Cogn Process (2006) 7: 1–2
DOI 10.1007/s10339-005-0027-5

EDITORIAL

John Sutton

Introduction to the special section: the extended mind and the foundations of cognitive science

Received: 15 December 2005 / Published online: 18 January 2006

The three papers in this special section of *Cognitive Processing* continue and extend the December 2005 issue, which was devoted in its entirety to reviews, research reports, and laboratory reports on the theme of 'Memory and the Extended Mind: embodiment, cognition, and culture' (Sutton 2005). Like the papers in that issue, these are revised versions of papers first presented at two workshops on 'Memory, Mind, and Media' in Sydney on November 29–30 and December 2–3, 2004. Where that issue focussed specifically on memory, these three papers deal with more general issues in the foundations of cognitive science.

Mitch Parsell's review paper, 'The cognitive cost of extending an evolutionary mind into the environment', directly addresses the 'extended mind' thesis developed by Andy Clark and David Chalmers (Clark and Chalmers 1998; Clark 1997, 2006), according to which mental states and processes can spread across the physical, social, and cultural environments as well as bodies and brains. One line of argument for this thesis rests on the putative cognitive economies which result from relying on external information stores and sources. Parsell defends this argument in response to a testing biologically-grounded critique by Kim Sterelny, who suggests that reliance on the social world in particular may, in contrast, increase the cognitive resources required to guard against deception. Parsell's two complementary replies nicely address both the subpersonal and the social implications of the extended mind thesis. On the one hand, the context-sensitivity of connectionist networks employing highly distributed representation can in principle allow the individual brain to achieve a requisite level of insurance against deception without dramatically increasing cognitive load; and, on the other hand, an appropriate analysis of trust and other features of interpersonal relationships can show us that openness to the social realm need not always increase our vulnerability to error, distortion, and deception.

Pamela Lyon's paper, 'The biogenic approach to cognition', radically extends the biological orientation of existing work in embodied and situated cognition. Synthesizing a number of distinct but related traditions in recent work on self-organizing complex systems and autopoiesis, Lyon offers a new set of unifying biological principles as revised foundations for our understanding of 'higher' cognitive processes too. Like related theorists working on the cognitive neuroscience of self-directed anticipatory learning (e.g. Christensen 2004), Lyon believes that the creative coordination of apparently 'lower-level' biological capacities can integratively give rise to the full panoply of characteristics of cognition.

The research report by Gerard O'Brien and Jon Opie, 'How do connectionist networks compute?', takes us back from foundational theory to the mechanisms of computation at the heart of connectionist cognitive science. Building on their long-standing research on the nature of analog computation, which in turn is nested in an overarching and inclusive framework for understanding the generic notions of computation and representation, O'Brien and Opie here develop in considerable detail a positive account of connectionist computation. Where much theoretical work on the implications of connectionism has focussed on questions about the interpretation of activation patterns on layers of units within a network, O'Brien and Opie argue in contrast that the key computational work in such networks is done by connection weights, and so we need methods to understand the representational capacities of these connection weights. Taking us through some highly original simulations, O'Brien and Opie offer a new way to analyse weight space which allows us to see connection weights as the causally potent vehicles of representation and to grasp the specific relations of

J. Sutton
Department of Philosophy, Macquarie University,
2109 Sydney, NSW, Australia
Tel.: +61-2-98508817
Fax: +61-2-98508892
E-mail: jsutton@scmp.mq.edu.au
URL: http://www.phil.mq.edu.au/staff/jsutton/

structural resemblance which hold between such networks and their task domains.

Acknowledgements In addition to all those thanked in my introduction in the December 2005 special issue, I am very grateful to Andy Clark, Thomas Hünefeldt, Cees van Leeuwen, Richard Menary, Mitch Parsell, Gerard O'Brien, and Kate Stevens for help with this issue. My thanks again to the Australian Research Council, the Division of Society, Culture, Media and Philosophy at Macquarie University, the Centre for Time at the University of Sydney, and the Royal Australian Institute of Architects for their generous support of the original workshops.

References

Christensen WD (2004) Self-directedness, integration, and higher cognition. Lang Sci 26:661–692

Clark A (1997) Being there: putting brain, body, and world together again. MIT Press, Cambridge

Clark A (2006) Memento's revenge: the extended mind, extended. In: Menary R (ed) The extended mind. Ashgate, Aldershot

Clark A, Chalmers D (1998) The extended mind. Analysis 58:7–19

Sutton J (2005) Memory and the extended mind: embodiment, cognition, and culture. Cogn Process 6:223–226