo of Judy even though the photo does not look very much like her; the photo would be about Judy even if it is more similar to someone else. These considerations seem to single out the causal relation that the photograph bears to Judy as grounding the claim that it is about Judy.

Dretske connected the idea of representation with that of information. In Dretske (1988), he maintains that a representing system is one that has the function of indicating that such-and-such is the case, being such-and-such the intentional content:

[A representing system is] any system whose function it is to indicate how things stand with respect to some other object, condition or magnitude. (ibid. p. 52)

The notion of indication links Dretske’s proposal with Stampe’s idea that causation is what lies at the core of representation. The notion of indication is
to be spelled out as a causally grounded informational connection (Martinez, forthcoming):

\[ M \text{ indicates } C \text{ if and only if:} \]

i) \( M \) carries information about \( C \): \( P(C|M) > P(C) \)

ii) The difference in probabilities in i) is causally grounded.

Recall that we want the representation relation to be normative. We need a naturalistic way to unpack such a normativity. In other words, we want the correctness conditions of the state to be independent of the intentions of the subject evaluating the state for truth or correction.

A mental state \( M \) indicates plenty of things; but we don't want to maintain that \( M \) represents all the things that it indicates: all that it takes to be indicated by \( M \) is to correlate with it and there being a causal ground for this correlation. The partition between correct cases and incorrect cases is done by the function of \( M \). Cases of misrepresentation (incorrect cases) are cases in which \( M \) indicates something different from what it has the function of indicating.

The interesting notion of function for a theory of mental content is one according to which the function of a trait is not necessarily something the trait does, but rather something that the trait is supposed to do. Function attributions seem to be normative in this sense — but see fn.2. For example, it is said that the function of kidneys is to filter toxins and waste products from the blood, even in the case of someone suffering from renal insufficiency:

Function attributions are, in other words, not descriptive (they do not tell us what is the case) but normative (they tell us what should be the case). From this point of view, the main task of a theory of function is to explain how this norm arises in biological contexts. (Wouters, 2005, p. 124)

The mainstream answer to the problem of normativity is to appeal to a teleological notion of function. The *teleological function* of a function bearer is the reason why the bearer is there: the function of a trait should be identified with the reasons for the existence of the trait. Teleological theories follow Wright's ideas, previously voiced by Ayala (1970), who proposed the following definition (Wright, 1976, p. 81):

\[ \text{The function of } X \text{ is } Z \text{ if and only if:} \]

i) \( Z \) is a consequence (result) of \( X \) being there,

ii) \( X \) is there because it does (results in) \( Z \).

In the case of artifacts we appeal to the intentions of the designer as reasons for the trait existence: the function of my computer's fan is to lower the CPU's temperature, because that's the reason why the designer placed the fan in the CPU. In the case of biological traits, it is usually unpacked by appealing to what the trait has been selected for, where selection is understood as natural
selection: the function of the kidney is to filter blood because filtering blood is what the kidney has been selected for. A proper understanding of this etiological notion of function requires substituting (ii) with:

\[(ii') \text{ X is there because tokens of X's type did Z (in the past)}\]

because selection does not depend on what the trait does, but on what traits of this type did.\(^1\) The function of a trait depends, according to these etiological theories, on its causal history and past selection for traits of that type. That allows us to explain cases of malfunctioning for traits that have never performed their function. A kidney malfunctions when it doesn’t filter blood even if this particular kidney has never filtered blood, because kidneys have been selected for filtering blood.\(^2\)

In this paper I want to focus exclusively on teleosemantic theories that appeal to natural selection to offer a theory of mental content, independently of the particular details of these theories. I will use the term 'evo-etiological' to refer to these theories.\(^3\) Some form or other of an evo-etiological theory has been endorsed by Cao (2012); Dretske (1995); Martinez (forthcoming); Millikan (1984, 1989); Neander (1991); Papineau (1993); Price (2006); Shea (2007); Tye (2002); etc.

A simplified version of these theories can be characterized as follows:

\[
\text{Tokens of M in a subject S represent Cs if and only if:}^{4}
\]

\(^1\) This requires an explanation of what makes it the case that a trait is a token of a certain type. Millikan (1984) appeals to a causal process of copying. Tokens of a type are similar – they have some relevant properties in common – because they are the result of a process of copying. In the case of artifacts because they are produced from a common model (for example, fans are produced following the attempt to reproduce certain properties of the prototype, which was designed to cool the CPU); in the case of natural selection, roughly, genes are reproduced from the ancestor’s genes.

