

Introduction

‘Neuroeconomics: hype or hope?’

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This Special Issue of the *Journal of Economic Methodology* brings together a selection of papers presented at the Conference Neuroeconomics: Hype or Hope?, which was hosted by the Erasmus Institute for Philosophy and Economics (EIPE) in November 2008 in Rotterdam. The conference speakers comprised ardent advocates and practitioners of neuroeconomics, outspoken critics and skeptics, and philosophers and methodologists taking a stance somewhere in between these extremes. The central question was whether neuroeconomics is a flimsy fad that is likely to pass without leaving a discernible trace in economics, or a promising new field with the potential to enrich and improve economic theory.

Neuroeconomics is hot. Over the last few years, all over the world many leading universities have started their own lab or centre for neuroeconomics. Papers explicitly presented under the banner of neuroeconomics frequently appear in leading science journals such as *Nature* and *Science*. Neuroeconomics has also received quite some attention in the popular press. Not surprisingly, economists have started to reflect on neuroeconomics and its relevance for economics. To date, the paper by Gul and Pesendorfer (2008) is perhaps the staunchest denial of any potential relevance of neuroscientific findings for economics. Gul and Pesendorfer argue that economists should keep their focus on observable choice behavior and retain their agnosticism about decision-making processes. Since neuroscientific data are about decision-making processes, they should be completely disregarded in empirical assessments of economic theories.

Various responses to Gul and Pesendorfer’s provocative paper have been collected in a recent volume edited by Caplin and Schotter (2008). At issue is whether, and if so how, neuroscientific (non-choice) data bear on economic theory.¹ The views on this issue expounded in the book vary among the authors, who are mostly practicing economists. This also holds true for the *Economics & Philosophy* special issue on neuroeconomics (number 3, 2008), in which a dozen authors were given the opportunity to react to two target papers. In one of the target papers, Glenn W. Harrison (2008) deplores the poor epistemological basis of neuroeconomics. Harrison points out that in neuroeconomics studies often bold conclusions are drawn from scanty data (cf. also Rubinstein 2008). In the other target article, Kevin A. McCabe (2008) gives an overview of what neuroeconomics is, what neuroeconomists do and what neuroeconomists have achieved thus far. Although McCabe is one of neuroeconomics’ earliest and most prominent protagonists, he also has problems in pinpointing what promise neuroeconomics holds out for economics.

This Special Issue of the *Journal of Economic Methodology* continues the debate initiated by these contributions. Again, the main question is whether, and if so how,

neuroscientific studies are (or will be) relevant for economics. The authors in this Special Issue take as their starting point either Camerer, Loewenstein, and Prelec's (2005) manifesto to revolutionize economic theory on the basis of neuroscientific data and insights and examine neuroscience's potential to revolutionize economic theory, or Gul and Pesendorfer's (2008) diatribe against it and examine whether neuroscientific findings are destined to remain idle and inconsequential for theorizing in economics.

One might easily get the impression that neuroeconomics involves a one-way transfer of data and insights from neuroscience to economics and that if neuroeconomics is to make a lasting contribution, it should be to the field of economics. But this is not at all obvious. As most of the essays collected in this Special Issue recognize, there are at least two rather different strands within neuroeconomics: behavioral economics in the scanner (BES) and neurocellular economics (NE) (Ross 2008). Whereas BES takes existing neuroscience to task to better understand economic behavior, NE takes existing (standard) economic theory to task to better understand neural activity in the brain. Whereas BES argues for radical, if not revolutionary changes in economic theory, NE argues for radical, if not revolutionary changes in neuroscience.

As several authors in this Special Issue observe, some leading proponents of neuroeconomics expect that neuroscientists have more to gain from introducing standard economic theory in the study of neural activity than economists can gain by trying to accommodate neuroscientific data and insights in the study of traditional economic phenomena (cf. Gallistel 2009). As the main focus of this Special Issue is on the potential benefits and dangers of BES-style neuroeconomics, the question of whether neuroeconomics will be able to fulfill this latter promise is not discussed further here. But the observation that the major contribution of neuroeconomics might not lie in the field of economics raises several interesting issues that will be discussed along the way. What defines the field of economics and its disciplinary boundaries vis-à-vis neuroscience, for example, and will the advent of neuroeconomics necessitate a rethinking of these issues?

Neuroeconomics indeed inevitably calls into question previously established relations between disciplines. This is obviously the case for the relation between economics and neuroscience. Should we stick, as Gul and Pesendorfer argue, with the historically evolved understanding of what economic theory is (and should be) about, or is a less conservative stance towards the aims and subject matter of economics possible and perhaps also desirable? Perhaps less obviously, neuroeconomics also calls into question the relation between economics and psychology. From an explanatory and evidential perspective, psychology seems to be more directly relevant to economics than neuroscience. Several authors in this issue argue that where we have solid psychological knowledge of economic behavior, there is not much that neuroscience can directly contribute to economics. What is at stake here is what relation there is (and should be) not just between psychology and neuroscience on the one hand and economics on the other, but also between psychology and neuroscience. Finally, there is also the question of how neuroscience relates to philosophy in general, and to philosophy of economics and social ontology in particular. Should philosophers actively engage in designing and conducting brain-scanning experiments, as Francesco Guala and Tim Hodgson argue, or are they better advised to stay on the sidelines, seems to suggest experiments conducted by others and reflect on how they affect economic theory, as Uskali Mäki examine?

