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Recognition-based judgments and decisions: Introduction to the special issue (Vol. 1)

Julian N. Marewski*
Max Planck Institute for Human Development, Berlin, Germany

Rüdiger F. Pohl
University of Mannheim, Germany

Oliver Vitouch
University of Klagenfurt, Austria

Eine neue wissenschaftliche Wahrheit pflegt sich nicht in der Weise durchzusetzen, daß ihre Gegner überzeugt werden und sich als belehrt erklären, sondern vielmehr dadurch, daß die Gegner allmählich aussterben und daß die heranwachsende Generation von vornherein mit der Wahrheit vertraut gemacht ist.
Max Planck (1948, p. 22)

[A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it.][1]

I suppose the process of acceptance will pass through the usual four stages:
i) this is worthless nonsense;
ii) this is an interesting, but perverse, point of view;
iii) this is true, but quite unimportant;
iv) I always said so.
J. B. S. Haldane (1963, p. 464)

1 Introduction

Does a sense of recognition play a pre-eminent role when it comes to people's inferences and choices? Many studies have investigated how people make decisions based on their previous encounters with an object or situation. To illustrate this, researchers have examined how consumers rely on their familiarity with brand names when deciding which consumer goods to buy (Coates, Butler, & Berry, 2004, 2006). Several related concepts have been investigated: *recognition* (e.g., Goldstein & Gigerenzer, 2002; Schooler & Hertwig, 2005), which we use here to distinguish between *alternatives*, such as brands people believe they have heard of before and those they have not; *familiarity* (e.g., Dougherty, Franco-Watkins, & Thomas, 2008; Mandler, 1980), which is frequently used to denote the degree of recognition or knowledge a person has of an alternative; and *accessibility* (e.g., Bruner, 1957), *fluency* (e.g., Jacoby & Dallas, 1981), or *availability* (e.g., Tversky & Kahneman, 1973), which often refers to the ease or speed with which mental content comes to mind.

2 The Recognition Heuristic and the Fast and Frugal Heuristics Framework

One model that operates on a sense of recognition is the *recognition heuristic* (Goldstein & Gigerenzer, 1999, 2002; see also Gigerenzer & Goldstein, 1996). This simple, noncompensatory decision strategy can be applied to infer which of N alternatives, some recognized others not, has a larger value on a given criterion.[2] According to the heuristic, such inferences can be based solely on a sense of recognition, ignoring other probabilistic *cues* (i.e., knowledge about alternatives' attributes) a person may be able to retrieve from memory. The heuristic reads as follows: *If there are N alternatives, then rank all n recognized alternatives higher on the criterion than the N–n unrecognized ones*.

To illustrate this, if a reader of this issue wanted to know who of the authors has published more journal articles in the past (or who has a higher h-index), she could rely on the recognition heuristic and infer that those authors whose names she recognizes will have published more papers than those whose names she has never heard of before. Of course, recognition may not always help her make a correct inference. Some authors who have published a lot, but were less often cited, may remain unrecognized, while others who have published only a few but heavily cited papers may be recognized. In other words,

*Address: Julian N. Marewski, Max Planck Institute for Human Development, Center for Adaptive Behavior and Cognition, Lentzeallee 94, 14195 Berlin. Email: marewski@mpib-berlin.mpg.de.

[1] Translation by F. Gaynor, in *Scientific autobiography and other papers* (New York, 1949), pp. 33–34.

[2] Originally, Goldstein and Gigerenzer (1999) formulated the recognition heuristic as a model for inferences about two alternatives (i.e., two-alternative forced choice tasks). Recently, the heuristic has been generalized to situations with N alternatives ($N > 2$; see Frosch, Beaman, & McCloy, 2007; Marewski, Gaissmaier, Schooler, Goldstein, Gigerenzer, 2010; McCloy, Beaman, & Smith, 2008).

recognition can be treated as a probabilistic cue that is more or less helpful in this and other judgment domains.