\(^2\) It is controversial whether this is the right analysis of the notion of function in biology. Cummins (1975) emphasizes that the explanatory role of function attributions is to explain a capacity to which the exercise of the function contributes, rather than to explain the presence of the function bearer. In contrast, defenders of the teleological notion of function maintain that their definition correctly describes certain uses of the term in science.

Whether Cummins is right or not is irrelevant for the purpose of this paper. We need a notion of function, according to which function attributions are normative in order to explain the relation of representation as the function of indicating. We need to make room for cases of misrepresentation, which are explained as cases of malfunction. Therefore, explaining what the trait does is insufficient for our purposes, as we need to explain what the trait is supposed to do.

Ruth Millikan (1984), who has developed the most thoughtful account of teleosemantics, is happy to agree with Cummins (Millikan, 1989), but claims that there is another sense of function, as selected effect, that intrinsically explains the presence of the trait. She has suggested that this notion of function is a stipulated definition that has to be judged by its usefulness in solving philosophical problems, independently of whether or not this is the notion used in fact in any scientific field such as biology.

\(^3\) According to etiological theories function attribution [and thereby its content] depends on the causal history of the trait. Although most etiological theories are evo-etiological ones, the later are only a subset of the former. The term is introduced to make clear the target of this paper.

\(^4\) The proposal I am discussing here intends merely to capture the insights of a teleological
1. Tokens of M have tracked information about Cs in a sufficient number of S's ancestors.
2. Ms tracking information about Cs has contributed positively to the fitness of S's ancestors.
3. The conditional probabilities implicit in 1 are causally grounded.

A classical objection to these theories is precisely that natural selection is required in order to ascribe a function to a trait and therefore for the trait to be a representation. The traits of an individual outside the phylogenetical order who is not the copy of any individual inside of it would thereby lack any evetoiological function and so, she would lack contentful mental states (beliefs, desires, perception, etc). Here is where Swampman enters into play.

1.2 Swampman

According to evetoiological theories, a trait has a function only if it (tokens of its type) has been selected for. When a trait appears for the first time in the phylogenetical chain it lacks a function. Some authors find this result counterintuitive. For example, Boorse (1976) invites us to imagine a population of rabbits, call them Swamprabbits, accidentally coming together into existence. According to Boorse, we would be able to ascribe functions to the rabbits' traits even if the Swamprabbits lacked any selection history.

In his paper "Knowing One's Own Mind" Davidson (1987) presented a philosophical character, Swampman, to show the relevance of causal history for reference. Davidson introduced Swampman as follows:

Suppose lightning strikes a dead tree in a swamp; I am standing nearby. My body is reduced to its elements, while entirely by coincidence (and out of different molecules) the tree is turned into my physical replica. My replica, Swampman, moves exactly as I did; according to its nature it departs the swamp, encounters and seems to recognize my friends, and appears to return their greetings in English. It moves into my house and seems to write articles on radical interpretation. No one can tell the difference. (ibid, p.19)

Now, evetoiological theories are committed to the claim that Swampman's traits lack any function because he lacks an evolutionary history and is not a copy (in the sense mentioned in fn.1) or the product of any intentional creation, by God for instance. The similarity between Davidson and Swampman is nothing but a stupendous coincidence.

In our case we are interested in the content of mental states, so telosemantic theories that embrace an evetoiological theory of function would be committed to the claim that Swampman's traits lack any function because he lacks an evolutionary history and is not a copy (in the sense mentioned in fn.1) or the product of any intentional creation, by God for instance. The similarity between Davidson and Swampman is nothing but a stupendous coincidence.

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to denying that Swampman has any mental content. He would not have any beliefs or desires. It would not be appropriate to say that he believes that Washington D.C is the capital of the United States because, lacking intentional states, he does not believe anything.

The intuition has a certain force but I think that it can be, at least partially, resisted. Plausibly, if Swampman’s belief is not about Washington D.C., then it is not about anything at all (thereby lacking content). But it is not clear at all why we are supposed to think that Swampman’s state is about Washington D.C if Swampman has never been causally connected to this city. If he has never visited, read about or heard about Washington, it is unclear why should we assume that Swampman’s state is about it. Imagine that Swampman were to pop into existence in Alfa Centaurry, would anyone be willing to maintain that he has a belief about a city in the United States? On the other hand, intuitions go in the opposite direction if we imagine Swampman returning home and taking over Davidson’s life and we had to deny that ten years later he believes that he had breakfast in the morning with Mrs. Davidson.

