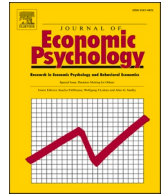


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Investigations of decision processes at the intersection of psychology and economics

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A B S T R A C T

In recent years, there has been growing interest in capturing, manipulating, and analyzing the effects of decision-making processes that underlie economic choice. This editorial discusses these recent developments by contextualizing the six contributions to the special issue “Cognition and Economic Behavior” within the broader scope of the existing literature.

1. Introduction

The choices we make are often clearly recognizable and easy to capture. When you choose to buy a book, we can easily observe the click of a button to order it online or the handing over of cash at your bookstore’s registry. But the processes inside a person’s head underlying even such mundane decisions are typically more difficult to capture. How do you go about choosing which book to buy? Do you recall hearing something good about the author, does a carefully designed cover grab your attention, or do you only choose from a subset of books that made it to a bestseller list? Classical economic theory models your book choices to reflect your (stable and well-defined) book preferences (Afriat, 1967; Varian, 1982). Hence, as the argument goes, observing your choices is sufficient to reveal your preferences.

However, in many instances, you may not evaluate all alternatives, but apply a simple heuristic, e.g., choose the first book on the bestseller list that appears new to you. You may, thus, sometimes settle on a book that would otherwise not be at the top of your priority list. While two people might end up choosing the same reading materials, their processes for deciding can be markedly different. Similarly, the same person with the same preferences may end up choosing relatively different books when relying on different choice processes. Treating all revealed choices as the same, without considering the underlying process, may therefore be misleading when extrapolating from these choices to wider theories about economic preferences. At the cognitive level, the process of deciding reflects the interplay of perception, attention and information processing, preferences and abilities, memory and reasoning converging to shape a final choice.

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This special issue focuses on the cognitive processes that constitute and guide economic decision making. The exploration of cognition in economic behavior has become a practical necessity, combining the research expertise of behavioral economics and social and cognitive psychology to offer a holistic view of human decision-making. Insights into the cognitive underpinnings of economic behavior can have far-reaching implications, from designing more effective economic policies and interventions to improving consumer experiences and predicting market trends.

Therefore, over the past two decades, economists and psychologists alike have become increasingly interested in better understanding this interplay in a variety of decision contexts, both in routine and specific economic decisions, like consumer decisions (see [Krajbich et al., 2012](#); [Zuschke, 2020](#)), and in more complex and abstract situations ranging from prosocial ([Millet & Dewitte, 2007](#); [Corgnet et al., 2015](#); [Cueva et al., 2016](#); [Jarke-Neuert & Lohse, 2022](#)) to intertemporal ([Frederick, 2005](#); [Dohmen et al., 2010](#); [Benjamin et al., 2013](#)), risky ([Andersson, Holm, Tyran, & Wengström, 2016, 2020](#); [Benjamin, Brown, & Shapiro, 2013](#); [Frederick, 2005](#); [Olschewski & Rieskamp, 2021](#); [Drouvelis and Lohse, 2020](#)), and strategic decision-making choices ([Gill & Prowse, 2016](#); [Alaoui & Penta, 2016, 2022](#); [Alaoui et al., 2020](#); [Proto et al., 2019, 2022](#)). This research agenda no longer focuses only on the choices made but uses sophisticated methods to reveal the underlying choice process (see [Schulte-Mecklenbeck et al., 2017](#); [Schulte-Mecklenbeck, Kühberger, & Johnson, 2019](#) for an overview). This includes methods to reveal information search patterns through mouse- and eye-tracking techniques (e.g., [Fiedler & Glöckner, 2012](#); [Devetag et al., 2016](#); [Konovalov & Krajbich, 2020](#); [Alós-Ferrer, Jaudas, et al., 2021](#)) or to manipulate attention (e.g., [Pachur, Schulte-Mecklenbeck, Murphy, & Hertwig, 2018](#)). Other methods manipulate the availability of cognitive resources (e.g., [Rieskamp & Hoffrage, 2008](#); [Deck & Jahedi, 2015](#); [Achtziger et al., 2016](#); [Goeschl & Lohse, 2018](#)) or focus on analyzing and modeling non-choice data that help reveal the underlying choice process or preference structure (e.g., [Alós-Ferrer & Garagnani, 2024](#); [Alós-Ferrer et al., 2021](#); [Clithero, 2018](#); [Krajbich et al., 2015](#); [Merkel & Lohse, 2019](#)). By better understanding the processes leading to similar choices or pinpointing commonalities across various choice domains, such research can more effectively discern between equally plausible explanations for established choice regularities ([Crusius et al., 2012](#)).

