

Guidance, Selection, and Representation: Response to Anderson and Rosenberg

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Anderson and Rosenberg's (2008) *guidance theory* of representation offers an analysis of mental content that strongly emphasises the influence that intentional states have upon the production and modulation of bodily behavior. On this view, a mental state gains both its status as a representation, and its content, in virtue of occupying a particular role in the guidance of action. I present three related challenges for the guidance theory, before defending an alternative model that is grounded not in action-guidance, but in action-selection. Firstly, I argue that the guidance theory fails to explain an important category of perceptual misrepresentation. Secondly, I propose that the content ascriptions predicted by the theory are not sufficiently determinate. Thirdly, I propose that the contents implicated by the guidance view do not match those that are naturally ascribed in the explanation of intentionally-directed behavior. The modified account that I develop responds to these concerns, and suggests that representational states depict affordance properties: the opportunities and obstacles that the subject's environment offers for the pursuit of goals and plans.

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Anderson and Rosenberg's *guidance theory* of representation (Anderson and Rosenberg, 2008) aims to provide a principled, naturalistic treatment of intentionality according to which a state acquires its representational status and content in virtue of the role it occupies in the guidance of action. The world-directed nature of internal representation is thus inherited from the world-directed character of bodily activity, and content is not determined (as it is on standard approaches in the philosophical literature) by a vehicle's informational significance (e.g., Dretske, 1981), or by its causal (e.g., Fodor, 1990) or evolutionary history (e.g., Dretske, 1988).

In what follows, I argue that the guidance theory faces three related criticisms: firstly, that its account of representational error is insufficient to capture an important class of perceptual misrepresentation; secondly, that its ascriptions of content are not adequately determinate; thirdly, that the intentional contents it predicts may diverge from those that are naturally employed in descriptions of an organism's goal-oriented behavior. However, I continue, all three concerns can be ameliorated by shifting the account's emphasis away from action-*guidance* and towards action-*selection*, a shift that entails that contents must be understood as depicting *affordances* or opportunities for activity and environmental interaction. Reinterpreting the action-oriented role of an intentional system in this way comes at the cost of having to make reference to teleological factors once again, but this cost is outweighed by the benefits that talk of affordance-specifying contents confers.

The Guidance Theory

Anderson and Rosenberg (2008) view informational, causal, and teleofunctional theories of content as excessively *input focused*, placing too much weight on the detection of external features and the flow of information into the cognitive system. What matters for a state's representational status, on the guidance theory, is not its intrinsic physical properties, nor the evolutionary or developmental provenance of its producers, but rather what it *does* for and within the intentional system (an emphasis which is shared by consumer-semantic theories; e.g., Millikan, 1989; Rowlands, 1997): "What do representations do? We hold that what a representation *does* is provide guidance for action. Whatever the details of its instantiation or structure . . . what makes a given item representational is its role in providing guidance to the cognitive agent for taking actions with respect to the represented object" (Anderson and Rosenberg, 2008, pp. 56–57).

The content of an intentional item can be characterised by reference to the target(s) of the actions to which it provides guidance; the objects of a behavioral/feedback loop into which the organism engages. A state *S* that is responsible for the guidance of a motor action that is taken with respect to an object *O* can be said to specify *O* as part of its content. Anderson and Rosenberg provide a substantial formal analysis of what it takes for an action to be *taken with respect to* an object, where the central concern is to outline a framework of facts about action-guiding routines that is sufficient to enable a non-circular definition of intentionality. Roughly speaking, the aim is to give an account of the action-oriented mechanisms into which a state is recruited that does not itself include a representational component; for if our putatively reductive explanation of *S*'s having *O* as its content relies on its being consumed by a system capable of representing *O*, then it is no explanation at all.

Anderson and Rosenberg's solution is to argue that action-guidance systems embody knowledge-how rather than knowledge-that, and therefore that they don't need to represent their targets in order to be taken with respect to them. Cognitive systems bear an implicit, skilful understanding of how to act when a particular environmental condition is indicated by sensory stimulation. Just as a computer can process a series of internal strings as being *about* an external printer without having to represent the content "I assume that this string has information about the printer" explicitly (Anderson and Rosenberg, 2008, p. 74), so a biological organism can possess assumptions of information (to use Anderson and Rosenberg's terminology) about environmental features that aid her world-engaging activity. The computer has practical knowledge of *how* to access its printer, and the (embodied-embedded) creature has a suite of implicit routines that enable her to interact successfully with the opportunities that her environment affords. Routines of this sort, that modulate the behavior of the organism in ways that direct it towards a particular object or feature bear joint responsibility (in conjunction with the presence of the input state) for fixing intentional contents, thus providing the internal focus sought by the guidance theorists.