The case against teleosemantic theories that rest on evolution to ascribe content to mental states can be presented more clearly in the case of perception due to the strong relation between consciousness and intentionality.

1.2.1 Phenomenology and Intentionality

Our mental states, like perception and thoughts, are often phenomenally conscious: there is something it is like for us to be in these mental states. Furthermore, these mental states very often are intentional states: they represent the world as being a certain way. For example, when we have a conscious experience as of red, a red-sensation, this experience represents the world as having a red object. This is an intentional state about red objects and, as a matter of fact, it is appropriate to evaluate it as correct (when it is caused by, say, a red apple) or incorrect (when the state is caused by, say, LSD consumption). It is hard, if possible at all, to consider an experience with the same phenomenal character as the one I have when looking at a red apple, which does not represent the world as having a red apple. Similarly with other kind of experiences. When I have a stomachache or I feel pain in my finger, the pain is about my stomach and my finger respectively. These states have correctness conditions and in phantom limb syndrome, for example, when the subject feels a pain in her amputated limb we talk of a malfunction of the damage detectors.

This suggests an intimate connection between intentionality and consciousness and traditionally the study of consciousness and intentionality has gone together. Philosophers from Descartes and Locke to Brentano and Husserl have typically analyzed them as a single topic. Although in the second half of the last century the dominant tendency was to offer an independent analysis (Chalmers (2004)), few have rejected such a connection and in the last years there has been a renewed interest in it focusing on the representational content of experience, the higher-order representation of mental states, the phenomenology of thoughts (cognitive phenomenology) and the emergence of theories that at-
tempt to ground consciousness in intentionality,\textsuperscript{5} typically combined with the view that intentionality can be explained in terms compatible with materialism to provide a materialistically acceptable explanation of consciousness. A full defense of the strong relation between consciousness and intentionality and an analysis of its nature is beyond of the purpose of this paper – see for example Byrne (2001); Chalmers (2004); Harman (1990); Tye (2002) – but I take the intuitive force of the examples at the beginning of this subsection and the fact that nowadays it seems fairly uncontroversial\textsuperscript{6} enough to secure the philosophical interest of my assumption at this point. For those who remain skeptical I will offer independent arguments in section 4.

Now, if we grant the strong relation between intentionality and phenomenology we can present the problem that Swampman exhibits for the teleological theories we are considering in a more pressing manner.

Many philosophers find it plausible that internalism is true in the case of consciousness:

**Consciousness Internalism (CI)** The supervenience base of a conscious experiences of a subject S at time t is constituted by the inner physical properties of S at t.

Imagine that Swampman comes into existence at time t. At this moment, he is a microphysical duplicate of Davidson and he would thereby enjoy the same experiences as Davidson does – if CI is true. If Davidson was looking at a red apple at t and thereby having a *red-sensation* then Swampman would have a *red-sensation* at t. However, Swampman would lack any intentional state precisely because he lacks any function. But it is hard to see how Swampman could have a *red-sensation* without it thereby seeming to him that he is seeing a red object.

In the next section I am going to present the most interesting replies to Swampman’s case. The remaining sections are devoted to offer a case that is immune to these replies.

## 2 Replies

There are two main lines of reply to Swampman’s case. The first one would take seriously the connection between consciousness and intentionality and the possibility of Swampman; bite the bullet and deny that Swampman entertains conscious states. The second one would argue that this objection cuts no ice against the theory, because the aim of the theory is to offer an account of how the norms of representation arise in the natural world. Note that these replies can be combined, as we are about to see, for one can take seriously the

\textsuperscript{5} Also theories that attempt to ground intentionality in consciousness like Searle (1990); Horgan (2002); McGinn (1988).

\textsuperscript{6} Russell, for instance, would probably deny that his sense-data represent anything as well as those who are hostile to the whole idea of mental representation like some Wittgenstenians. Ruth Millikan (forthcoming) has also explicitly rejected this connection.
connection between consciousness and intentionality and dismiss intuitions in fanciful thought experiments.