2. This issue

The six studies contained in this special issue approach the challenge to assess and compare different choice processes in the following ways:

[Oberholzer et al. \(2024\)](#) examine the impact of complexity on risk taking, focusing on the concept of complexity aversion and its influence on choices of simple (two-outcome) vs. complex (multiple-outcome) lotteries. Their work shows that complex lotteries were less commonly preferred when a cognitively less demanding lottery with similar or equal expected value was available. This effect is significantly smaller when simple and complex lotteries are evaluated separately rather than on the same decision screen. Complexity aversion is, thus, linked to a dislike of cognitive effort, speaking to an emerging literature on complexity in economic choice ([Oprea, 2020](#); [Kendall & Oprea, 2024](#)).

[Müller et al. \(2023\)](#) investigate the impact of different ways of presenting compliance-related information on the deterrence of tax evasion. They use MouselabWEB to trace information acquisition patterns. The study finds that providing a visual cue about the expected gains from non-compliance aligns behavior more closely with the predictions the rational deterrence model makes for risk-neutral decision-makers (i.e., EV maximization). In contrast, presenting additional verbal explanations or showing numerical EV information did not have the same effect. Information acquisition data on features such as tax and fine rates do not fully explain the differences in EV-maximizing choices across treatments. These results suggest that participants may be considering factors not explicitly presented in the decision problem, such as the ethicality and desirability of compliance, which warrants further research.

[Mondal and Traczyk \(2023\)](#) explore the relationship between numeracy and adaptive decision-making under risk, investigating whether more numerate individuals adjust their decision strategies based on the stakes involved. Contrary to the intuition that more numerate individuals might follow simpler rules in low-stakes environments compared to high-stakes ones, they find that more numerate individuals consistently choose in line with risk-neutrality (i.e., EV-maximization) under both high and low stakes. This finding aligns with the idea that exhibiting risk aversion under the small stakes typical of economic experiments is difficult to reconcile with a smooth utility-of-wealth function ([Arrow, 1971](#); [Rabin, 2000](#)) and may result from cognitive imprecision ([Khaw et al., 2021](#)). Their results also speak to the broader literature on the role of cognitive abilities and processes in risk-taking behavior (for a review, see [Lilleholt, 2019](#)).

[Amasino et al. \(2023\)](#) analyze how budget information affects consumer choices in an experimental purchasing task, using eye-tracking to understand the influence of budget constraints and individual sensitivity to budget information. They find that larger experimental budgets accelerate the choice process and increase the likelihood of purchasing an item at a given price. When changes in experimental budgets are small relative to the overall wealth of participants, price information relative to willingness to pay (WTP), rather than the experimental budget, should drive purchasing decisions unless participants engage in narrow bracketing ([Read et al., 2000](#)). Eye-tracking data reveal how participants decide between skipping and purchasing an item. Most participants initially focused on the item and quickly skipped rejected items without gathering more information on price or budget, effectively treating some items for which they previously stated a positive WTP as too costly relative to the available budget. The authors propose a two-stage choice process that begins with a fast-paced, early 'judgment of liking,' which shapes the subsequent processing of price and budget information.

[Hirmas and Engelmann \(2023\)](#) investigate how impulsiveness moderates the effects of attention on sensitivity to gains and losses in risky lottery choices. Their findings demonstrate that extending the display time of losses has minimal impact on their decision weight, while longer exposure to gains significantly enhances sensitivity to all lottery attributes. This attention effect is particularly pronounced among participants scoring highly on the Barratt Impulsiveness Scale (BIS-11), who initially undervalue all outcomes but

show increased decision weights with prolonged presentation.

Hoffmann and Hosch (2023) study the influence of memory recall on judgment errors in retrospective evaluations, focusing on the role of serial position effects and memory in shaping judgments. Their experiments reveal serial position effects in memory recall and corresponding, but less consistent, effects in averaging judgments, demonstrating that individuals recall better and weigh more heavily the first and last item observed in a series. Their research contributes to a better understanding of retrieval patterns and to the potential adaptiveness of recall biases for consumer and financial decisions.

3. Conclusion

While each of the papers in this special issue follows its own approach to address a unique research question, they share several common themes.

First, there are commonalities centered around the methodological approaches. Regarding the measurement approach to cognitive processes, we saw two trends: measuring ongoing processes of information acquisition via MouselabWEB (Willemsen & Johnson, 2019) and eye-tracking (Russo, 2019) and using manipulations of the decision set-up to trigger variations in decision processes (Bhatnagar and Orquin, 2022). Expanding the methodological toolkit of research on cognitive processes of economic decisions to assess affective or neural correlates is an area where we expect to see many developments in the future.