Neuroeconomics is starting to appropriate a significant amount of intellectual and financial resources, and assessments of its scientific potential are necessary to make informed decisions on the profitability of investing in it. Informed reflections on the issues

raised by neuroeconomics are therefore both timely and important. The analyses collected in this Special Issue suggest that although neuroeconomics raises various methodological problems that ought to be dealt with, it might contribute to economics in various ways, some perhaps more promising than others. One thing comes out clearly, though: a complete insulation of economics from neuroscience and psychology, as suggested by Gul and Pesendorfer, is likely to do economics more harm than good.

In his paper, Uskali Mäki disentangles various aspects of the Hype or Hope question. Mäki argues that on several counts neuroeconomics in fact is a hype, but that this does not mean that we should be pessimistic about its potential contribution to economics. The article by Roberto Fumagalli provides an informative overview of the divergent positions held by neuroeconomists regarding both what neuroeconomics is as well as what it can achieve. Fumagalli argues that these divergences might hamper neuroeconomics in fully exploiting its potential and advocates the importance of methodological reflections as an aid for settling those divergences.

The article by Moana Vercoe and Paul Zak puts neuroeconomics in action; the authors set out to show that by using drugs to manipulate brain activity it is possible to establish causal relations. They do this by reporting the results of a set of experiments they themselves have carried out. Vercoe and Zak's article clearly expresses the promise that neuroeconomics holds out for economics and the revolutionary zeal characteristic of the first generation of neuroeconomics papers. Francesco Guala and Tim Hodgson too report on their own experiments conducted to test theories about the emergence of conventions. Their further aim, however, is to show not only that neuroscientific data are relevant to philosophy of social science, but also that philosophers of social science are well advised to conduct neuroscientific experiments themselves.

The articles by Emrah Aydinonat, Jack Vromen, and Glenn Harrison jointly with Don Ross react to Gul and Pesendorfer's bleak view on the potential relevance of neuroeconomics to economics. In his contribution, Aydinonat agrees with Gul and Pesendorfer that neuroeconomics and economics ask different questions and employ different abstractions. Yet, drawing on ideas from current philosophy of modeling and explanation, he argues that neuroeconomics contributes to economics, or can do so, in two ways: it extends the set of (what-if) questions that economics addresses about the phenomena it traditionally studies, and it provides evidence against which its typically conjectural explanations can be tested. Vromen argues that, understood in an abstract way, computational neuroscience and economics are in the same business of identifying algorithms that map environmental variables on to choices, and this is precisely where the two disciplines can meet. Thus conceived, neuroeconomics can potentially improve understanding of when and why individual responses to environmental changes deviate systematically from the predictions of standard economic theory. Harrison and Ross argue against both the view that neural data are irrelevant to economics as well as the view that any data are useful until proven otherwise. They are especially skeptical of the revolutionary claims of BES-style neuroeconomics, which they claim is flawed by the treatment of fMRI data as if they were first-order observations rather than products of inferential chains. Harrison and Ross conclude with the general recommendation to neuroeconomists to keep in mind that there are good reasons not to turn economics into a branch of psychology.

Michiru Nagatsu argues that part of the debate about the relevance of neuroeconomics for economics can be understood in terms of two different metaphysical stances, the

mechanistic and the functional stance. Although these stances are compatible, Nagatsu suggests that they lead to different ways of building explanatory models even when the available evidence is the same. He illustrates how the features of the mechanistic and functional stances figure in the practice of the sciences of individual decision making by considering two alternative models of framing. Alessandro Antonietti's paper investigates various kinds of correspondences between mental activities and cerebral structures that are reported in neuroeconomic studies, in particular in studies of the neurological underpinnings of financial decision-making. Antonietti argues that because of logical flaws and/or difficulties in identifying the role played by those structures, these correspondences may have a heuristic function, but are unlikely to have an evidentiary function. Finally, Jaakko Kuorikoski and Petri Ylikoski argue that too often the arguments for neuroeconomics rely on mistaken assumptions about criteria of explanatory relevance across disciplinary boundaries. Deploying philosophical insights about scientific explanation, they forcefully contend that neuroscientific findings have evidential and explanatory relevance for economics only when mediated via substantial psychological theories.

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Note

1. Gul and Pesendorfer (2008) sharply distinguish the potential relevance of neuroscientific (non-choice) data for positive economics from their potential relevance for normative economics. Another part of Caplin and Schotter (2008) is devoted to this latter theme.

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