The first reply I am considering here denies that Swampman has conscious states. We can find support for this claim in representationalism. Representationalism is a widely held view in philosophy of mind, according to which consciousness supervenes on intentional content. Some philosophers go a step further and claim that phenomenally conscious states are representational states of a certain kind. In this case, if Swampman lacks intentional content then he lacks phenomenal consciousness. This kind of reply has been endorsed for instance by Dretske (1995).

Although it seems counterintuitive that Swampman would lack beliefs and desires and even more counterintuitive that he would lack phenomenal consciousness, one might resist any conclusion from such an overimaginative thought experiments and maintain that Swampman’s case is so far away from anything we can really take in, that our intuitions about it can hardly show anything about our concepts. These considerations bring us to the second reply I want to consider. Along these lines, philosophers like Millikan (1996); Neander (1996) have claimed that objections based on intuitions about Swampman case cannot prove teleological theories wrong because they miss the point of these theories, which is to offer a real-nature theory.

My aim in the remaining sections is to offer a case against theories according to which mental content depends on evolution, which is not based on exotica but rather on the current state of the art of our genetic science. I will present this argument in two steps. In section 3 I will argue, pace Dretske, against the plausibility of denying that individuals who are the product of a random process lack consciousness. This will defeat evo-etiological theories if, as many philosophers agree, there is an intimate relation between consciousness and intentionality. For those skeptical of such a relation I will offer in section 4 further reasons for rejecting the dependence of intentionality on evolutionary history. My arguments there will rest on the example presented in section 3 and on the analysis of what by a “real-nature” theory can be meant.

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7 Representationalists differ in their analysis of conscious states. Higher-Order theorists (Carruthers, 2000; Lycan, 2004; Gennaro, 2012; Rosenthal, 2005) do it in terms of higher-order states that represent them. First-Order theorists focus on the first-order representational content of conscious states (Dretske, 1995; Tye, 2002). In between, Self-Representationalists maintain that first-order representational content includes the state itself (Kriegel, 2009) or the subject of experience herself (Sebastian, forthcoming).

8 I will come back to this point, trying to unpack the understanding of the “real-nature” claim, in the last section of the paper.

9 If my argument in this latter section is sound, it would, by itself, defeat the kind of teleological theories under consideration. However, I have proceed in two steps, considering first the relation between consciousness and intentionality because of the relevance of representationalism in philosophy of mind – although obviously not only representationalist theories are targeted by it, just consider someone who believes that visual experiences always represent but not that all experiences do. Representationalism is a very attractive and popular theory (the most popular according to the survey on philpapers –http://philpapers.org/surveys/results.pl), especially in the project of naturalizing consciousness, on the assumption that the relation of representation can itself be naturalized. For this later purpose, representationalists typically appeal to teleological theories of mental content (See Dretske (1995); Kriegel (2009); Prinz
3 Consciouness, Intentionality and The Zombie Project

Genetic engineering makes it possible to create individuals who lack an evolutionary history. DNA consists of two long polymers of simple units called nucleotides, with backbones made of sugars and phosphate groups. Attached to each sugar there is one of four types of molecules called “bases” — Adenine (A), Thymine (T), Guanine (G) and Cytosine (C).

Having a map of Davidson’s DNA, it is possible to create a DNA duplicate in the laboratory. This chain is then introduced in a cell with the basic proteins to express this genome, a totipotent stem cell.¹⁰ The conditions for its reproduction are guaranteed and some months later Dollyman is born. Evo-etiologicalists would want to jump boat at this point: it is hard to deny that Dollyman would enjoy conscious mental states. But those who maintain that intentionality depends on natural selection are not committed to denying that Dollyman’s states would lack intentionality. As we have seen, one can appeal to the fact that he has been copied from Davidson for holding that Dollyman’s mental states exhibit intentionality. Contrary to Swampman, who is not a copy of Davidson but the product of mere randomness, Dollyman inherits Davidson’s historical properties. His mental states are of the same type as Davidson’s and have functions in virtue of his being a copy of Davidson.

In order to have an objection against theories of mental content that rest on an evo-etiological notion of function we need to get rid of the process of copy, we need a being that is the result of a random process – as Swampman is. Furthermore, we want a real-nature example; ideally we want the process to be nomologically feasible so that we can really test our intuitions.