It is key that any naturalistic treatment of intentionality is able to account for *misrepresentation*, and on the guidance view the potential for representational error trades on the possibility of failure-in-action. A state is said to misrepresent just in case it is (or would be) responsible for the guidance of an action that is not successful (Anderson and Rosenberg, 2008, p. 64). When an action is attempted, but fails due to the influence of an intentional state contributing to the action's guidance, then that state's content is in error. Similarly, if the action is not in fact initiated but *would* have failed due to the state's contribution, the same is true. The aim is to show that the normative aspect of representation need not be couched in terms of a system's proper function, nor of its operating under standard conditions, contrary to teleofunctional alternatives.

Three Objections to the Guidance Theory

Three related concerns face this account, and each suggests that Anderson and Rosenberg's view has not negotiated the balance between the contribution to intentional content of system-internal and system-external features successfully. Firstly, there are cases that demonstrate that their analysis fails to capture representational error in a suitable way. These involve misrepresentation in spite of *success* in action, and hence illustrate that error cannot be characterised by action-failure. It is well-supported (Aglioti, DeSouza and Goodale, 1995; Clark, 2001; Milner and Goodale, 1995) that the contents of conscious perceptual representations need not match those that are geared towards detailed action-guidance, and can instead edit and exaggerate certain features of the environ-

ment. In certain cases of visual illusion, for example, the (reported) conscious contents fail to depict some properties veridically despite action-guidance systems being appropriately sensitive to them. Aglioti et al. showed that a viewer subject to the Titchener circles illusion, for instance, can exhibit unperturbed behavioral responses towards the circles in question (as cited in Milner and Goodale, 1995, p. 168). Here, then, the representational error in visual perception cannot be diagnosed by reference to a failure of action, for there is none.

Secondly, the guidance view is vulnerable to a version of the problem of content-indeterminacy that faces input-focused teleosemantic theories (see, e.g., Fodor, 1990; Rowlands, 1997). This is the challenge of ascribing intentional contents with the right degree of specificity given the multiplicity of ways in which the object or cause of a representation can be described. In the familiar example, it is unclear whether states in a frog's visual system should be understood as responding to (and hence as representing) flies, black-specks, patterns on the retina, entities with such-and-such molecular structure, or some disjunction of these or others. Teleological accounts emphasising the proper function of a state's consumers have been criticised on the grounds that they are insufficiently determinate — it isn't possible to specify the function of an evolved mechanism with sufficient fineness of grain.

The problem with the guidance account, too, is that there is more than one way to describe the feature towards which a suite of actions is directed, and so if the content of a guiding state is said to specify its target, this content is ambiguous. Conversely, different environmental features are capable of eliciting the same kind of guided action — for example a frog will snap its tongue at a fly or a black-speck — and so are treated in the same way from the point of view of the intentional system. Yet the guidance theory's consequence is that each scenario involves a different content, a content that picks out the target of the activity. There exists a tension between the potentially indeterminate contribution to content of the external target of action and the fairly coarse-grained, and also jointly content-determining, internal guidance mechanisms.

Finally, an influential concern has been developed by Pietroski (1992), who argues that there are cases in which standard consumer-semantic approaches, such as Millikan's, ascribe a content to a state (on the basis of the biological function of its consumers) that is implausible given the higher-level discriminatory abilities of the state's bearer. Although Anderson and Rosenberg's view does not rely on evolutionary factors, I suggest that a version of this objection is applicable to their theory. In the teleosemantic cases, the worry is that the historical function of a state of type *S* — the advantage it confers on individuals in a creature's ancestry — may have been to signal the presence of a feature which current individuals in possession of token *S*s are themselves incapable of discriminating. In Pietroski's example, the *Kimu* has adapted a sensitivity to certain wavelengths of light, those in the red part of the visible spectrum, due to the

selective advantage this sensitivity has conferred. The advantage comes from the fact that regions that reflect red light have happened to be free from the Kimus' only natural predator, the *Snorf*. Kimus in possession of neural states tokened by the presence of red light have the tendency to gravitate towards these safe portions of the environment, and so to survive long enough to reproduce. On the consumer-semantic line, the content of a representational state is inherited from the proper-function of its consumers, where in this case the relevant proper-function is the avoidance of Snorfs (for this is the function for which the consumers have been selected), and hence the content must specify "fewer Snorfs this way," or similar (Pietroski, 1992, p. 274). And yet no Kimu, present or ancestral, has ever been able to identify a Snorf, nor is it plausible to suppose that Kimus possess beliefs or desires concerning Snorfs, so it is implausible to conclude that this is the content of their internal states.