The recognition heuristic is only one of several simple decision strategies that have been developed within the *fast and frugal heuristics framework* (Gigerenzer, Todd, & the ABC Research Group, 1999; for recent overviews, see Gigerenzer & Brighton 2009; Marewski, Gaissmaier, Gigerenzer, 2010a; for critical discussions, see Bröder & B. Newell, 2008; Dougherty et al., 2008; Evans & Over, 2010; Hilbig, in press; for replies see Gigerenzer, Hoffrage, & Goldstein, 2008; Marewski, Gaissmaier, Gigerenzer, 2010b). In keeping with many other frameworks (e.g., Beach & Mitchell, 1978; Hogarth & Karelaia, 2007; Payne, Bettman, & Johnson, 1988, 1993), this approach to judgment and decision making assumes that the mind comes equipped with a repertoire of strategies. Metaphorically speaking, this repertoire forms an "adaptive toolbox" of heuristics, each of which is hypothesized to exploit how basic cognitive capacities, such as recognition memory, represent regularities in the structure of our environment. This exploitation of basic cognitive capacities and environmental structure enables the heuristics to yield accurate judgments based on little information, say, a sense of recognition.

The recognition heuristic, for instance, can help a person make accurate inferences about an alternative's (e.g., a brand) criterion value (e.g., product quality), when a person's memories of encounters with alternatives (e.g., brand names) correlate with the criterion values of the alternatives. This is the case, for example, for our recognition of soccer teams and tennis players, which can be used to forecast their future success in sports competitions (e.g., Pachur & Biele, 2007; Serwe & Frings, 2006), as well as for our recognition of billionaires and musicians, which reflects their fortunes, and record sales, respectively (Hertwig, Herzog, Schooler, & Reimer, 2008). Also scientists' familiarity with scientific topics and concepts can be used to predict what journal articles they find interesting to read (Van Maanen & Marewski, 2009). Besides being useful in many domains, recognition is also easily accessible and surprisingly lasting (e.g., Pachur & Hertwig, 2006; Shepard, 1967; Standing, 1973). As has been suggested by Goldstein and Gigerenzer (2002) and others (e.g., Pachur & Hertwig, 2006), these remarkable characteristics make it likely that a sense of recognition plays an important role in a multitude of tasks, and in fact, there is evidence that reasoning by recognition is a common strategy not only in humans (Galef, 1987).

However, although there is some consensus in the literature that a sense of recognition represents an important psychological variable (see Pachur, Bröder, & Marewski, 2008, for an overview), the recognition heuristic, as originally formulated by Goldstein and Gigerenzer, has triggered a number of highly controversial debates about methodological, normative, and descriptive questions (e.g., Borges, Goldstein, Ortmann, & Gigerenzer, 1999; Bröder & Eichler, 2006; Dougherty et al., 2008; Frings, Holling, & Serwe, 2003; Frosch et al., 2007; Gigerenzer et al., 2008; Hertwig et al., 2008; Hilbig, in press; Hilbig, Erdfelder & Pohl, 2010; Hilbig & Pohl,2008, 2009; Marewski, Gaissmaier et al., 2009, 2010; McCloy et al., 2008; B. Newell & Fernandez, 2006; B. Newell & Shanks, 2004; Oppenheimer, 2003; Pachur, in press; Ortmann, Gigerenzer, Borges & Goldstein, 2008; Pachur & Biele, 2007; Pachur et al., 2008; Pachur & Hertwig, 2006; Pachur, Mata, & Schooler, 2009; Pleskac, 2007; Pohl, 2006; Reimer & Katsikopoulos, 2004; Richter & Späth, 2006; Scheibehenne & Bröder, 2007; Schooler & Hertwig, 2005; Serwe & Frings, 2006; Snook & Cullen, 2006; Volz et al., 2006). Some of the main questions that are under debate concern the following topics.

(1) How should the adequacy of the recognition heuristic as a model of behavior be assessed? For instance, (a) when is contradictory empirical evidence alone enough to refute this model, and when should alternative models be specified and tested against it, with the models being each other's benchmark in assessing how well each model predicts behavior, (b) how should corresponding comparative model tests be conducted, (c) what measures are valid to assess people's reliance on the recognition heuristic, (d) how can the recognition heuristic be implemented in models of memory and other models of cognition, including detailed cognitive architectures, and (e) how do such implementations specify or amend the predictions being made by the recognition heuristic?

(2) On what sort of recognition process does the recognition heuristic operate? For example, at what levels of analysis should the underlying memory variable considered to be binary or continuous?

