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The dynamics of deferred decision ☆

Sudeep Bhatia [a,*], Timothy L. Mullett [b]

[a] University of Pennsylvania, United States
[b] University of Warwick, United Kingdom

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ABSTRACT

Decision makers are often unable to choose between the options that they are offered. In these settings they typically defer their decision, that is, delay the decision to a later point in time or avoid the decision altogether. In this paper, we outline eight behavioral findings regarding the causes and consequences of choice deferral that cognitive theories of decision making should be able to capture. We show that these findings can be accounted for by a deferral-based time limit applied to existing sequential sampling models of preferential choice. Our approach to modeling deferral as a time limit in a sequential sampling model also makes a number of novel predictions regarding the interactions between choice probabilities, deferral probabilities, and decision times, and we confirm these predictions in an experiment. Choice deferral is a key feature of everyday decision making, and our paper illustrates how established theoretical approaches can be used to understand the cognitive underpinnings of this important behavioral phenomenon.

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1. Introduction

Cognitive models provide a powerful, theoretically constrained approach to studying preferential decision making (Busemeyer & Johnson, 2004; Newell & Bröder, 2008). These models formally describe the psychological mechanisms underlying choice, and in doing so are able to explain a variety

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* Corresponding author at: Department of Psychology, University of Pennsylvania, Philadelphia, PA, United States.
E-mail address: bhatiasu@sas.upenn.edu (S. Bhatia).

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of behavioral findings, including decoy effects, reference dependence, anchoring effects, and risky choice effects (Bhatia, 2013, 2014; Bogacz, Usher, Zhang, & McClelland, 2007; Busemeyer & Townsend, 1993; Diederich, 1997; Glöckner & Betsch, 2008; Pleskac & Busemeyer, 2010; Rangel & Hare, 2010; Roe, Busemeyer, & Townsend, 2001; Stewart, Chater, & Brown, 2006; Trueblood, Brown, & Heathcote, 2014; Usher & McClelland, 2004). For this reason, cognitive models are rapidly replacing traditional utility-based approaches as desirable theoretical tools for understanding preferential choice behavior (see Oppenheimer & Kelso, 2015 for a discussion).

Theories of decision making within the cognitive tradition typically make predictions about choice probabilities, decision times, attention to external information or information stored in memory, and judgments of confidence. These are some of the most important behavioral, cognitive, and metacognitive outcomes in a decision, and modeling these outcomes is necessary in order to characterize the choice process. That said, many existing theories of decision making are incomplete. They are largely unable to capture the causes and consequences of choice deferral, that is, the decision to disengage from the choice task without selecting any available options (but see Busemeyer, Johnson, & Jessup, 2006; Jessup, Veinott, Todd, & Busemeyer, 2009; White, Hoffrage, & Reisen, 2015). The failure to decide is a fundamental feature of everyday preferential decision making. Most consumer, financial, health, food, and entertainment choices are not forced, and decision makers can often wait to make the choice at a later point in time, or even completely avoid the choice in favor of the status quo or default.

The importance of deferral as a decision outcome was recognized by Tversky and Shafir (1992) who showed that the probability of choice deferral reduces in the presence of dominated decoys. Since then a large literature in psychology and marketing has attempted to characterize the determinants of choice deferral, and the consequences of allowing choice to be deferred (see Anderson, 2003; Chernev, Böckenholt, & Goodman, 2015; Scheibehenne, Greifeneder, & Todd, 2010 for reviews). This work has established that the likelihood of choice deferral depends not only on dominance relations, but also on variables such as option desirability, attribute commonality, and attribute alignability (e.g. Chernev, 2005; Chernev & Hamilton, 2009; Dhar, 1997; Dhar & Sherman, 1996; Gourville & Soman, 2005; White & Hoffrage, 2009; White et al., 2015; also Tversky & Shafir, 1992). Additionally the mere presence of deferral as a feasible outcome in the choice task can affect the relative choice probabilities of the available options, and reverse certain behavioral effects (Dhar & Simonson, 2003).

Formally modeling choice deferral involves a departure from the assumption of forced choice, which is standard in cognitive decision making research. Besides this, it fits very cleanly into the general decision modeling paradigm. Many existing models of decision making already make explicit predictions regarding variables such as dominance, desirability, attribute commonality, and attribute alignability; variables that also characterize the determinants and consequences of choice deferral. It may be possible to modify one of these models to successfully predict key findings regarding choice deferral.

We find that this is indeed the case. In this paper, we study the properties of a deferral-based time limit, initially suggested by Jessup et al. (2009). This mechanism applies to sequential sampling models, for which it generates deferral when a decision threshold is not crossed by a particular time. In the first part of the paper we implement this time limit in Bhatia's (2013) associative accumulation model (AAM), which serves as a convenient back-end model for studying the relationship between deferral and the various features of the choice set. Using the choice options and parameter values assumed in Bhatia (2013) we find that the proposed mechanism is able provide a parsimonious explanation for eight different existing behavioral effects regarding choice deferral. AAM is not the only back-end model that is able to account for these effects, and we show that a more restricted variant of AAM, a leaky competitive accumulator (LCA) model (Usher & McClelland, 2001) can capture four of these effects (and indeed, that these four effects emerge from the assumptions AAM adopts from LCA).

Additionally, our assumption of a deferral time limit within a sequential sampling model makes strong, general predictions regarding decision times, and their relationship with choice and deferral probabilities. These predictions are largely independent of the specific sequential sampling model used to specify the accumulation process, and thus hold for AAM, LCA, and a number of related models. In the second half of the paper we develop a behavioral task to test these predictions. In this experiment subjects make choices both with and without the option to defer, thus allowing us to make the

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