For the guidance theory, the worry is that the representational contents entailed simply specify whatever red object happens to be the target of the Kimu's actions, be it a safe region, a red-coloured Snorf, or something in between. The Kimu's very basic discriminatory abilities — borne out by its predictable behavior — do not match up with this wide spectrum of possible contents; she isn't capable of distinguishing among the red objects that, on the guidance theory, she represents differently.

A Solution: Action-Selection

The difficulties facing Anderson and Rosenberg's theory stem from the emphasis it places on internal systems responsible for the guidance of action, whose role is said to contribute to the determination of intentional content. Representational contents cannot be straightforwardly inherited from the world-directedness of guided bodily activity, for the latter does not ground representational error successfully, cannot be specified with adequate determinacy, and does not provide a natural account of the discriminatory capacities of an embodied organism.

However, we can employ many of the theoretical resources put forward by the guidance theorists in order to circumvent these issues, although doing so requires certain significant alterations to their proposal. I suggest that the action-oriented mechanisms to which we should appeal in accounting for representational contents are those that are responsible for the *selection* of goal-directed behaviors rather than for their guidance. This in turn entails that contents must be understood as specifying *affordances* (possibilities, opportunities) for action and intervention (see Gibson, 1966; Ward, Roberts, and Clark, in press), rather than simply the targets of guided activity.

Empirical results (see, e.g., Milner and Goodale's (1995) *dual streams hypothesis*) now strongly motivate a division of labour within the visual cortex, between

vision for (conscious) perception and vision for the guidance of action. If the guidance theory is to generalise across cases of visual representation, then, it must do justice to the functional characteristics of both of these processing streams. On the face of it, the guidance theory accommodates representational transactions within the *dorsal stream*, which is responsible for the online visual updating of the fine details of object-directed actions. When reaching to pick up a cube, for example, we can view the states that are responsible for keeping, say, the thumb and forefinger accurately aligned as representing features of the cube's size and orientation. As noted above, though, the contents of the dorsal stream can diverge from those of conscious visual experience. This indicates that the language of *guidance* is a less appropriate description of genuinely perceptual representation, as it is not clear that perceptual contents drive the online control of action in standard cases. They do, however, play a rather more indirect role in governing action, and it is *this* role, I suggest, that fixes their representational status and content. Following Goodale (1998) and Clark (1999), we can see that the relevant emphasis should be placed on experience-based *selection* of action: what the perceptual illusion results and others show is that perception enables the fluent online choosing of options for action from among possible targets and possible response-types. In Goodale's memorable illustration, the dual-role of visual processing is like that of the control system of a Mars Rover: coarse-grained information about possible actions and targets is presented on a screen, while the fine details of action-tuning go on in the background (Goodale, 1998). Neural states belonging to the ventral processing stream (responsible for visual perception) inform the agent of the possibilities for action and interaction afforded by the present scene.

This is consistent with the analysis of guidance provided by Anderson and Rosenberg, which is explicitly to involve more than simple online control, as "[A] token provides guidance to a subject by making its features available for the subject's motor systems and rational control processes for use in making discriminating choices between possible actions or possible ways of executing actions" (2008, p. 68). It is my suggestion that once we take this more substantial interpretation of guidance into fuller consideration, we can see that perceptual states have a somewhat different content to that indicated by Anderson and Rosenberg's overall project: they specify *affordances* for action, response, and goal-satisfaction.

