

Re-presenting representations¹

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Abstract: I argue that, at best, the concept of representation is a scientific abstraction that stands in for an explanation – it is not an *explanans* that does any work itself, but a concept under which one still needs all the explanation to be made. In responding to Mark Rowlands' notion that pre-intentional acts (PIAs) are representational, I defend enactivist and non-representationalist accounts of perception and action. PIAs can be viewed as important aspects of action (and motor control) that have intentionality, but are not representational in either the classic sense or in a sense that involves the informational constraint (involving content), or any strong sense of misrepresentation or decoupleability.

Keywords: action-oriented representations; pre-intentional acts; decoupleability; content; Mark Rowlands.

Although representational explanations are ubiquitous in philosophy of mind and cognitive science there has been a long-standing debate about their validity and usefulness, with perhaps the most recent major salvo against such explanations launched by Hutto and Myin (2013). In a more limited tactical move, in a previous paper (Gallagher 2008), I focused on the concept of minimal representations as it is used in discussions of action. Minimal representations include what are sometimes called action-oriented representations (AORs) (Clark 1997; Wheeler 2005), Minimal Robust Representations (MRRs) (Clark and Grush 1999), or pre-intentional acts (PIAs) (Rowlands 2006). I argued that such minimal representations do not have the classic characteristics of, or meet other constraints associated with the notion of mental representation and therefore are not truly representations and should not be so called.

¹ The author thanks Mark Rowlands and participants at the conference, *What is Cognition?* hosted by the Center for *Mind, Brain, and Cognitive Evolution at Ruhr University Bochum* (27-29 June 2013), and at the workshop, *Representations in action*, CREA, Paris (7 June 2010). The author also acknowledges support from the Humboldt Foundation's Anneliese Maier Research Award.

My 2008 paper initiated a debate between Mark Rowlands and myself, the first part of which took place in Paris in 2010 as a face-to-face discussion. This was followed by a publication in which Rowlands argues that I misrepresented his claims, and where he re-presents his concept of the representational (Rowlands 2012). In a follow up encounter at the Center for Mind, Brain and Cognitive Evolution, Bochum in 2013, I adjusted my critique to avoid any mis-representation, and this paper is a summary of what I presented there.

The upside of this debate is that it seems that Rowlands and I are in much more agreement than I first thought. Both of us are scientific pragmatists about representations and in this regard we agree in some measure. As Rowlands expresses it in his 2012 paper:

The idea of a mental representation has come to mean too many different things to too many different people. As an erstwhile, if distinctly revisionist, defender of mental representations, I strongly suspect that the problem is not with the idea of mental representations as such – if only people could be persuaded to use the term in the right way. But that, unfortunately, is the tricky part. And so, even if the theoretical utility of the idea of mental representations remains intact, its practical utility must be questioned (2012: 133).

While I too remain a pragmatist in this regard, I'm more of an erstwhile skeptic, more inclined to think that there are theoretical problems with the notion of representation. Clark and Grush (1999), with regard to action explanation, put the pragmatic question in just the right way:

It is, of course, true that the emulator circuitry [which is representational] can also and simultaneously be viewed simply as a smaller dynamical system linked to the one that hooks directly into the real-world. But that is just as it should be. ... The question is, which of these descriptions is most useful for Cognitive Science? (Clark and Grush 1999: 8).

I suspect, at best, the concept of representation is a scientific abstraction that stands in for an explanation – it's not an *explanans* that does any work itself, but a concept under which one still needs all the explanation to be made. Accordingly, I look to enactivist and non-representationalist accounts, which tend to be dynamical systems accounts (although, of course, the debate is simply put off if, as some want to say, dynamic systems are themselves representational [Bechtel 2001; Chemero 2000; Clark and Toribio 1994; but see Chemero 2009: Ch. 3]).

In the phenomenological tradition, for example, Dreyfus (2002) argues that for practiced or skillful intentional action one does not require representations.

A phenomenology of skill acquisition confirms that, as one acquires expertise, the acquired know-how is experienced as finer and finer discriminations of situations paired with the appropriate response to each. Maximal grip [Merleau-Ponty] is the body's tendency to refine its responses so as to bring the current situation closer to an optimal gestalt. Thus, successful learning and action do not require propositional mental representations. They do not require semantically interpretable brain representations either (Dreyfus 2002: 367).

