has been defined in various ways, including the level of embedding in a goal–subgoal hierarchy during problem-solving [6], the number of relations being simultaneously processed during reasoning [7], or the number of items held in working memory [8]. Reviews of RLPFC recruitment across multiple domains [2,9] show that activations are more frequent when the complexity of cognitive processing is high than when it is relatively low. This selectivity would permit reverse neuroimaging inference to a much greater extent, especially when specific cognitive processes such as relational integration [7], the evaluation of self-generated information [4], or subgoal processing [5,10] are theorized at the highest levels of cognitive complexity.

Implications and questions for future research

In summary, brain regions differ not only in their overall selectivity of response, but also in terms of the specific task characteristics they are selective to. This suggests that reverse inference can be improved by incorporating information about the relevant task characteristics into neuroimaging databases and meta-analyses. At present, databases generally classify tasks according to their cognitive domain and contain virtually no information about the level of task complexity, possibly because complexity of processing can be difficult to quantify and compare across tasks.

In addition, a number of other questions emerge: Are there other brain regions that show selectivity to the level of task complexity but lack selectivity to task domain? How can we compare levels of cognitive complexity across different cognitive domains? What other task characteristics, in addition to complexity and domain, might be relevant in determining the selectivity of brain regions? Clearly, much remains to be resolved. In the meantime, the framework presented by Poldrack places clear constraints on the inferences that can be drawn with the limited information that is currently available.

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Neuroeconomics and the metastable brain

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In a recent article Sanfey and colleagues [1] suggest that neuroeconomics should build upon the strengths of the 'unitary perspective' in economics and the 'multiple-systems approach' in neuroscience to challenge classic decision-making theories rooted in rationality. They entertain the notion that ideas from economics will shed light on one of the great riddles of neuroscience: how the many diverse regions of the brain are coordinated to produce goal-directed behaviour. In an attempt to bridge the conceptual gap between two such disparate fields Sanfey and colleagues offer an analogy between the *modus operandi* of the brain and of a corporation. In a nutshell, both are presented as systems ruled by an executive control that interacts with more or less independent specialized agents that transform an input into an output [1].

An alternative approach to this purely hierarchical model is coordination dynamics [2,3]. Inspired by self-organizing principles specifically tailored to the informational demands of cognitive and brain function, coordination dynamics proposes that states-of-mind, manifested as coordination patterns in the brain, spontaneously arise from non-linear coupling among interacting components. Which patterns arise depends upon their stability under given constraints. As circumstances change, one pattern might lose stability and another emerge spontaneously because it better fits current demands. Such context-dependent decision-making and pattern selection have

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been observed and modelled at both behavioural and cerebral levels [2].

A novel aspect of coordination dynamics is that beyond where stable states of coordination occur, a more subtle 'metastable' regime exists [2,4,5]. Metastability – 'a new principle of brain function' [6] – is characterized by partially coordinated tendencies in which individual coordinating elements are neither completely independent (local segregation) nor fully linked in a fixed mutual relationship (global integration). Thus, the polar tendencies of specialized brain regions to express their autonomy and to work together as a coherent unit co-exist simultaneously [2,7].

Considering that one's environment and state of mind are subject to rapid and often unpredictable change during the decision-making process, the brain must be able to exhibit adaptive features on a sub-second timescale. By virtue of a subtle balance between the intrinsic neuronal properties of individual brain areas and the synaptic coupling between them, metastability provides a mechanism for task-relevant brain areas to engage and disengage flexibly to accomplish real-time information processing and decision-making. The essentially *nonlinear* dynamics also permits rapid switching between different brain synergies through the re-organization of component areas into different coordinated behavioural and brain networks [2,4].

Metastable coordination dynamics appears to be gaining acceptance in the neuroscientific community as illustrated by the increasing number of syntheses that have embraced it [4,5,8–10]. As a conceptual framework for spontaneous decision-making that respects the dynamics of both the brain and the economy, we suggest that metastability is a useful complement to the hierarchical model proposed by Sanfey and colleagues [1], and might therefore be expected to become an active participant in the development of the transdisciplinary field of neuroeconomics.

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Book Review

Why we read literary criticism

Why We Read Fiction: Theory of Mind and the Novel by Lisa Zunshine. Ohio State University Press, 2006. $22.95 (198 pp.) ISBN 0-8142-5151-X

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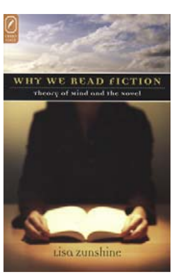

Human beings have not only the ability to think about what others are thinking (a 'theory of mind', ToM) but the inclination to do so. Lisa Zunshine, a professor of English Literature at the University of Kentucky, makes much of this inclination. Our ToM, she proposes, is 'Why we read fiction'.

Zunshine's project is part of a fast-growing trend of 'cognitive approaches to literature' that seek to use a scientific understanding of readers' minds to help explain why and how fiction works the way it does [1–3]. In principle, the project of interdisciplinary exchange is exciting. There is a long tradition of constructive dialogue between vision science and the visual arts, and no reason not to consider a similar proposition for literature. Unfortunately for Zunshine, and discouragingly for cognitive scientists, our current understanding of higher-order cognition is much flimsier than our understanding of vision, and stands up much less well under the pressure of export to a neighbouring discipline. Thus despite Zunshine's gratifying enthusiasm for cognitive science, her book is weakest where she relies most heavily on the science and strongest where it stands on its own.

Zunshine's proposal is most often expressed in metaphor. She variously suggests that fiction exercises ToM like a muscle, satiates our ToM 'drive', satisfies an addiction to ToM stimulation, or even serves as a low-stakes test of our ToM, to reassure ourselves about the functioning of this crucial evolutionary endowment.

Only two empirical 'discoveries' about ToM play any role in the book and neither discussion is successful.

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