The ability to select actions from among a range of possibilities yields a behavioral flexibility that, as Anderson and Rosenberg note (2008, p. 62), marks out a system as genuinely representational in nature. Flexibility is a step up the ladder of cognitive sophistication from purely context-bound organisms driven by input-output mechanisms; flexible actors can respond differently to identical environmental circumstances on different occasions, for they have internal states that *register* external conditions and which are available to inform any of

a range of further action-guiding systems (Anderson and Rosenberg, 2008, p. 65). It is by examining this role more closely that we can see the distinctive part that action-selection plays in determining the content of perceptual representations. The ability to choose from among a range of possible world-directed responses is advantageous for its possessor only if selection is non-arbitrary in the following sense: it must empower the agent to act in ways that are not only appropriate to the constituents of the currently-encountered environment, but also to the agent's own ongoing wants and needs. That is, it must mediate the satisfaction of the organism's requirements by putting her into contact with the opportunities (and obstacles, threats, and so on) that exist to fulfil them. Here, we can adopt Anderson and Rosenberg's notion of an assumption of information profitably: the structures of the biological mechanisms responsible for the selection of action are implicitly geared towards particular affordances; although they need not explicitly depict the assumption that a certain state carries information about environmental opportunities, they embody skilful goal-satisfying routines that are put into action by suitable stimuli.

This approach, in common with other consumer-semantic hypotheses, again asserts that joint responsibility for the content of a state is borne by those mechanisms that recruit it into their service. When we understand that these mechanisms govern goal-directed activities — responses that must be sensitive to features both of the environment and of the agent herself — the content of the intentional states that feed them can be understood to be goal-involving too. The skilful interactions that are prompted by an internal registration are geared towards achieving some benefit for the organism — they embody assumptions of information concerning what external features afford. Given that the assumptions of information implicit in a system are what disambiguate its intentional contents, the affordances thus show up as part of this content.

This new emphasis enables us to avoid the three criticisms that face the original guidance account. Firstly, we can understand *perceptual errors* as cases in which intentional contents depict affordances for action and goal-satisfaction that are not in fact present in the environment. A state misrepresents when it informs its consumers of opportunities that do not obtain, either (as in cases of hallucination) because no external object is present, or (as in cases of illusion) because present objects do not afford in the ways described. The frog who successfully ensnares a black-speck, for example, has carried an action to completion but has nonetheless misrepresented. Misrepresentation takes place when food-seeking behaviors (whose motor routines may be performed with complete success) are driven by input states in ways that are inappropriate to what the external environment affords for the agent. While these may involve actions that are not ultimately successful, such a failure is not a necessary requirement.

Secondly, affordance-specifying contents achieve the right level of determinacy. Contents need not describe external features in a neutral way, nor as a poten-

tially lengthy disjunction, but rather in quite coarse-grained, affordance-based terms. When it comes to the frog, the assumptions of information embedded in the cognitive system, responsible for providing determinacy to the content of its inner tokens, concern items with food value, items capable of satisfying the organism's appetite. They needn't make reference to flies, or to their chemical or physical properties, or to other entities except insofar as they afford nutritional opportunities.

Thirdly, Pietroski's objection concerning the potential separation between the contents entailed by a particular theory and the contents that it is natural to ascribe to an organism in light of its discriminatory capabilities and intentional behavior does not apply to the current view. The light-sensitive Kimu represents red regions as affording safety, as opposed to explicitly Snorf-free, and its behavior accords well with this ascription. By hypothesis, the Kimu is drawn inexorably towards stimuli of the right colour, irrespective of their safety or otherwise, and this is consistent with (and may be explained by) its representing each such stimulus in the same way, as safe. If this diagnosis seems peculiar, it is because the Kimu who inhabits surroundings that include a multitude of red objects with varying properties must very often *misrepresent* red areas as peril-free when they offer no such benefit.

Conclusion

The affordance-based approach employs much of the central framework of Anderson and Rosenberg's guidance theory, though the shift of emphasis that it provides reveals an alternative (and, I believe, preferable) way to understand representational content and error. Interpreting the action-oriented mechanisms involved in the determination of content as those responsible for the selection of goal-directed activities brings with it a return to the teleological perspective that the guidance theorists aimed to avoid, however. This is because structural assumptions of information (and their implicit directedness towards external affordances) are best understood as the products of evolutionary pressures. Functional facts like these have standardly been explained by reference to the selective advantage conferred on an organism's historical antecedents by the system in question, a strategy that can be applied to the current model: an action system implicitly empowers its host to make use of a particular environmental affordance when appropriate just in case such systems contribute to its adaptive success. So, while the affordance-based view can respond effectively to the three objections facing the guidance theory, this comes at the price of reintroducing evolutionary considerations into our understanding of intentionality.

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