What takes the place of representations in non-representationalist accounts of action is a form of dynamic perceptually based online intelligence which generates action “through complex causal interactions in an extended-body-environment system” (Wheeler 2005: 193). But can this sort of system do what it needs to do without any form of representation? Rowlands answers in the negative; he thinks that we need an explanation in terms of representational normativity.

What are representations

Let's begin by considering a set of characteristics that, at least on the classic conception, characterize a mental representation. Some may take these as necessary conditions, but I'll leave that an open question. The list is based on Rowlands (2006: 5ff.), who understands the classical concept to be modeled on propositional formats.

1. Representation is internal (image, symbol, neural configuration).
2. Representation has duration (a representation is a discrete identifiable thing).
3. Representation bears content that is external to itself (its content refers to or is about something other than itself – representations involve intentionality).
4. Representation requires interpretation – its meaning derives from a certain processing that takes place in the subject.
5. Representation is passive (it is produced, enacted, called forth by some particular situation).
6. Representation is decoupleable from its current context (it can be part of an offline process; it can stand in for something that is not present).

We find agreement concerning elements on this list in both proponents and critics of representation. For example, Ramsey (2007), who notes “there is nothing even remotely like a consensus on the nature of mental representation”, describes the common understanding of mental representation as involv-

ing “content-bearing internal states” and “structures that serve to stand for something else” (xi). “Mental representations are states that have some sort of non-derived intentionality and that interact with other cognitive states in specific sorts of ways” (19). We find some disagreement as well. Rather than taking representations to be passive (as in 5), representations are often considered causally active – “mental representations are states that *do* various things” (Ramsey 2007: 18).

Specifying characteristics of representation in this way contrasts to the views of some theorists who would define representation in extremely loose terms, for example, construing a representation as any internal change caused by experience. In these terms, “to assume the existence of a representation is rather innocuous and should rarely be an issue for theoretical dispute” (Roitblat 1982: 355). In mainstream cognitive science and philosophy of mind, however, the concept of representation is not so innocuous. In spite of variations in definition (including or excluding some of the characteristics on the list), the notion of representation appears to occupy a significant place within many models of cognition.

Rowlands (2008; 2012) criticizes the classical concept of representation and offers a revised list of characteristics or constraints that make something representational.

1. THE INFORMATIONAL CONSTRAINT: If something is representational it carries information about something other than itself (x) – it has content
2. THE TELEOLOGICAL (OR NORMATIVITY) CONSTRAINT: If something is representational, it is teleological – it tracks or has a specific function towards x
3. THE MISREPRESENTATION CONSTRAINT: If something is representational it can misrepresent x
4. THE DECOUPLABILITY CONSTRAINT: If something is representational it is decouplable from x (x may be absent)
5. THE COMBINATORIAL CONSTRAINT: If something is representational it can be *combined* into a more general representational framework

Rowlands’ (2008) notion of a “pre-intentional act” (PIA), which he sometimes terms ‘deed’, qualifies as representational. The following are offered as examples of PIAs: the positioning of fingers in catching a ball that is flying toward you at a high rate of speed; the movement of your fingers while playing Chopin’s *Fantasia Impromptu in C# Minor* on the piano. PIAs include an array of “on-line, feedback-modulated adjustments that take place below the level of intention, but collectively promote the satisfaction of [an] antecedent intention” (2008: 103). Rowlands offers a detailed example: Yarus’ (1967) ex-

periments on saccadic movements. In this experiment subjects view a painting that shows six women and the arrival of a male visitor; subjects are asked to do certain tasks.

1. View the picture at will
2. Judge the age of the people in the painting
3. Guess what the people had been doing prior to the arrival of the visitor
4. Remember the clothing worn
5. Remember the position of the objects in the room
6. Estimate how long it had been since the visitor was last seen by the people the painting.

Yarbus measured the visual scan paths/saccades of the subjects, and found different ones for each task. The scan paths varied systematically with the nature of the task. The saccades are in some way governed by the intention/task, but they are not intentional in the sense that we do not control them, and we are not conscious we are doing them: they are, in this sense, pre-intentional acts.

