Sensory models. Rethinking representational status

The “Cognitive Revolution” has made paramount the paradigm of *Mental Representation,* its upshot being that intentional forms such as representational content, data, symbols, images, inference or interpretation determine our understanding of the mental and its derivatives in AI and robotics. But there are doubts about this paradigm. Especially the idea advanced by the enactive and embodied cognition movement: that the mind is less veridical depiction of its environment and but rather more practical engagement in it, has drawn new attention on the conditions of representational status.

Given the seminal importance of intentional explanations to both philosophy and cognitive science, we have to thoroughly examine the conditions which are to obtain for mental representation to be realized in its basic form. We have to ask ourselves even more clearly what must be called into play if an animal is not merely to *react* to, but acquires a *depicting perspective* on its environment, specifying how things are.

Most prominent theories have failed to deal sufficiently with this “Status-question” (Schulte 2015, 124) or “job-description challenge” (Ramsey 2007, xv) of mental representation. Notwithstanding a certain consensus to the effect that basic perception as sensory representation constitutes the lower border of intentionality (cf. Burge 2010, 376), in order to justify this thesis, I'll suggest two principles need to be implemented.

(1) The first I call the *emancipation-principle.* It requires of basic representation to evolve from *receptivity*, i.e. from functional correlation or co-variation, but neither “decouple” itself from it nor is reduced to it. Since visual, auditive or tactile perception of place, shape, size, structure etc. is *sensory* representation, receptors for light, sound or pressure are required, but only as a means to generate a representing model of the environment.

(2) The second I call the *autonomy-principle*. It reinforces that said emancipation must be realized in an autonomous and intrinsic manner by the perceptual system itself. Consequently, no high-level representations, such as inference, tacit knowledge or subjective representations like sense-data or mental images must not be presupposed as subsidizing capacities. Furthermore, representational status is intrinsic in that it is neither a cognitive observers’ projection of informational content on merely correlated events nor does its being a representation require to be represented itself, as it is the case with images.

Mindful of both principles, we can proceed to evaluate the two most powerful theories on representational status: Cognitivism and Teleosemantics.

Cognition is processing on representational states, invests them already (Searle 1992, Orlandi 2014, Adams 2017). See David Marr (1982, 68): “*(…) the true heart of visual perception is the inference from the structure of an image about the structure of the real world outside.”.* High-Level capacities and subjective states are presupposed. This view of perception as an “heuristic interpretation process” (Palmer 1999, 58) is backed by the claim, that perception must know its own principles (Rock 1983, 15f.), have a “background theory” about its environment (Fodor 1984, 36). In this intellectualizing tradition “predictive processing” advocates “that the brain is an inference machine” (Hohwy/Friston 2008, 2).

Cognitivism makes too heavy demands on perception, such as we find it in mammals, birds and some arthropods.

(1) Firstly, should basic representations represent its own preconditions to having intentional status, there will be an infinite regress of inner homunculi *whose* intentional capacities remain unfounded again.

(2) Secondly and most notably, what justifies the attribution of those demanding operations to evidently representational creatures otherwise lacking in intelligent behavior, such as sand scorpions or locusts (cf. Gallistel 1990, 110-113)? Knowing the principles is rather the task of perceptual psychology, not of perception itself. Projection looms large.

The other tradition, Teleosemantics, pursues to explain intentional status by the way in which organism *use* natural correlations. According to Millikan, a state represents a condition when whose presence has been the "normal" or "historically optimal" condition for the evolutionary success of the "*consumer-function*" which uses the state (Millikan 1989, 284f.). Therefore, e.g. the marine bacteria's magnetosome, whose activity responds to magnetic waves which correlate with beneficial oxygen-poverty habitats, represents for Millikan "the whereabouts of oxygen-free water" (ibid. 290).

This attribution exemplifies the distorting inflation of representational status.

(1) Firstly, because Millikan thinks she can "ignore" the "*producer-function*" (ibid. 290), it remains a mystery to me how a simple crystalline magnetosome can represent intrinsically such a complex high-level concept as oxygen-free water. And generally speaking, we can never conclude from the sheer correlation of a relevant condition with a practical exploitation the ability to represent this condition.

(2) However, the profound mistake is a systematic confusion of the functionality of accuracy with the functionality of practical success and evolutionary fitness (cf. Burge 2010, 301f.). Both have different standards: I can represent something correctly though my action on it fails, et vice versa. Moreover, the represented environment cannot be reduced completely to "affordances" (Gibson). Consequently, a frog does not visually represent "fly as nutrition" (Millikan 1991, 163), because fly is a non-perceptual *concept*. Instead, a frog sees approximately this+moving+body+there. Consequently, it can visually represent inedible fly mock-ups with these attributes *correctly*, but its content's release and tuning of the snapping mechanism do *not* fulfill its biological function.

Enactivism, arguing for "a paradigm shift from accurately representing the environment to continuously engaging that environment" (Beer 2000, 97; Varela et al. 2016, 173; Clark 2015, 21f.), ignores these distinctions as well.

To conceive of a well-founded theory of representational status, my proposal is to reevaluate two strands of thought, which in the literature, however, were falsely treated as individually sufficient. I intend to revise and combine them to sketch a genuine form of "Embedded Representation".

(1) Firstly, an ecological-physiological situation in which behavior on certain environmental distal conditions (e.g., the visible shape of an enemy) cannot be explained by proximal stimuli alone. However, these attributes do not have to be "decoupled", as it is proposed (Cantwell-Smith 1996, Chemero 2009, Orlandi 2014) - constant stimulation already systematically *underdetermines* them. Therefore, a compensating stand-in is needed. It is a product of *perceptual constancies*. They privilege one distal cause over other candidates via environmental constraints (cf. Burge 2010). This *non-cognitive, embedded biasing* explains the fine-grained and fallible character of content.

(2) Secondly, the format of perception matters (Haugeland 1991). The first strand cannot suffice, because being (complexly) produced in response to a condition is not enough for representing that condition - it is equally the constancy's *product* and its format that informs behavior. "Structural isomorphism" seems suitable: it joints structure-preserving for the sake of accuracy and structure-prescription for the sake of practical success.

But because structural isomorphism is indeterminate or too easy to construe and today's advocates of such modelling or “S(imulation)-representations” such as O'Brien (2015), Clark (2015), Williams / Colling (2018) take it to be already realized in mere biological adaptation of organisms, projection and inflation of the mental looms large.
Therefore, I propose a more restricted explanatory use of the model-concept so as to attribute representational status. To this end, I will integrate it into the first strand: modelling the environment is only plausible where proximal stimulation underdetermines it and the system needs to anticipate how the world could look like. Only where these two strands are interwoven, representational mind enters the stage of reality.

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