The brain as part of an enactive system

doi:10.1017/S0140525X12002105
BEHAVIORAL AND BRAIN SCIENCES (2013) 36:4, pp. 421-422.

Shaun Gallagher,[a,b,c] Daniel D. Hutto,[b,c] Jan Slaby,[d] and Jonathan Cole[e]

[a]Department of Philosophy, University of Memphis, Memphis, TN 38152; [b]School of Humanities, University of Hertfordshire, Hertfordshire AL10 9AB, United Kingdom; [c]Philosophy Program, University of Wollongong, Wollongong NSW 2522, Australia; [d]Exzellenzcluster "Languages of Emotion," Freie Universität Berlin, 14195 Berlin, Germany; [e]Department of Clinical Neurophysiology, Poole Hospital, Poole, Dorset BH15 2JB, United Kingdom.

s.gallagher@memphis.edu d.d.hutto@herts.ac.uk
slaby@zedat.fu-berlin.de Jonathan.Cole@poole.nhs.uk
http://www.ummoss.org/ http://herts.academia.edu/DanielDHutto
http://www.janslaby.com/

Abstract: The notion of an enactive system requires thinking about the brain in a way that is different from the standard computational/representational models. In evolutionary terms, the brain does what it does and is the way that it is, across some scale of variations, because it is part of a living body with hands that can reach and grasp in certain limited ways, eyes structured to focus, an autonomic system, an upright posture, etc. coping with specific kinds of environments, and with other people. Changes to any of the bodily, environmental, or intersubjective conditions elicit responses from the system as a whole. On this view, rather than representing or computing information, the brain is better conceived as participating in the action.

We applaud Schilbach et al. on the long overdue venture to define a second-person neuroscience and to improve the neuroscientific study of social cognition. At the same time, we see an unresolved tension in their account. Specifically, their questions about how the brain functions during interaction continue to reflect the conservative nature of "normal science" (in the Kuhnian sense), invoking classical computational models, representationalism, localization of function, and so forth. Yet, in proposing an enactive interpretation of the mirror neuron system (MNS), Schilbach et al. point beyond this orthodox framework to the possibility of rethinking not just the neural correlates of social cognition, but the very notion of neural correlate, and how the brain itself works.

The enactive interpretation is not simply a reinterpretation of what happens extra-neurally, out in the intersubjective world of action where we anticipate and respond to social affordances. More than this, it suggests a different way of conceiving brain function, specifically in nonrepresentational, integrative and dynamical terms (see, e.g., Hutto & Myin 2013). Although Schilbach et al. point clearly in the direction of ecologically valid enactive designs for investigating social interaction, they constantly fall back to the language of neural correlates, singling out measurable brain activation as the most relevant explanans. This vestige of neurocentrism is at odds with the path-breaking potential of a second-person neuroscience.

Functional magnetic resonance imaging (fMRI) technology goes hand in hand with orthodox computational models. Standard use of fMRI provides an excellent tool to answer precisely the kinds of questions that can be asked within this approach. Yet, at the limits of this science, a variety of studies challenge accepted views about anatomical and functional segregation (e.g., Shackman et al. 2011; Shuler & Bear 2006), the adequacy of shortterm task-based fMRI experiments to provide an adequate conception of brain function (Gonzalez-Castillo et al. 2012), and individual differences in Blood-Oxygen-Level-Dependent (BOLD) contrasts in subjects performing the same cognitive task (Miller et al. 2012). Such studies point to embodied phenomena (e.g., pain, emotion, hedonic aspects) that are not appropriately characterized in representational terms but are dynamically integrated with their central elaboration.

Consider also recent challenges to the idea that so-called mentalizing areas (cortical midline structures) are dedicated to any one function. Are such areas activated for mindreading (Frith & Frith 2008; Vogeley et al. 2001), or folk psychological narrative (Perner et al. 2006; Saxe & Kanwisher 2003); a default mode (e.g., Raichle et al. 2001), or other functions such as autobiographical memory, navigation, and future planning (see Buckner & Carroll 2007; Spreng et al. 2008); or self-related tasks (Northoff & Bermpohl 2004); or, more general reflective problem-solving (Legrand & Ruby 2009)? Or are they trained up for joint attention in social interaction, as Schilbach et al. suggest; or all of the above and others yet to be discovered?

Neuroscience, like any other discipline, works with limited vocabularies and limited tools in a limited theoretical space. The technical limitations are, as Schilbach et al. make clear, even more obvious in the study of social cognition. In a scanner, two is already a crowd and three is impossible (also see Dumas 2011). In contrast to the computational/ representational orthodoxy of fMRI, the enactive approach not only adds extra-neural externalities and interaction to the explanatory mix, but also redefines the role of the brain – the way the brain actually works in this mix – moving away from any idea of social cognition as a meeting of brains (Schilbach et al.'s Fig. 1).

The explanatory unit of social interaction is not the brain, or even two (or more) brains, but a dynamic relation between organisms, which include brains, but also their own structural features that enable specific perception-action loops involving social and physical environments, which in turn effect statistical regularities that shape the structure of the nervous system (Gallagher 2005). The question is, what do brains do in the complex and dynamic mix of interactions that involve moving, gesturing, expressive bodies, with eyes and faces and hands and voices; bodies that are gendered and raced, and dressed to attract, or to work or play; bodies that incorporate artifacts, tools, and technologies, that are situated in various physical environments, and defined by diverse social roles and institutional practices?

The answer is that the brain participates in a system, along with eyes and face and hands and voice, and so on, that enactively anticipates and responds to its environment. How an agent responds will depend to some degree on the overall dynamical state of the brain and the various, specific and relevant neuronal processes that have been attuned by evolutionary pressures, but also by personal experiences (the historicity, as Schilbach et al. put it) of the agent (see Slaby et al. [in press] for evidence of this in depression). How an agent responds also depends on the worldly and intentional circumstances of the agent, the bodily skills and habits she has formed, her physical condition, a variety of so-called extraneous factors (see, e.g., Danziger et al. 2011), the person(s) with whom she is interacting, and what the other person may expect in terms of normative standards stemming from communal and institutional practices.

When a person turns her gaze towards you or reaches out to touch you, what happens is not just that her visual and motor cortexes are activated; what happens also includes her eye movements and the movements of her arm that require peripheral (proprioceptive) and vestibular involvement. None of these things happen, however, if you are not there, and whatever happens next depends on your response, which involves your eye movements, facial expression, and what you do with your hands – which further involve peripheral and central processes that may be controlled more by her than by you, and perhaps by the fact that you are in a dance hall and dressed to the hilt. There is no denying that the brain has a role to play, but an explanation of what is going on here can never be cast solely in terms of neurons or mental states. If we are looking for an explanation of social cognition and interaction – the kind of things that happen in the world rather than in the brain, or scanner, or lab – then, as Schilbach et al. suggest, we need to employ a multiplicity of methods which includes neuroscience as one among many.