Being able to produce relevantly similar creatures to us who lack phenomenal consciousness is a tremendously interesting project. Many would agree with the idea that if a zombie creature¹¹ lacks phenomenal consciousness then all kind of experiments on her should be allowed. Zombies do not feel any pain when the lancet cuts their skin or feel miserable about the way scientists treat them. Investigation on zombies would surely lead to plenty of benefits for human kind. We would get the advantages of the investigation in humans avoiding most of the ethical reasons for not doing it. Here is the recipe to produce zombies if individuals outside the phylogenetical order lack consciousness:

The Zombie Project

1. Take a random number generator that generates a sequence of 0s and 1s.

¹⁰ Totipotent stem cells can be differentiated into embryonic and extraembryonic cell types. Such cells can construct a complete, viable, organism and are produced from the fusion of an egg and sperm cell.

¹¹ The term ‘zombie’ is technical and was introduced by Chalmers (1996). A zombie is not a reanimated corpse, nor a human being who is controlled by someone else through the use of magic, nor the victim of a government’s experiment causing a weird pandemic. A zombie looks and behaves like you and me. However, a zombie lacks any phenomenally conscious experiences.
2. Use a computer to code pairs of numbers as: A (00), T (01), G (10) and C (11).

3. Connect the computer to a DNA synthesizer. The DNA synthesizer receives the sequence from the computer and converts it into a molecule.

4. Group randomly these fragments of DNA and introduce them into a cell with the basic required proteins. The introduced genome is completely random and lacks any history.

The vast majority of the resulting combinations won’t give rise to organisms; others will give rise to an organism but they will be unable to survive. However, the process will also give rise to dinosaur-like organisms, orangutan-like organisms and human-like organisms. According to evo-etiological representationalism, these human-like organisms are zombies: lacking any evolutionary history and not being the copy of a human they lack function and thereby intentionality. Whereas one can bite the bullet and deny that Swampman lacks phenomenal consciousness, my intuition is that not many people would support the Zombie project, not being able to accept that these human-like organisms lack phenomenal consciousness. This example puts additional pressure for those willing to maintain that phenomenal consciousness constitutively depends on a causal history of selection and makes, I believe, their proposal implausible.

One might agree that it is implausible to maintain that individuals resulting from the zombie project lack consciousness but resist the conclusion that this defeats an evo-etiological understanding of intentionality by denying the intimate relation between consciousness and intentionality – see Millikan (forthcoming) for instance. I seriously doubt that this project has any future. However, for the sake of the argument, I will concede that consciousness is independent of intentionality in the next section and leave aside consciousness to focus solely on intentionality. Based on the Zombie Project experiment, I will argue against any teleological theory of mental content according to which function ascriptions depend on the evolutionary history without taking for granted an intrinsic relation between intentionality and consciousness.

4 Real Nature Theories and What Randoman Thinks

As I admitted in the first two sections of this paper, intuitions about fanciful thought experiments might be rejected in the light of the virtues of the theory,
denying, for example, that Swampman has conscious states — we might not be in a position to decide about the mental life of that kind of individuals. On the other hand, I take the thought experiment presented in the previous section to offer a case worth considering when evaluating our intuitions and theories. I think that no one would be willing to deny that the individuals resulting from the zombie project would entertain conscious states.

The zombie project offers a systematic way of producing individuals outside the phylogenetical order according to our current scientific knowledge instead of considering an implausible phenomenon at the macroscopic level. In this section I will consider the zombie project to be a real nature one in this sense. Furthermore, my reasoning here will not rest on intuitions but on the analysis of the requirements of a theory of mental content.

Randoman is the first human-like individual that results from the Zombie project described in the previous section. He starts speaking before being two years old, he goes to the school and then to the university where he studies philosophy and specializes in non-etiological theories of function. After reading ‘The Conscious Mind’ Randoman claims that he is not a zombie, that he undergoes phenomenally conscious experiences, and we think that what he says is true.

One day Randoman is walking down the street with his boyfriend and he sees a fruit shop. He stops by and a minute later, when he comes back, his boyfriend asks him about what he did in the fruit shop. Randoman replies: “I was feeling like eating strawberries, you know I love them. I saw a box of delicious strawberries inside the shop and I came in to buy it. However, they were not strawberries but raspberries. I decided to buy these peaches”. They both go home sharing a peach.