Rowlands argues that pre-intentional acts are representational and meet all of the constraints listed above: they *carry information* about x (the trajectory, shape, size of ball, the keyboard, a specific aspect of people in painting); they *track* x or function in a way that allows me to accomplish something in virtue of tracking x ; they can *misrepresent* (get it wrong); they *can be combined* into a more general representational structure (I catch the ball and throw it back; I continue to play the music; I can systematically scan a painting); they are *decouplable* from x (x may be absent from the immediate environment – e.g., I can later remember or simulate how I caught the ball replicating the same act).

Similarly, these constraints would operate in a variety of minimal representations in the context of action. For example, a Minimal Robust Representation (MRR) is claimed to be involved in the “internal” neural circuitry used for predictive/anticipatory purposes in a forward emulator involved in motor control (Clark and Grush 1999). The circuitry is a model that *stands in* for a future state of some extra-neural aspect of the movement – a body position (or an anticipated proprioceptive feedback connected with a body position) just about to be accomplished, e.g., in the action of catching a ball. The MRR, they indicate, is a “decoupleable surrogate.” Since the emulator anticipates [represents] an x that is not there – a future x – it is in some sense off-line, or “disengaged.” For Clark and Grush, the MRR is an “inner state” that does not depend “on a constant physical linkage” between it and the extra-neural states which it is about.

Likewise, Wheeler (2005), although a friend of Dreyfus’ anti-representationalist view, nonetheless suggests, following Clark (1997) that action requires

something like “action-oriented representations” (AORs). AORs are temporary egocentric motor maps of the environment that are fully determined by the situation-specific action required of the organism/robot. For Wheeler (in contrast to Clark’s suggestion that AORs are more or less equivalent to Millikan’s pushmi-pullyu representations) AORs have directive/imperative [motor/efferent-related] content but not descriptive/indicative (recognitional) content (cf. Millikan 1995). They are what Goldman (2012) calls body-formatted representations rather than propositional-formatted representations. On this model, it is not that the AORs *re-present* the pre-existing world in an internal image or that they map it out in an isomorphic neuronal pattern: rather, “how the world is *is itself encoded in terms of possibilities for action*” (Wheeler 2005: 197). What is represented in AORs is not knowledge that the environment is *x*, but knowledge of how to negotiate the environment. Accordingly, AORs are action specific, egocentric to the agent, and context dependent.

Why minimal representations are not representations

In my 2008 paper, my strategy was to use the list of constraints provided by Rowlands to see how these various minimal representations fit with the notion of representation. Basically, I argued that they failed to meet a sufficient number of constraints, and therefore they were not representational.

Consider first the decoupleability constraint. It is difficult to see how an aspect of action that is a constitutive part of the motor control process can be decoupled or disengaged from, the action itself, understood as a dynamic (temporally extended) event that necessarily includes the just future moment of ongoing movement. Doesn’t the anticipation of the just future movement require reference to the current state of the motor system, e.g., to the current motor command (via efference copy)? And if it is going to play a part in the control of movement, it seems necessary that this is a dynamical connection. To think that the MRRs of the anticipatory emulator, or AORs or PIAs, involve a decoupled (or decouplable) process is to think that motor control or anticipatory processes are (or can be) detached from perceptual input about the ongoing action, the proprioceptive input about current bodily states, which specify the possibilities of any future moment – which they clearly cannot be. It is true that, as anticipatory, they are one step ahead of real-world proprioceptive feedback from the just-future movement – but they are also at the same time one step behind the just-previous feedback – informed and updated by it – and they depend on the ongoing perception of relevant objects in the world. Such emulation or action-oriented processes are part of the online process of

perception-action. The process registers not simply some future state, in an abstract disconnected way, but the ongoing trajectory of the action.

Clark and Grush acknowledge this issue: “full-blooded internal representations” are fully decoupleable inner surrogates for extra-neural states of affairs. But the “case of basic motor emulation does indeed fall short of meeting this stricter criterion ... the surrogate states are not fully decoupleable from ongoing environmental input” (1999: 10). So although they talk about the process which they call the MRR being “offline”, this seems to mean only that it is a process that involves the ongoing (online) anticipatory tracking of the system’s movement.