(3) When will the recognition heuristic help decision makers to make accurate inferences about unknown quantities; for instance, (a) when will recognizing fewer alternatives be beneficial, and (b) when can the heuristic be used as a forecasting tool?

(4) When will people rely on the noncompensatory recognition heuristic, ignoring other knowledge about alternatives' attributes, and when will people switch to other decision strategies instead; for example to compensatory strategies that integrate other knowledge by weighting and adding it? To illustrate this, are people more likely to rely on the recognition heuristic when they have to retrieve all available information from memory as opposed to reading it off a computer screen or a piece of paper?

(5) How do people know when to choose which decision strategy, and how many strategies are available that people choose from in a given situation?

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(6) What are alternative conceptions to the fast and frugal heuristics framework that do not assume people to make use of a repertoire of decision strategies, or that assume fewer strategies than the fast and frugal heuristics framework, and how can such alternative conceptions' potential as descriptive and normative models be adequately tested? For instance, recent alternative approaches include the *Adjustable Spanner* metaphor proposed by B. Newell (2005), or the *Parallel Constraint Satisfaction* model proposed by Glöckner and Betsch (2008; see Marewski, in press, for a critique; see Glöckner & Betsch, in press, for a reply), but naturally, there are many other frameworks that may as well be conceived of as alternative approaches to the fast and frugal heuristics framework, including *decision field theory* (e.g., Busemeyer & Townsend, 1993), or the *heuristics-and-biases program* (e.g., Kahneman, Slovic, & Tversky, 1982; Tversky & Kahneman, 1974), to name just two.

The idea to dedicate a special issue to the recognition heuristic, and recognition-based or familiarity-based judgments and decisions more generally, was born out of these debates. Our goal was to bring together advocates and critics of the various positions, thereby highlighting and potentially resolving some of the controversial issues.

Importantly, we are not neutral in these debates. Julian Marewski tries to tie recognition heuristic research, and more generally, the fast and frugal heuristics program to detailed quantitative architectural models of cognition such as Anderson and colleagues' (e.g., Anderson et al., 2004) *ACT-R cognitive architecture* (e.g., Marewski, Gaissmaier et al., 2009, 2010; Marewski & Schooler, 2010; Van Maanen & Marewski, 2009). With respect to testing the recognition heuristic and other decision strategies, he has emphasized that they should be cast into precise, formal models and tested comparatively against each other, using formal model selection procedures such as cross validation or the minimum description length principle to compare how well each model predicts behavior. Ideally, such tests should come accompanied by models of strategy selection that allow predicting when people will use each of the decision strategies, as well as models of the memory, perceptual, motor, and other lower-level cognitive processes on which the decision strategies depend (Marewski & Olsson, 2009; Marewski, Schooler, & Gigerenzer, 2010).

Rüdiger Pohl, in contrast, considers himself a critic of the recognition heuristic and the fast and frugal heuristics program. In recent years, much of his research has focused on experimentally testing the recognition heuristic (e.g., Hilbig & Pohl, 2009; Hilbig, Pohl, & Bröder, 2009; Pohl, 2006). He argues, for example, that in many situations, people do not ignore further knowledge beyond recognition, thus he questions the hypothesis that people base decisions on recognition alone by using the non-compensatory recognition heuristic. Accordingly, he has strived to develop measurement tools to assess to what extent people may actually use the recognition heuristic (e.g., Hilbig & Pohl, 2008; Hilbig, Erdfelder et al., 2010). He also considers evidence-accumulation models (Lee & Cummins, 2004; B. Newell, 2005; B. Newell, Collins, & Lee, 2007) as a viable alternative to the fast and frugal heuristics framework. According to these models, decisions are generally not based on one cue (although they could be), but rather on the difference in evidence for the available options (Hilbig & Pohl, 2009).

Oliver Vitouch has been recruited as a catalyst and mediator for this project. After the fast and frugal heuristics program had been developed, he spent two years as a member of the fast and frugal heuristics research group (also known as ABC Research Group), where he was also in charge of moderating the group's reading and debate club. At that time, he began empirical work on the recognition heuristic himself (e.g., Zdrahal-Urbanek & Vitouch, 2006). While being convinced about the paradigmatic impact of the fast and frugal heuristics program, he holds a mixed view on its strong assumptions on how decision processes actually work in humans. At the same time, he believes that people's decision strategies will show much adaptive variability (even in the sense of protean behavior, i.e., advantageous unpredictability). Altogether, he aims to take an integrative stance, with an emphasis on the epistemic implications of the debate.