As any of us would do, Randoman explains his own behaviour by appealing to beliefs, desires and perceptions. These are intentional states; in fact, he claims that his perception was wrong and he mentions his misperception of the box of raspberries as a box of strawberries as the reason for his entering in the fruit shop. We need to explain Randoman’s behaviour, his cognitive abilities and his competence in the use of the language. Lacking any evolutionary history, his states lack any evo-etiological function and, according to the teleosemantics theories we are considering, this is a necessary condition for intentionality, for having representations. We cannot therefore ascribe Randoman beliefs nor desires and we need an alternative explanation to the one that he himself offers for explaining his behaviour.

Randoman poses the following dilemma:

If on the one hand, we can explain Randoman’s behaviour, cognitive capacities and ability to use the language without postulating representations, then so could ours be explained. In this case, there would be good reasons for eliminativism about intentionality: the natural order could be explained without any need to appeal to intentionality, to states which are about other things.

If, on the other hand, we cannot get rid of representations to explain Randoman’s behaviour, then Randoman has intentional states but his states lack an evo-etiological function. We either give up teleosemantics and look for a different
account of representation in the case of Randoman or we look for a different account of teleological function, one that do not depend on having an evolutionary history. In any case, if we do not have to appeal to the evolutionary history of a trait to unpack the normativity in the relation of representation for Randoman then there is no need to appeal to it in our case either.

There is one strategy that one might try to pursue in order to save evolutionary accounts, avoiding ascribing intentionality to Randoman’s states. I will first present this strategy and then show why it does not solve the problem.

What explains my entering the fruit shop and buying strawberries is my desire to eat strawberries and my belief that they sell strawberries in the fruit shop; a belief that is based on my perception of what seems to be a box of strawberries inside the shop. This kind of explanation requires my mental states to be about strawberries. There is a representational relation between my perceptual state and strawberries. One could claim that a parallel explanation is valid in the case of Randoman. Those who endorse this reply would allow Randoman’s explanation of his own behaviour to be correct but deny that their words refer to the same kind of states as ours. They would concede that when Randoman says that he believes that they sell strawberries in the fruit shop, his state is about strawberries but they would deny that the relation that hold between strawberries and Randoman’s (quasi-)belief is that of representation, but representation* instead. Let me explain the reply with a bit more of detail by considering the analogy with a posteriori necessities as in the well-known case of water.

Consider Twin Earth (Putnam, 1975), a planet that is identical to Earth, including duplicates of Earth inhabitants, except that in Twin Earth there is no H$_2$O but XYZ, a substance with different microstructure but with similar observable properties. In Twin Earth the colourless, odourless and potable substance that fills up lakes is XYZ and not H$_2$O. If our term ‘water’ fixes its reference through a description like “the colorless, odorless and potable substance that fills up lakes” we would identify different chemical substances as water depending on our actual environment: if the actual environment is like Earth then water is H$_2$O; however, if the actual environment were like Twin Earth, then water would be XYZ. It is a commonly shared intuition that if one assumes that the former is the actual environment then one will judge that water is essentially H$_2$O in all counterfactual circumstances; if one assumes that it is the latter then one would judge that water is essentially XYZ.

We have seen that judgments about possible worlds considered as counterfactual reflect the theoretical criterion we accept after we have learned the relevant empirical facts about our actual environment. These judgments might contrast with judgments that we make when we only consider the reference fixing mechanisms. At this point, the tools of two dimensional semantics might be useful for the discussion of this reply. Two-dimensionalism models these differences in a possible world semantics as intensions. The primary-intension is a function from worlds considered as actual to extensions. If we consider the actual world as actual then water is H$_2$O, if we consider TwinEarth as actual then water is XYZ (the primary intension depends on the world we consider to be actual).
The secondary-intension is a function from worlds considered as counterfactual to extensions: given that water is \( H_2O \) in the actual world, so will it be independently of how the world is considered as counterfactual. Whereas the primary intension expresses an epistemic possibility for a sufficiently clueless speakers, although fully competent, about empirical matter (like someone lacking chemical knowledge), the secondary intension expresses metaphysical possibility: water is essentially \( H_2O \). The terms used by us and by Twinearthians share their first-intension but differ in their secondary-intension. Twinearthians and we express different meanings with our respective expressions.