For Rowlands (2012), however, decoupleability does not mean being offline or detached from the action – he suggests that I get him wrong on this issue. Following Millikan (1995), he maintains that the decoupleability constraint is tied to the misrepresentation constraint, which in turn is governed by the teleological (normativity) constraint: “all the decoupleability we can reasonably require can be found in misrepresentation, if this is properly understood” (2012: 141). When a PIA gets it wrong (when my fingers go up to catch the ball when they should go down) – in effect, when I haven’t tracked the ball properly – then the PIA is misrepresenting and is decoupled from what it is supposed to be representing.

In contrast, I had argued, under the supposition that to decouple means to take something offline, as in memory or imagination, “it is difficult to see how pre-intentional acts can be decoupled from x (the ball, the piano keys, the painting) or the context without becoming something entirely different from an element of the action at stake” (2008: 357).

Rowlands responds to this in the following way:

... pointing one’s fingers up or down in a context where there is no cricket ball hurtling towards you is a very different type of action from that of performing the same movement in the heat of the game. But simply getting it wrong – pointing your fingers up when you should have pointed them down, and so dropping the ball, for example – does not make it a different sort of action (2012: 141).

For Rowlands, being decoupled means just getting it wrong (misrepresenting) while still being online. “But this makes it mystifying why Gallagher thinks decoupling the action from the ball or the piano makes it an entirely different sort of action” (142).

To be clear, I don’t say “an entirely different sort of action” – I say: “*something entirely different from an element of the action at stake.*” In saying that, I was thinking of decoupleability as taking the representation out of the action – making the representation part of an offline process – which is, perhaps, the classic way of thinking of decoupleability – e.g., when the neuroscientist says

that imagining X activates the same representations (the same neuronal patterns) as when we perceive X.

As I noted, Rowlands position is similar to Millikan's. Millikan links Brentano's notion that intentionality has to explain "the capacity of the mind to 'intend' the nonexistent" with "an explanation of how misrepresentation can occur." Thus she argues "that misrepresentation is best understood by embedding the theory of intentionality within a theory of function that allows us to understand, more generally, what malfunction is" (1995: 186). Proper function is captured by the teleological constraint. By accepting the teleological/normativity constraint, we get the misrepresentation and decouplability constraints for free. In subsuming the decouplability constraint under the misrepresentation constraint, and subsuming the latter under the teleological/normativity constraint, Rowlands is suggesting that decouplability is a form of misrepresentation, and misrepresentation consists in failing to track x properly. In turning my fingers up rather than down, and thereby missing the ball, my fingers fail to track the ball properly. Likewise, in failing to track the richness of Rowlands' teleological constraint, my analysis decouples from his view of decouplability. But that's not all.

Representational but not representations

Rowlands also points to another important issue. He claims that PIAs are *representational* but not representations. They are not representations because they do not fulfill an additional constraint – the *explanatory constraint*. For something to qualify as a representation means that it fulfills the five constraints already mentioned plus the explanatory constraint: representation "plays a role in explaining (producing, guiding) behavior" (2012: 143).

I think there are several things to be said here. First, the explanatory constraint is, of course, precisely what is at stake in the ongoing debate – does representation explain anything? Second, for Rowlands, PIAs do not fulfill the explanatory constraint – they do not *explain* behavior, because they *are* behaviors – therefore they are not representations, although they are representational. The fact that PIAs are behaviors, however, and specifically parts of a larger behavior or action (e.g., of catching the ball), doesn't mean that they can't be part of an explanation of how catching the ball works, how it is possible, or, even, importantly, the normative aspects of the action. "Our normative grip on the world is, I have argued, precisely what the traditional apparatus of representations was supposed to explain" (Rowlands 2012: 136).

It seems to me that PIAs need to be part of the explanation of why catching

the ball is successful or fails, and of precisely what conditions are necessary for tracking the ball – to have one’s fingers thus-and-so, rather than so-and-thus. If this were correct, then it would seem to force Rowlands, according to his own logic, to say what he does not want to say, that PIAs are representations. Following the logic set up by Rowlands, if (1) PIAs do meet the 5 constraints, including the decouplability constraint – because decouplability hinges on nothing other than misrepresentation, and (2) pre-intentional acts do meet the explanatory constraint because they do explain the normative aspect of action, then PIAs are not only representational, but also representations. Rowlands denies (2) and therefore thinks PIAs are not representations.

