

## Introduction to the special issue on 4E cognition

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### Introduction

One thing that has become clear in the last 10 to 15 years of research on cognition is that there are many different dimensions of modelling and explanation at work. Homogeneity there is not. One only needs to think of the differences in emphasis and approach that one finds under the often grouped together labels of embodied, embedded, extended and enacted cognition<sup>1</sup>. One reason that the four E's are grouped together is that they are all held to reject or at least radically reconfigure traditional cognitivism<sup>2</sup>, coupled with a methodological individualism<sup>3</sup>. However, we might ask whether simply lumping, for example, cognitive extension together with enactivism is to miss out on the nuances and sometimes genuine incompatibilities between them. Enactivism, as understood by the likes of Thompson (2007, Thompson and Stapelton 2009) and DiPaulo (2009), is a thesis about the continuity between life and mind. The position appears to be quite incompatible with an extended functionalism, which abstracts away from biological details (Clark and Kiverstein 2009).

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<sup>1</sup>This list does not include distributed and situated models of cognition.

<sup>2</sup>Which is usually understood as cognition as the manipulation of representations. Despite Adams' and Aizawa's protestations to the contrary, I do not think that cognitivism is committed to anything stronger than this. Indeed, it would be unwise for cognitivists to hold to Adams' and Aizawa's stronger version of cognitivism—that only manipulations of representations with underived content count as cognitive—as this leads to the counter-intuitive conclusion that the many examples of empirical work on the brain's transformation by internalising public symbol systems do not count as cognition.

<sup>3</sup>Cognitive processes and representations supervene upon the brain.

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There are also disagreements between those grouped together under the catch-all of the extended mind. For example, Clark (2008) and Wheeler (2010) argue for an extended functionalism, which works only at a very coarse-grained level of functional analysis. Clark (2008, p. 88) allies himself with a common-sense functionalism, which claims that we all have folk intuitions about the roles that mental states like belief and memory are supposed to play. This is to ally oneself with the ‘folk’ functional role semantics of Lewis (1972, see also Braddon-Mitchell and Jackson 2007). By contrast, there are those who think that only empirical arguments showing that there are integrated cognitive systems will do (Menary 2007, Sutton 2010a, Sutton et al. 2010, Rowlands 2010). This disagreement between allies may not turn out to matter that much because it is obvious that Clark and Wheeler are deeply interested in the empirical arguments and cases; and Menary, Sutton and Rowlands have at least a broad conception of mental states such as memory and belief and not just a set of empirical cases.

Further disagreements concern the degree to which we can understand cognition and the mind in terms of our embodiment. Clark (2008) thinks that there are limitations to the embodied approach to cognition (2008, p. 204–205). By contrast, Gallagher (2005) gives an embodied account of our prenoetic awareness and our capacities for social cognition and even the self (see also Menary 2008).

One might conclude that there is no homogeneity within 4E cognition, except a shared enemy—cognitivism. Even this claim turns out to be too strong. Some extended mind theorists, such as Clark and Sutton, are quite happy to endorse a weak cognitivism—that representations are sometimes involved in cognition. Whereas, some enactivists are much more radical, calling for the replacement of cognitivism and arguing that there is no need at all for mental representations in cognitive explanations (Chemero 2009) or that they will have a very limited and reduced role (Hutto 2008).

Where does this leave us? Some critics of 4E cognition will be rubbing their hands with glee at the falling out amongst a previously tight knit band of brothers and sisters. However, there is no need to despair, and the critics should think twice before crowing. For we are in a position of abundance, not disarray: if one looks at the array of empirical cases that are provided by the, now rich, 4E literature, one finds the need for a battery of different explanatory methods that are suited to the differences in those cases. For example, one might find that there are cases that require attention to the detail of the dynamics of neural networks and the information that they encode (to put it in traditional information processing terms). One might also find cases where the representational dynamics of neural networks have been reformatted by the internalisation of public systems of representation and that only after this transformation, of the inner processing and representational environment, are certain higher cognitive capacities available to the cognitive agent. In fact, there are strong empirical reasons for thinking that this is the case in domains such as mathematical thinking (Dehaene et al. 1999, 2007).

The papers in this issue show us that there are strong phylogenetic reasons why cognitive capacities have turned out to be highly embodied and embedded (Sterelny 2010, Stotz 2010, Jeffares 2010) and that, therefore, we need explanatory resources that go beyond the dynamics of neural networks. When combined with an ontogenetic account of the developmental basis of cognitive capacities, we have another potent set of reasons for thinking that a broadly 4E framework will prosper.