3 Surprises and lessons learned

Collaborating on compiling this special issue entailed two surprises for us. First, while we knew that the recognition heuristic represents a focus of hot debates for many researchers, we were overwhelmed by the number of submissions to the special issue. What was originally planned as one issue consisting of about 6 contributions turned into two volumes with about 20 submitted articles, some of which are still under review. All submissions were and are subject to *Judgment and Decision Making*'s peer review process, under the direction of the journal's editor, Jonathan Baron, and us. We give an overview of the two issues and the contents of this first issue below.

Second, while we knew that the special issue would represent an adversarial collaboration, we were surprised at how much we disagreed on theoretical, methodological, and editorial issues. This made it not always easy to settle on our evaluations of submitted papers and accordingly on the editorial feedback to the authors. In fact, our (and/or the reviewers') respective evaluations of the contents of some articles have been very much opposed, making it impossible to reach a consensus. In such situations, we have ended up to provide editorial feedback

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by following the evaluations embraced by the majority of us and the reviewers. While this policy has more or less worked for us, it has at times led to frustrating results for those of us who have been outvoted in the process. Even writing this editorial together turned out to represent a challenge, resulting in a text that reflects a compromise between our various positions.

Hopefully, we have learned a few things from our joint editing efforts. Of course, we knew about the specific controversies regarding the recognition heuristic and the fast-and-frugal approach in advance, and we also knew each other to some extent, but we were nevertheless surprised by our own resoluteness in several matters. We had believed that there would have been more common ground among us three on which to settle controversial issues. But rather, we were confronted with several, long-lasting, fierce debates on theoretical, methodological, and editorial issues. And instead of finding compromise positions, we sometimes defended our own positions even more strongly than before. These experiences made it clear to us that there is more to this "debate" than just different opinions on certain aspects. The debate very much resembles what is known from the traditional schools of psychology (like, e.g., psychoanalysis, behaviorism, or gestalt psychology), in which theoretical convictions were turned into dogmas that had to be defended by all means. Critical researchers were expelled. Scientists either belonged to the school or were against it. There was no common ground.

For the time being, it appears to us that the recognition heuristic and the associated fast and frugal heuristics framework will continue to be debated, not just among ourselves, but also, of course, among most involved authors and reviewers. We believe that much of the heat in the debate stems from mainly hidden sources, at least hidden to the public. These could be personal communications with critics from one or the other side, overlooked and thus not cited studies, selective reporting of contradictory results, and the like; but maybe most importantly, rather one-sided reviews. We believe this to hold true in equal degrees for all involved camps. We will take up this topic in the forthcoming second volume of the special issue, where we will discuss the various topics with more detail than in this short editorial. We thereby aim to disentangle the different sources of disagreement and still hope to thus somewhat calm the debate.

Perhaps one lesson we could all learn from our endeavor to make this adversarial collaboration happen (which was at times more adversarial than collaborative) could be to step back a little and see what the other side has to offer. This advice sounds simple, but is very hard to accomplish, as we have experienced ourselves. But at least we tried.[3]

[3]To be honest, we have simply failed to agree on what other lessons we have learned. To illustrate this, we have discussed whether debates about verbally defined concepts and notions are fruitful when it comes to the fine-grained level of analysis most behavioral studies on the recognition heuristic aspire to; for example when deriving reaction time predictions in situations in which decision, memory, perceptual, and motor processes interplay, or when discussing at what level of analysis recognition processes are binary or continuous. In the view of one of us (Julian Marewski) such debates are not fruitful; rather it may be more beneficial if verbally-defined concepts and notions were cast into detailed mathematical or computational models, making the model codes publicly available (e.g., in an online data base). Corresponding models should then not only be tested against each other, but those parts of the models that are reconcilable or emerge as winner from formal model comparisons should be developed into a single overarching formal theory. Such formal approaches lend precision to the research questions being asked as well as to the predictions being made. At the same time, it may be harder to engage in debates about jargon, when it comes to the properties of a precisely defined computational or mathematical model (on the advantages of formal modeling, see Fum, Del Missier, & Stocco, 2007; Hintzman, 1991; Lewandowsky, 1993; Marewski & Olsson, 2009; A. Newell, 1973).