In response to this, however, I want to argue that PIAs can be explanatory for the normative aspects of action – not as representational – but as part of an enactive-dynamical explanation. What saves them from being representations or even representational is that they are not decouplable, because decouplability is not reducible to misrepresentation, in contrast to what Rowlands claims. If misrepresentation is one way of being decoupled from the action, not all forms of decoupling are misrepresentations. Significantly, Millikan acknowledges the compatibility of pushmi-pullu representations with evidence, from Marc Jeannerod’s work, that imagining ourselves acting (offline) activates the same representations as engaging in the action. The representation of a possibility for action is, according to Millikan, a “directive” representation (1995: 186). This is because it actually serves a proper function only if and when it is acted upon. There is no reason to represent what can be done unless this sometimes effects its being done. But Brentano can also imagine an action that he should *not* do and that he *will not* do – and there may be a good reason to imagine it. Does this mean that he is misrepresenting the action?

Imagining an action offline – in a way that is decoupled from action – is not misrepresenting it. Rowlands may want to claim that for PIAs to be representational it is enough that they can be decoupled in the sense of misrepresenting – call this minimal decouplability. Rowlands, however, with respect to PIAs, shouldn’t (and I think, doesn’t) object to ditching decouplability in the classic sense. Clark and Grush already go some distance in this direction in regard to MRRs, which “fall short of meeting this stricter criterion ... [they] are not fully decouplable from ongoing environmental input” (1999: 10). And Wheeler – very much in line with Clark’s idea that an AOR “can also and simultaneously be viewed simply as a smaller dynamical system linked to the one that hooks directly into the real-world” – ditches decoupleability altogether (2005: 219).

The problem with classic representations is that it’s difficult to say how a

representation “hooks directly” into the physical environment – in some sense a representation is more decoupled than coupled to begin with. As Rowlands puts it: they “can be instantiated independently of what is going on in the outside world.” But much more than AORs and MRRs, PIAs *are* the things that hook directly into the real world – “through complex causal interactions in an extended-body-environment system” (Wheeler 2005: 193) – they are, after all, already, extra-neural events in the world – things like hands shaping and moving in a certain direction. Even more than Wheeler’s AORs, Rowland’s PIAs fit well with an embodied, *enactive* action/perception model, where perception and action are linked to the world in a temporal, dynamic structure.

Even if, however, instead of outright ditching minimal decouplability (defined in terms of misrepresentation), we allow that these conditions are governed by the normativity condition (i.e., that we can somehow get it wrong), as Rowlands wants, still, in turn, I would argue that it is possible that the normativity constraint can be fully explained in terms of non-representational dynamical processes. Concerning this I can only point here to a reconception of the notion of the teleological found in the recent biological sciences and explicated by Jonas, Varela, Thompson, and others. If you think of the mind purely in terms of mechanistic processes (or machine states, e.g., emulators) you miss something fundamental about the life-aspect of the mind – the embodied mind. On this view, intentional directedness is the default of action; not something to be accomplished in representational processes (see Gallagher and Miyahara 2010; Thompson 2007; Weber and Varela 2002). There is a deeper sense of intentionality here, captured by the concept of motor intentionality (Merleau-Ponty 1992) or motor intention (Pacherie 2006). If PIA’s are “pre-intentional”, they are so, as Rowlands indicates, only in the sense that they are not consciously controlled or decided. But to the extent that they are elements within an intentional action, they are not pre-intentional in any deeper sense.

Concerning the teleological [or normativity] condition, we can maintain the idea that a movement or process qualifies as a PIA “only if it has the *proper function* either of tracking the feature or state-of-affairs *s* that *produces* it, or of enabling an organism [...] to achieve some (beneficial) task in virtue of tracking *s*” (Rowlands 2012: 138). But it does so only as a dynamical process where an organism is properly coupled to an environment (enactively hooked into the world). Accordingly, we can say that action-oriented PIAs that contribute to the constitution of actions are characterized by

1. THE TELEOLOGICAL/NORMATIVE CONSTRAINT: they *fallibly* track things in the world. But this can be explained in terms of an enactive perceptual

tracking – I see the ball that I intend to catch and my bodily posture and movements go into a dynamic relation to the changing conditions of its trajectory. PIAs (which are coupled to body-schematic aspects of motor control) are meaningful insofar as they reflect a motor intentionality defined by both the person's goal and aspects of the physical (or social) environment.