Further, several of the studies showed a shared theoretical basis. In modeling cognitive processes of economic decision-making, many early theoretical considerations pursue black-box approaches, proposing that decisions are made as if economic agents followed a certain decision rule (e.g., as if the decision-maker aimed to maximize utility, Friedman & Savage, 1948). With the consideration of cognitive heuristics and biases (Tversky & Kahneman, 1974), as well as the application of evidence accumulation models to economic decisions (e.g., Busemeyer & Townsend, 1993; Krajbich, Lu, Camerer & Rangel, 2012), the papers in this special issue have taken up developments of process-oriented models of economic decision making to shed light on the cognitive antecedents and processes of decisions in the context of their specific questions. For instance, by studying response times as a non-choice correlate of evidence accumulation models, the included studies evaluated statements regarding the strengths of preference. While long recognized in psychology as the chronometric effect (Cattell, 1893; Moyer & Landauer, 1967), the analysis of non-choice data such as response times is a relatively recent development in economics (Alós-Ferrer, Fehr, & Netzer, 2021; Alós-Ferrer & Garagnani, 2024; Rubinstein, 2007; Spiliopoulos & Ortmann, 2018). In doing so, these contributions made important steps in demonstrating that observations of non-choice data and manipulations of processes can be informative beyond observing choices, especially when grounded in a theoretical framework producing testable predictions, an outlook that future research may take even further.

Third, several studies investigate individual differences in variables that moderate and influence the use of different choice processes, covering numeracy and preferences for dealing with complexity. A possible complication when relating intelligence measures to other elicited measures or outcome data involves the extent of measurement error that either of the two measures can entail. For instance, studies that have investigated the relationship between cognitive ability and risk attitudes have indicated how any relationship previously documented can be spurious and driven from the fact that individuals of lower cognitive ability are more error-prone and such noisy decision-making results in erroneous elicitation of their risk preferences (Yechiam et al., 2005; Andersson et al., 2016, 2020; Mechera-Ostrovsky et al., 2022). Similarly, cognitive ability has been found to be positively correlated with choice precision and consistency (Chapman et al., 2018; Nielsen & Rehbeck, 2022). Along similar lines, individuals of lower cognitive ability have been found to suffer from more reasoning errors and inconsistent implementation of strategies in strategic interactions (Rydval et al., 2009; Proto et al., 2019, 2022). Future work on the link between cognitive abilities and economic preferences hence needs to consider and potentially mitigate the impact of measurement error by relying on more sophisticated designs, measurement techniques and/or empirical methods.

The general empirical strategies of the publications included in this special issue were twofold: they either modified cognitive processes through elements of their experimental design (such as varying presentation lengths, imposing time constraints, or using attentional cues), or traced correlates of the cognitive process with the aim of reducing unwanted perturbations. The first approach, taken for instance by Hirmas and Engelmann (2023) in this special issue through the manipulation of presentation time, is straightforward to implement and does not necessitate specialized equipment or software, making it possible to conduct studies both in laboratory settings and online. However, this method requires paying attention to potential unintended consequences that might arise from altering the reliance on specific processes, such as increased confusion regarding the experimental task (Goeschl and Lohse, 2018; Recalde et al., 2018) or the simultaneous manipulation of more than one process. Process tracing addresses some of these issues by relying on indirect correlates of the decision-making process (like fixation durations, response times, or search patterns; see Amasino et al. (2023) in this special issue for a demonstration using eye-tracking or Müller et al. (2023) relying on MouselabWEB). Both approaches require careful theoretical modeling of the decision process, its outcomes, and its correlates to enhance our comprehension further.

The contributions in this special issue also share a common commitment to good research practice and Open Science, heeding the particular requirements for studies producing rich data and using finely calibrated manipulations (Nosek et al., 2015; Simmons, Nelson, & Simonsohn, 2021; Nosek et al., 2022), and following the open data policy of JoEP (see Alós-Ferrer & Yechiam, 2020). All studies referred to an existing preregistration; data, code, and materials were made available in openly accessible repositories or in supplementary materials. At the same time, all experiments included in the special issue are based on samples drawn from Western, Educated, Industrialized, Rich, and Democratic (WEIRD) subject pools. Therefore, the generalizability of the conclusions drawn from the body of research in this special issue beyond this specific cultural context remains limited, and hence perspectives of intercultural and system-dependent influences on cognitive processes of decision making remain to be explored in future research (Henrich et al.,

2010). Further, the body of research in this special issue contains evidence both from lab and online studies, while expansions to the field remain a largely unresolved challenge, especially for studies aiming to precisely trace process data.

The papers in this special issue cover a range of choice domains. Most of the papers included focused on abstract decision making under risk or uncertainty. One application to tax compliance combined the theme of risky choice with a normative component. The two remaining studies included choices and judgments in the scope of purchasing decisions. With these varied themes, the contributions of this special issue highlight the field's sustained interest in risky choice and consumer decisions. At the same time, the potential for expanding research about cognitive processes underlying choice to other domains suggests a substantial scope for future work. Similarly, the contributions to this special issue were largely focused on individual choice, without capturing complex processes of interdependent or strategic social decisions. Assessing decision processes in which outcomes depend on others (e.g., Fiedler et al., 2013, Polonio et al., 2015), on group affiliation (e.g., Rahal et al., 2020) or on other features of social interactions is a valuable perspective for future research.

In sum, the present special issue represents a snapshot of the current state in research on cognition underlying economic decision making. We are grateful to the authors and reviewers for helping us bring together this issue and hope that it will kindle further research exploring information processing and cognitive abilities in decision research.

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