



How short- and long-run aspirations impact search and choice in decisions from experience [☆]



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ABSTRACT

To what extent do people adapt their information search policies and subsequent decisions to the long- and short-run consequences of choice environments? To address this question, we investigated exploration and exploitation policies in choice environments that involved single or multiple plays. We further compared behavior in these environments with behavior in the standard sampling paradigm. Frequently used in research on decision from experience, this paradigm does not explicitly implement the choice in terms of the short or long run. Results showed that people searched more in the multi-play environment than in the single-play environment. Moreover, the substantial search effort in the multi-play environment was conducive to choices consistent with expected value maximization, whereas the lesser search effort in the single-play environment was compatible with the goal of maximizing the chance of winning something. Furthermore, choice and search behaviors in the sampling paradigm predominantly echoed those observed in the single-play environment. This suggests that, when not instructed otherwise, participants in the sampling paradigm appear to favor search and choice strategies that embody short-run aspirations. Finally, the present findings challenge the revealed preference approach in decisions from experience, while also suggesting that information search may be an important and potentially even better signal of preference or aspirations than choice.

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1. Introduction

Choices between uncertain options can be interpreted as representing either single-play or multi-play decisions. A lottery ticket, for instance, represents a single-play decision; its entry price entitles the player to exactly one play of the lottery. A choice to buy car insurance, on the other hand, guarantees against repeated plays of a gamble that is realized each time the car is driven. More generally, decisions to buy products that will be consumed either once (e.g., a dinner in a gourmet restaurant) or many times (e.g., a pair of running shoes) involve different time horizons. These may, in turn, prompt differences in the decisions made as well as in the information needed to render a decision. For illustration, consider the offer that Nobel-prize winning economist Paul Samuelson

(1963) once made his lunch partners: “to bet each \$200 to \$100 that the side of the coin *they* specified would not appear at the first toss” (p. 50). One colleague, whom Samuelson identified as a distinguished scholar but otherwise granted anonymity, responded to the offer by saying: “I won’t bet because I would feel the \$100 loss more than the \$200 gain. But I’ll take you on if you promise to let me make 100 such bets” (p. 2). Samuelson (1963) considered his colleague’s preference to be inconsistent with expected utility theory and, by extension, to be irrational (a fallacy of large numbers): “. . . no sequence is acceptable if each of its single plays is not acceptable” (p. 3).

More recent analyses, however, have concluded that models of expected utility theory—by many considered *the* normative theory of individual decision making—can in fact capture the colleague’s preference for safety in numbers, assuming that the 100 bets are aggregated to a single choice. Ex ante aggregation brings the final distribution of potential payoffs of a gamble much closer to its expected value and accordingly reduces in the above example the likelihood of a loss (Aloysius, 2007; Kahneman & Lovallo, 1993; Wedell, 2011; see also Peköz, 2002). Thus, in decisions under uncertainty, single-play and multi-play choice environments

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effectively entail different payoff distributions. A single utility function can thus be consistent with both preferences of Samuelson's colleague, as well as the general observation that the higher expected value option is preferred in multi-play but not in single-play situations (Aloysius, 2007; Montgomery & Adelbratt, 1982).

What is less well understood—and the focus of this article—is how people respond to single- and multi-play environments in which they first have to search for information before making a choice. We address this question by implementing the two choice protocols described in Samuelson's anecdote within the sampling paradigm, a popular design used in research on decisions from experience (Hertwig, Barron, Weber, & Erev, 2004; Hertwig & Erev, 2009). In the sampling paradigm, people first explore the possible outcomes¹ of risky options in a self-directed and self-terminated sampling process before making a decision based on their sampled experience.

By investigating information search and choice, we can add search as a new dimension to the analysis of the effects of single-play and multi-play choice environments (DeKay & Kim, 2005; Montgomery & Adelbratt, 1982; Redelmeier & Tversky, 1992; see Wedell, 2011, for a brief review). Our investigation will also permit us to further analyze a recently discovered relationship between information search and choice that may originate from the pursuit of short-run versus long-run aspirations (Hills & Hertwig, 2010). Finally, systematic differences in information search between single- and multi-play environments will help us to further understand how preferences, as revealed by choices, are further impacted by the search that precedes them—a problem that generalizes to all tasks in which the actually experienced environment is a function of the organism's information search.

In the following, we first review pertinent empirical literature about expected utility in relation to single- and multi-play decisions. We then review findings on information search in decisions from experience, before describing how we link these lines of research.