This issue provides examples of enactive accounts of know-how (Simpson 2010) and socially distributed accounts of memory (Sutton 2010) and responsibility (Cash 2010). Inevitably, there is also a critical backlash from cognitivist critics (Adams and Aizawa 2010, Adams 2010), reminding us that the cognitivist explanatory programme is still very much alive and kicking.

Consequently, the papers for this issue provide richly detailed examples of how 4E cognition is making us think in new ways about the mind. It shows us that our cognitive lives are rich and varied and that simple homogenous explanations do not do justice to the complexity of cognitive phenomena.

We begin the special issue with Kim Sterelny's paper, in which he argues for a view of the mind as scaffolded by resources in the cognitive niche. He deploys the niche construction framework from biology (Odling-Smee and Feldman 2003) to human cognition. Sterelny argues that the construction of cognitive tools and artefacts in the cognitive niche, scaffold and support human cognition. He also argues that the cognitive niche construction framework explains a wider range of human cognitive capacities than does the extended mind. He does not deny that there are cases of extended cognition, but only as limiting cases of scaffolding. However, Sterelny's framework provides a vision of human cognitive capacities as not just embodied and embedded but also deeply transformed by the cognitive niche. Therefore, Sterelny's position should not be confused with a classical individualism. The individual cannot be considered apart from the niche and her/his activity in the niche.

Karola Stotz's paper follows directly on from Sterelny's development of the cognitive niche framework. She argues that we should talk not just of the cognitive niche but also the developmental or ontogenetic niche. Our mature cognitive capacities are sculpted and transformed during development, and Stotz argues this ought to lead us to a broadly embodied and embedded vision of the developmental process. Furthermore, the developmental process produces minds that are strongly embedded or extended. Therefore, Stotz and Sterelny disagree about whether our development in the niche leads to minds that are scaffolded or extended.

Ben Jeffares continues the evolutionary theme and explores the evolutionary history of tool use in hominins. He argues that rather than seeing tools simply as the output of cognitive capacities, we should think of tools and cognitive capacities as co-evolving in an evolutionary feedback loop. Consequently, tools have had important influences on the evolution of our cognitive capacities.

John Sutton and colleagues produce a richly detailed account of their empirical work on collaborative recall. They offer this work as empirical support for an extended and/or socially distributed account of memory (and cognition in general). They also engage internalist critics about the proposed complementarity of neural, bodily and environmental resources, arguing that such resources are integrated into hybrid cognitive systems and that the result is a profound alteration in the practice of cognitive science.

Menary's paper takes up the dimensional theme in both Sterelny and Sutton et al.'s papers. He adds two further dimensions of interaction between individuals and environments: the manipulation of the environment and the transformation of cognitive capacities by development in the cognitive niche. The paper also addresses the different dimensions of explanation in terms of the strength of embodiment and embeddedness.

Adams and Aizawa present a case for adopting cognitivism and critique the positions adopted by Clark (2005, 2008) and Menary (2006, 2007). Their argument constitutes a reminder that cognitivism is still a powerful explanatory force in cognitive science. As they suggest, one can adopt a weak or strong form of cognitivism, they prefer a stronger form that requires representations with underived content. They also argue that unless extended mind theorists adopt a strong form of cognitivism, they will be unable to deal with some serious objections to their position.

Menary's response to Adams and Aizawa argues that for their strong cognitivism to work, Adams and Aizawa need both a successful theory of representation and a successful theory of natural (underived) content. He also argues that many cognitive scientists only employ a weaker form of cognitivism, which is quite consistent with a cognitive integrationist framework.

Fred Adams provides a critique of Glenberg's embodied cognition. He argues that the data from Glenberg and colleague's experiments do not warrant us to conclude that perceptual-motor activity is constitutive of cognition.

David Simpson gives an enactive, know-how-based account of our knowledge of language. Simpson argues that we should shift our focus from propositional knowledge of language that is internally represented, to knowing how to interpret and communicate with others.

The final paper in this volume Mason Cash, gives us a rich treatment of responsibility and autonomy and how we might think of this phenomenon as part of an extended mind framework. He argues that we need to re-think the autonomy and responsibility of extended agents in terms of relational autonomy familiar from the work of feminist philosophers.

Research in 4E cognition continues to develop in leaps and bounds. The once homogenous framework of cognitivism is being replaced by a multi-dimensional analysis of cognition as incorporating our brains, bodies and environments.

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