2. THE DYNAMICAL CONSTRAINT: they are dynamically related to (coupled or hooked directly into) environmental contexts – processes that make up an action may refer to something or some state of affairs other than the action itself, but only in pragmatic terms of the action. But this doesn't mean that they represent that state of affairs. Even if they objectively register information about that state of affairs (e.g., if the shape of my grasp reflects the shape of the thing that I am reaching for), taking this as information about the world is only secondary, and available only from an observational perspective. It doesn't play the role of information for the system itself.
3. COMBINATORIAL CONSTRAINT: such acts are kinematically integrated into more complex, dynamical, goal-related movements.

In effect, PIAs can be viewed as important aspects of action (and motor control) that have intentionality (understood in terms of motor intention or intention-in-action), but are not representational in either the classic sense or in a sense that involves the informational constraint (involving content), or any strong sense of misrepresentation or decoupleability. So the question comes back to this: What's representational about a process if the process in question is no longer (1) internal (PIA's are bodily movements); (2) discrete (PIAs are dynamical distributed processes); (3) passive (PIAs are enactive/anticipatory, proactively contributing to the rich adaptability of the system); (4) decoupleable (even if they are still explainable in terms of a non-representational normative/teleological constraint).²

So what is the point in retaining the term 'representation'? What work does the concept of representation really do since there is no literal *re*-presentation of anything; since it is not consistent with most aspects of the classical notion of representation; and since in working out the detailed explanation of the process, one is already explaining action in non-representational terms of perception-based complex causal interactions in an extended-body-environment system.

Rather than going the enactive/dynamical theory route, however, Rowlands

² I've set aside the issue of whether something like a PIA requires interpretation, which involves homuncularity, modularity, and off-line processing. Briefly, I would argue that they don't. See Gallagher (2008) for more on this issue.

continues to worry that this would not be enough: the problem of representation still persists: “The problem of representation is, ultimately, a problem of explaining our normative *grip* on the world” (Rowlands 2012: 135). In this regard, however, Rowlands shifts the focus. Rather than focusing on action, Rowlands explains the problem of representation (or normative grip) in terms of belief: “If I have a belief with the content that *p*, then the world *should* be *p*” (2012: 134). It’s an old problem – connected with an old way of thinking of the mind – “from the inside out”, as Rowlands rightly puts it. Rowlands is right to reject this way of thinking of the problem and to

[...] reject this direction of explanation. The true locus of normativity does not, or does not necessarily, reside on the inside, in the form of inner representations. Rather, it is also to be found on the outside. Our behavior is infused with a form of normativity that is *sui generis* and does not derive from the inner states of a subject (2012: 136).

Once we get this far, I suggest, the problem of explaining our normative grip is no longer the problem of representation; it’s rather the problem of explaining how we are dynamically coupled to the world – starting with perception and action (rather than with belief).

I think this starting point gives us a different strategy for explaining cognition more generally, where thinking, reflecting, problem solving, deliberating, judging, deciding, etc. are online dynamic processes, like acting in the world, like catching a ball, and where beliefs are *products* (and nothing more than products that are grasped reflectively, in a reflection that is itself equally a dynamic process) of just such processes and are already explained as pragmatically successful or not by just such processes. That would be the basis for what Rowlands (2010) calls a “new science of the mind”.³

³ This would be quite a different strategy from what Rowlands presents in his 2010 book. For Rowlands, even as he argues against Adams and Aizawa’s claim that the mark of the mental is intrinsic or non-derived (representational) content, intrinsic representational content remains his measure of the mental since a process counts as cognitive only if it subtends a representational content as a result: “[...] processes are cognitive because, when they are fulfilling their proper function, and when they are combined with other processes of the requisite sort, they are capable of yielding representational states.... A cognitive process must be the sort of thing that can, in isolation or in combination with other processes, be normally capable of yielding a state with nonderived content” (133). On this view, the measure of cognition remains directly tied to the notion of representation/intrinsic content. Is that a “new” or an old science of the mind?

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