1.1. Aspirations and the importance of expected utility in single- and multi-play decisions

References to expected utility often invite one to say, subtly and under one's breath, 'long-run' expected utility. Some may argue that the addition of 'long-run' is redundant. Given the broad class of single-play decisions where expected utility does not immediately apply (Lopes, 1981), however, we would not agree. An offer to pay \$5 to play once a gamble that pays off \$100 with probability .1 and \$0 otherwise will leave the gambler poorer by \$5 nine times out of ten (Fig. 1). This is true regardless of the amount of the non-zero payoff, be it \$100, \$1000, or even \$100,000. However, the opportunity to play this gamble 100 times increases the probability of coming out ahead to above 50% (by 'coming out ahead,' we refer to the short-run aspiration of winning any non-zero amount). Anyone with a strict requirement of more than a non-zero return on their investment should avoid the single-play gamble, because in most realizations it will lead to losses.

The importance of achieving a minimal aspiration and its role in explaining many choice anomalies has been well explored (Koop & Johnson, 2012; Lopes, 1996; see also Lopes & Oden, 1999). The key argument is that many of the mathematical prosthetics added to expected value theory (e.g., polynomial utility functions and subjective probability curves) are unnecessary if one considers that

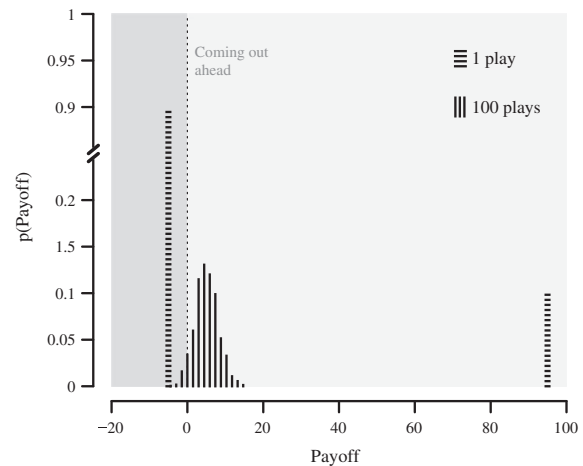


Fig. 1. The influence of 1 play versus 100 plays on the probability distribution of payoffs at the end of play. Results for a single-play gamble costing 5 to play and promising an outcome of 100 with a probability of .1 and otherwise 0. The results for the multi-play gamble reflect the expected payoff per single play (each costing 5) of that gamble.

in many situations it may not be rational to pursue the expected value or long-run expected utility, but rather “the probability of coming out ahead” (Lopes, 1981, p. 377)². Indeed, studies investigating peoples' choices of single- and repeated-play gambles have found fewer violations of expected utility theory when people play repeatedly than when they play once (Camilleri & Newell, 2013; Keren, 1991; Keren & Wagenaar, 1987; Liu & Colman, 2009; Wedell & Böckenholt, 1990, see Caraco, 1980; Houston & McNamara, 1999; Stephens, 1981, 2001, for a similar discussion in behavioral ecology).

According to this line of theorizing, single-play and multi-play trigger short- and long-run aspirations, with short-run aspirations indicating an increased preference for the option that is most likely to come out ahead and long-run aspirations favoring the option offering the higher expected value. Yet, let us emphasize that aspirations are not the only way to conceptualize behavior across single-play and multi-play choice (Aloysius, 2007; Langer & Weber, 2001; Lopes, 1996; Tversky & Bar-Hillel, 1983; Wedell, 2011). For instance, any mechanism explaining risk aversion, that is, the preference for the option with the lower variance, is under most circumstances also capable of explaining differences in choice (but not in search), even when the expected values of single- and multi-play scenarios are the same (as in Fig. 1). Such explanations include non-linear transformations of outcomes and non-linear transformations of probabilities (Kahneman & Tversky, 1979; see Wedell, 2011).

1.2. The relation between aspirations and information search

Assuming that decision makers conceive of single- and multi-play environments differently, then one may ask whether and how the process of information acquisition differs across these environments. If decisions and decision rules in these different

¹ In what follows, we use the term *outcomes* to refer to the set of values that could result from choosing an option or that are experienced in the process of sampling from an option. The term *payoffs*, in contrast, refers to the monetary consequences of choosing an option and that are contingent on the payoff scheme employed.

² The short-run aspiration of maximizing the chance of coming out ahead has sometimes been used interchangeably with the aspiration of maximizing some percentile of the outcome distribution (e.g., the median). Although both criteria would essentially produce identical predictions in our study, we focus on the aspiration of coming out ahead for two reasons. First, for two-outcome gambles as used in our study, the median is not well-defined. Second, the aspiration of maximizing the chance of coming out ahead corresponds more closely to the short-run criteria implemented in the literature on risk-sensitive foraging (e.g., Stephens, 2001).

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