The kind of reply I am considering here extrapolates this case in defense of an evo-etiological understanding of functions in teleosemantics. This might be one possible reading of Millikan and Neander’s claim that the role of teleosemantics is to offer a real-nature theory as suggested by Neander (2012) in reply to the Swampman’s case:\(^{15}\)

Swampman intuitions cannot show that teleological theories are incorrect because they are irrelevant. They are, it can be argued, not to the point if a teleological theory is offered as a real-nature theory (Millikan (1996), Neander (1996))...the decision about Swampman’s intentionality should be driven by the theory of content that best accounts for the real kind. That in turn should be driven by other considerations, such as which theory delivers correct content ascriptions for us and other existing creatures (my emphasis).

There are two understandings of Neander’s claim about real-nature theory. In the first one, the claim about the real-nature theory is a claim about the actual world and its laws. Following this route, one would deny that Swampman is nomologically possible – possible according to the actual laws of nature. I don’t know of any law of physics that prevents this possibility; one might try to appeal to thermodynamics and the amount of energy (and its particular vectorial configuration) that would be required for the reorganization of the particles in a human-like configuration – clearly a lightning won’t do it – to cast doubts on the possibility of Swampman. If that were the case, Swampman would still be metaphysically possible (Swampman might be possible in a world with different laws of nature). However, in this case the possibility that Swampman states fall under the extension of the term 'representation' (as it was that \( XYZ \) falls under the extension of our term 'water'), which we use in the explanation of our behaviour, cognitive capacities and competence in the use of the language remains a mere epistemic possibility (Neander, 2012). A posteriori investigation on the nature of representation as the relation that holds between our states and objects in the world shows, my opponent would argue, that representation depends on a selection process and therefore that Swampman states are representation* states but not representational. Representation and representation* are different kinds of relations, just as \( H_2O \) is not \( XYZ \). In other words, our term 'representation' and Randoman’s one share their first inten-

\(^{15}\) See also Papineau (2001) for a similar point.
tion but not their secondary intention. The problem in this case is that, even if Swampman were not nomologically possible, Randoman clearly is and, so, a real-nature example, a possibility in the actual world.\(^{16}\)

According to a second understanding of the real-nature claim, teleosemantics would be a theory of creatures like us, creatures who have an evolutionary history. In this case, in a similar vein, one would claim that the relation that holds between our states, and their objects fall under the extension of the term

\(^{16}\) An anonymous referee objected that it is not clear that “Randoman is any more nomologically plausible than Swampman”. Some numbers might help to rejoin this claim:

There are approximately 320 million pars of bases in a human DNA chain. The probability of obtaining the random number that corresponds to my DNA is therefore: \(\frac{1}{4^{320\times 10^6}}\) (permutations of 4 elements – C, T, G, A – taken in groups of 320 million elements) – a much higher probability would be obtained if we consider the possibility of having a random number corresponding to any possible human’s DNA that is what the project requires, but we can ignore this for the present purpose that is to compare the plausibility of Swampman and Randoman. To a first pass take this to be the possibility of Randoman.

This is really small number but many orders of magnitude greater than the possibility of a combination of a Swampman. We can approach it as follows: Consider for simplicity that we were composed only by 4 elements [N, O, C, H] – there are more and the more elements the lower the probability. An approximation to the number of atoms for a standard person (1.75 m 70 kg.) is \((350 \times 10^6)^{23\times 10^6}\) (approximated by the popular claim that 70% of a person is water). So, we could approximate the probability of Swampman as \(1/(4^{(350\times 10^6)^{23\times 10^6}})\). In the light of these numbers, we could say that the ratio (as a way of comparing plausibilities) between the possibility of the sun rising tomorrow morning (aprox 1) and the possibility that I die tomorrow at 12:35:31 by an asteroid impact (which can be estimated from the possibility of dying from an asteroid impact in the whole life http://www.livescience.com/3780-odds-dying.html) is much higher than the ratio between the probability of Randoman and the probability of Swampman. In fact, the ratio between the possibility of the sun rising tomorrow morning and Randoman is much higher than the ratio between the probability of Randoman and Swampman.

Furthermore, whereas we generate a random number with possibility (aprox.) 1, we have to consider the probability of an event with such an energy in a configuration that is able to organize the particles in a human-like way, I have no idea about the possibility of such an event [I doubt that it can be calculated or approximated] but it is extremely low. The more realistic probability of Swampman is the product of \(1/(4^{(350\times 10^6)^{23\times 10^6}})\) by this number (many orders of magnitude lower than the former).

