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The effect of unpleasant experiences on evaluation and behavior

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ABSTRACT

Analyses of the impact of unpleasant experiences reveal two contradictory effects: direct studies of experienced utility reflect overweighting the peak (rare and most extreme) experience, but studies of decisions from experience reflect underweighting of the peak and reliance on the frequent experiences. The present research highlights the role of two contributors to this pattern. First, the results suggest that evaluations are more sensitive to rare events than decisions. It seems that the implied weighting of the peak experiences is a reflection of beliefs that affect evaluation and decisions in different ways. Second, the results show clear indications of underweighting rare events in ongoing decisions, but not in planning decisions. This pattern can be explained with the assertion of beliefs concerning the probability of the peak event is approximately accurate on average, but it changes from trial to trial. The potential value of these results is highlighted with a discussion of safety enhancement in industrial settings.

1. Introduction

Human responses to the risk of potential catastrophes and rare accidents reflect an apparent inconsistency. In many cases people express high sensitivity to low probability risks, but behave "as if" they ignore them. For example, most drivers indicate that passing on a two-lane road is a risky maneuver, but often still take the risk (Harris, 1988). Similarly, people report that they backup their computer less often than necessary (Yechiam et al., 2006). The robustness of the two distinct tendencies, suggested above, is reflected in the difference between two lines of research: the study of experienced utility (Kahneman, 2000; Kahneman et al., 1997), and the study of decisions from experience (Barron and Erev, 2003).

Direct studies of experienced utilities reveal that the human reaction to sequences of experiences reflect high sensitivity to the peak (extreme) and the end (final) experiences, and limited sensitivity to the duration of the sequence (Fredrickson and Kahneman, 1993).[1] This pattern, known as the "peak-end rule," has been documented in studies that focus on a range of unpleasant experiences including: listening to aversive sounds, watching aversive film clips, and suffering monetary losses (Kahneman et al., 1993; Langer et al., 2005; Redelmeier et al., 2003; Schreiber and Kahneman, 2000). The indication of the "peak effect" part of the "peak-end pattern" comes from studies that examine the relationship between online and global

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[1] Follow up research also highlight the importance of the change over time (e.g., Ariely and Carmon, 2000; Ariely and Loewenstein, 2000).

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evaluations. For example, in a typical study (Fredrickson and Kahneman, 1993), participants were asked to provide online evaluations and a global evaluation of aversive film clips. Each clip had a long and short version. The correlation between the peak of the online evaluations and the global evaluation was 0.77. The correlation between the global evaluation and the clip duration (a proxy of the objective pain) was only 0.13. This pattern could be a product of a tendency to recall the extreme experiences rather than the more typical ones (Morewedge et al., 2005).

In contrast to the above, studies on experience-based decisions suggest that humans and other animals tend to focus on the frequent outcome and neglect the rare peaks (Barkan et al., 1998; Barron and Erev, 2003; Hertwig et al., 2004; Erev and Barron, 2005; Shafir et al., 2008; Ungemach et al., 2009; and see a related observation in Taleb, 2007). In certain cases, decision makers prefer the alternative that most frequently leads to the best outcomes over the alternative that maximizes expected payoff. For example, in one of the conditions studied by Barron and Erev (2003) participants were asked to minimize losses in 400-trial experiments. They were asked to choose between one of two unattractive alternatives in each play. Each choice of Alternative H led to a loss of 3 agorot (1 agora = 0.01 sheqel $\approx$ 25 US cents) while a selection of Alternative L led to a loss of 32 agorot with probability 0.10, and to a payoff of 0 otherwise. Participants did not receive a description of the relevant payoff distributions and had to rely on their personal experience – the feedback they received after each choice. The results reveal a tendency to prefer Alternative L: that is, the typical choice reflects a preference for the alternative that yields better outcomes most of the time, even when this alternative was associated with a lower expected payoff and the worst peak experiences. In addition, recent research shows that experience leads people to underweight rare events even when they can rely on an accurate description of the incentive structure (Yechiam et al., 2005; Jessup et al., 2008; Lejarraga and Gonzalez, 2011; Teoderescu et al., 2013; Teodorescu and Erev, 2014).[2] This effect can result from a tendency to rely on a small sample of experiences (Kareev, 2000; Fiedler, 2000; Hertwig et al., 2004; Selten and Chmura, 2008). Reliance on small samples implies a "frequency effect" (i.e., underweighting of the rare peak event) because rare events are likely to be underrepresented in most samples of this type.

Reliance on small samples, in turn, can be the product of cognitive limitations, or the belief that only a subset of the experiences should be considered. Cognitive limitations can trigger reliance on small samples when dealing with larger samples is too costly (Fiedler, 2000; Hertwig and Pleskac, 2010; Kareev, 2000). Beliefs that can lead to reliance on small samples include: the assumption that the outcomes of the different actions depend on the state of nature; that the state changes over time; and that the agent can discriminate between the different states. Under these, and similar beliefs, not all the past experiences should affect the next choice; only the subset of these experiences that occurred under the current state should be considered (see Gonzalez et al., 2003; Biele et al., 2009).

2. Research hypothesis

The main goal of this paper is to improve our understanding of the effect of extreme experiences on behavior. Specifically, we examine the role of two classes of likely contributors to the difference between studies of experienced utility, which reveal oversensitivity to extreme experiences, and studies of decisions from experience, which appear to reflect the opposite bias.

The first class of contributing factors involves the effect of the subject's beliefs on expressed evaluations. We propose that expressed evaluations of experienced utilities may not be identical to the "true experienced utilities;" they can also be affected by the subject's belief. One example is the belief that complaining (using extremely low ratings) can lead to more attractive experiences in the future (Yechiam et al., in press). Another example is the subject's beliefs concerning the distributions of the attractiveness of future experiences: when the evaluation scale is bounded, pessimistic subjects, who expect the future experiences to be worse than the past experiences, may want to keep the low values of the scale for these future experiences (see Unkelbach et al., 2012).

The current "beliefs affect stated utilities" hypothesis explains the coexistence of the peak effect and underweighting of rare events as a result of differences between evaluations and decisions. The peak effect, under this explanation, is a result of beliefs that affect stated utilities but do not reflect the true utilities that drive choice behavior. This explanation is consistent with the observation that studies of experienced utility demonstrate that the peak-end rule captures evaluations and decisions, but the "peak effect" aspect of this rule was only demonstrated in studies of stated evaluations.

A second class of contributing factors involves factors that lead subjects to feel that the probability of the peak event varies from trial to trial. To clarify this "variability between trials" hypothesis consider an agent that, on average, exhibits high sensitivity to peak negative experiences. She truly feels that these experiences are at least as common as their objective occurrence rate, and she finds them particularly unpleasant. In addition, the agent tends to believe that the probability of these events changes from trial to trial. Specifically, it is very high in some trials, but very low in most trials. This hypothesis is consistent with studies that examine probability estimates in decisions from experience tasks. For example, in one of the conditions run by Barron and Yechiam (2009) participants faced a repeated decision task between a sure gain of 2.7 and a gamble with the same expected loss that led to a gain of 3 in 85% of the trials, and a gain of only 1 (the rare event) in the other 15% of trials. Participants were asked to estimate the probability of the rare outcome (only 1) before 200 of the trials.

[2] In addition, several studies document a tendency to underweight rare events in one-shot decisions based on free sampling of the payoff distributions (Hertwig et al., 2004). Yet, in the free sampling the bias is less robust; it is not observed when the possible payoffs are described (Gottlieb et al., 2007).