4 Overview of the two special issues

Let us briefly provide an overview of the contents of the two issues. The first issue presents 8 articles with a range of new mathematical analyses and theoretical developments on questions such as when the recognition heuristic will help people to make accurate inferences; as well as experimental and methodological work that tackles descriptive questions; for example, whether the recognition heuristic is a good model of consumer choice.

The forthcoming second issue strives to give an overview of the past, current, and likely future debates on the recognition heuristic, featuring comments on the debates by some of those authors who have been heavily involved, early experiments on the recognition heuristic that were run decades ago, but thus far never published, as well as new experimental tests of the recognition heuristic and alternative approaches. Finally, in the second issue, we will also provide a discussion of all papers in the two issues, and speculate about what we should possibly learn from these papers.

In allocating accepted articles to the two issues, we strove to strike a balance between the order of submission, the order of acceptance, and the topical fit of the papers. We apologize to those authors who feel disfavored by our attempts to establish such a balance; either because they preferred to see their contributions appear in the first, or alternatively, in the second issue.

5 Contents of the first issue

Tackling a normative question, **Davis-Stober, Dana, and Budescu** (2010) mathematically lay out foundations for the recognition heuristic and related single-variable heuristics as an optimal decision strategy in a linear modeling framework. They conclude that the recognition

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heuristic does not merely represent a poor substitute for linear weighted-additive models that integrate many variables but closely approximates an optimal decision strategy when a decision maker has finite data about the world. Davis-Stober et al.'s article thus not only contributes to the recognition heuristic literature but also to the broader literature on the performance of decision heuristics that integrate one or only a few cues (e.g., Baucells, Carrasco, & Hogarth, 2008; Brighton, 2006; Czerlinski, Gigerenzer, & Goldstein, 1999; Gigerenzer & Brighton, 2009; Gigerenzer & Goldstein, 1996; Hogarth & Karelaia, 2005, 2007; Katsikopoulos & Martignon, 2006; Katsikopoulos, Schooler, & Hertwig, in press; Martignon & Hoffrage, 2002).

Also Smithson (2010), Katsikopoulos (2010), as well as Beaman, Smith, Frosch, and McCloy (2010) focus on what may be considered normative questions. They study the intricacies of the *less-is-more effect*, extending and clarifying the conditions under which this effect could be expected. The less-is-more effect was first described and formalized by Goldstein and Gigerenzer (1999, 2002). It entails that recognizing more alternatives (e.g., brand names) may lead to less accurate inferences about these alternatives (e.g., about the brands' quality) than recognizing fewer alternatives. Whether and when this effect will occur has so far been investigated in several experimental studies (e.g., Frosch et al., 2007; Pachur & Biele, 2007; Pohl, 2006; Scheibehenne & Bröder, 2007; Serwe & Frings, 2006; Snook & Cullen, 2006), as well as in mathematical analyses and computer simulations (e.g., Dougherty et al., 2008; Gigerenzer et al., 2008; McCloy et al., 2008; Pachur, in press; Pleskac, 2007; Reimer & Katsikopoulos, 2004; Schooler & Hertwig, 2005)

Using mathematical analyses, **Smithson** (2010) argues that the original conditions for the emergence of the less-is-more effect that have been proposed by Goldstein and Gigerenzer (2002) are insufficient. In doing so, he derives a more general characterization of this effect, carving out new conditions when this effect will occur and when not; for instance, when memory is imperfect. These analyses have important implications for future experimental tests of less-is-more effects.

Also **Katsikopoulos** (2010) mathematically derives a more general characterization of this effect by assuming an imperfect recognition memory. He argues that the effect can be found even if involved heuristics have low validity. In addition, he shows by simulation that the effect is predicted to be small (as has empirically been found so far). Finally, he discusses methodological problems concerning appropriate tests of the less-is-more effect and suggests a new method to examine this effect.

Beaman et al. (2010) take a closer look at the less-is-more effect, too. They derive their predictions analytically through means of a model termed LINDA (Limited INformation and Differential Access), assuming that people possess limited but relevant knowledge for recognized objects and that their access to subsets of objects may be different for different subsets. With this model, Beaman et al. provide evidence that a less-is-more effect is not necessarily an outcome of recognition-driven inferences but may also spring from knowledge-driven processes.