What is more, we can generate another random number in our random number generator with probability (aprox.) 1. If \(P\) is the probability of Randoman considered before and we generate \(n\) numbers, being \(n\) sufficiently big, then the probability that one of this numbers correspond to my DNA may be approximated by \(n^P\). This increases the probability of Randoman as we generate more numbers and as we increase the computing capacity and reduce the size of the random number generator. Current quantum technology considers speeds over 1THz and sizes of 0.001 microns. So, we would be able to compute in a 1 liter computer aprox. 8.6 \(\times 10^{37}\) random numbers a day. Additionally, we should take into account that Moore’s law is still valid: computer’s size reduces to a half while the computing speed doubles every two years. We can calculate its absolute limits by considering the speed of light, the quantum scale, the gravitational constant and the Boltzmann constant, giving a performance of \(5.4258 \times 10^{50}\) logical operations per second on approximately \(10^{13}\) bits [Lloyd, 2000], so that a one liter volume computer computes \(10^{89}\) numbers per second. Besides, we can estimate how long might our random number generator be running by considering the heat death of the universe [I am grateful to XX for this later suggestion]. If we consider the decay time for a supermassive black hole of roughly 1 galaxy-mass (\(10^{11}\) solar masses) due to Hawking radiation is on the order of \(10^{100}\) years, then entropy can be produced until at least that time [Page, 1976].
5 Conclusions

‘representation’, but not so Randoman’s – or Swampman’s for all that matters in this point – despite the superficial similarities. This kind of reply does not withstand further scrutiny. Representational states are successfully postulated by our theories to explain our behaviour, communication abilities and cognitive capacities. The problem is that Randoman’s states and ours share many properties; in particular all the properties that do not depend on a causal evolutionary history. The same kind of relation, call it representation*, that holds between Randoman’s states and strawberries, also holds between our mental states and strawberries.\footnote{Note that the opposite is not true, in particular the relation of representation holds between our mental states and strawberries but not between Randoman states and strawberries.} Now, if representations* explain Randoman’s behaviour, cognitive abilities and language competence, then they will also suffice for the same kind of explanation in our case. There is no need for having an evolutionary history for a mental state to represent*, say, strawberries and representation* is all that is required for the kind of explanation in which we postulate representations. Hence, we can get rid of representations – or better maintain that representations are representations* and get rid of evolutionary history explanations – which are not necessary in our theory.

5 Conclusions

Teleological theories of mental content unpack the normativity in the relation of representation by appealing to the teleological function of the trait: a state M represents such-and-such if and only if M has the teleological function of indicating that such-and-such is the case. Teleological functions allow us to explain the intrinsic normativity in the relation of representation and to explain cases of misrepresentation as cases of malfunctioning. The desired notion of function is not one that tells us what the state does but what the state should do.

Etiological theories of function satisfy this desideratum. According to them, the function of a trait depends not only on its causal role but also on the causal history of tokens of this trait. In particular, the most popular etiological theories maintain that the relevant causal history is the evolutionary history.

In this paper I have tried to show that such an account is not tenable. Genetic engineering makes it feasible to produce human-like individuals that are the result of a random process. Intuitively, such individuals would undergo conscious experiences and thereby have intentional states. As we have seen, even if one is willing to resist the intimate connection between consciousness and intentionality, the problem remains: if on the one hand, representations are not required to explain the behaviour, cognitive capacities and language competence of Randoman then we can get rid of this notion for explaining ours; if, on the other hand, we had a theory that satisfactorily attributes content to Randoman states then this theory would also explain the intentionality of our mental states, given that Randoman shares with us all the relevant non-historical properties.
Alternative theories of function are available on the market. On the etiological side, Papineau (1984) has proposed that function attributions depend on a learning process and similarly Dretske (1986) appeals to functions that depend on recruitment by conditioning; on the non-etiological side, alternatives have been proposed by Schroeder (2004); Mossio et al (2009). It is an open question whether these notions of function can satisfactorily unpack the normativity in the relation of representation.

References


Acknowledgements.
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Martinez M (forthcoming) A solution to the indeterminacy problem


Sebastian MA (forthcoming) Experiential awareness: Do you prefer it to me?