Taking up recent methodological discussions on how people's reliance on the recognition heuristic should be assessed (Hilbig, in press; Hilbig, Erdfelder, et al., 2010; Hilbig & Pohl, 2008; Marewski, Gaissmaier et al., 2010; Marewski, Schooler et al., 2010; Pachur et al., 2008), **Hilbig** (2010) compares four different approaches using both computer simulations and a re-analysis of existing empirical data. Focusing on a paradigm where both recognition and other knowledge is acquired naturally (i.e., outside the laboratory) and where all information has to be retrieved from memory, he intends to find a measure which provides a sufficiently unbiased estimation of the proportion of recognition heuristic use. Hilbig concludes that a multinomial processing tree model does fulfill this criterion and thus allows an adequate estimation of recognition heuristic use, while the frequently-used proportions of inferences consistent with the recognition heuristic do not.

Hochman, Ayal, and Glöckner (2010), Hilbig, Scholl, and Pohl (2010), and Oeusoonthornwattana and Shanks (2010) follow the tradition of experimental papers on the recognition heuristic, investigating how good the heuristic describes behavior (Bröder & Eichler, 2006; Hertwig et al., 2008; Hilbig & Pohl, 2008, 2009; Marewski, Gaissmaier, Schooler et al., 2009, 2010; B. Newell & Fernandez, 2006; B. Newell & Shanks, 2004; Oppenheimer, 2003; Pachur et al., 2008; Pachur & Hertwig, 2006; Pohl, 2006; Richter & Späth, 2006; Volz et al., 2006). Specifically, **Hochman et al.** (2010) use psychophysiological (finger plethysmography as a marker of arousal) and behavioral measures (choice proportions, response times, and confidence ratings) to further elucidate an already classic part of the debate, asking the question whether the recognition cue is used in a noncompensatory way, or whether additional information is integrated in a compensatory manner. They argue that their results are more in line with models that conceptualize decision processes as compensatory in nature, such as the Parallel Constraint Satisfaction model (Glöckner & Betsch, 2008).

Hilbig, Scholl et al. (2010) focus on one feature that has been proposed to be central to heuristics, namely the reduction of cognitive effort (e.g., Shah & Oppenheimer, 2008). Thus, the authors conjecture, heuristics like the recognition heuristic should be most beneficial in situations of deliberative thinking, which has been considered to be slow, stepwise, and effortful. They test this hypothesis in two experiments with two groups each, differ-

ing in their mode of thinking: intuitively versus deliberatively. In both experiments, the probability of using the recognition heuristic was higher when participants were instructed to think deliberatively rather than to think intuitively. This finding thus sheds light on the question whether heuristics should be understood as tools of intuitive thinking, adding to the ongoing debates with respect to dual system theories of reasoning (e.g., Cokely, 2009; Cokely, Parpart, & Schooler, 2009; Evans, 2008; Gigerenzer & Regier, 1996; Kahneman, 2003; Keren & Schul, 2009; Reyna, 2004; Sloman, 1996).

Goldstein and Gigerenzer (2002) proposed the recognition heuristic as a model of inference, and thus far, all experimental studies on the heuristic have focused on inference. **Oeusoonthornwattana and Shanks** (2010) investigate the recognition heuristic for the first time in preference. In two experiments, they test whether this heuristic is a good descriptive model of consumer choice. They conclude that most of their participants make choices that are inconsistent with the noncompensatory recognition heuristic; interestingly, however, a minority does seem to make choices in line with the heuristic. The article thus also contributes to the marketing and consumer choice literatures, where both compensatory and noncompensatory models of product choice are discussed (e.g., Goldstein, 2007; Hauser & Wernerfelt, 1990; Yee, Dahan, Hauser, & Orlin, 2007).

At the close of this editorial note to the first issue, we would like to express our gratitude to the many authors sharing their impressive work with us and thus accepting the intricacies of our attempt of an "adversarial collaboration". We also thank all those who have acted as reviewers for the special issues, and especially Jon Baron. He has been a tremendous source of help, offering reliable, fast, thoughtful editorial advice and support throughout the entire process.

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