



The effect of experience on using a safety device

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Abstract

Recent experimental research suggests that decision makers tend to overweight low-probability outcomes in choices based on a description of the possible outcomes, but tend to underweight low-probability events in decisions from experience. The current paper argues that these tendencies imply that in certain cases people buy safety devices and plan to use them, but fail to do so. A study of Israeli drivers shows that the majority of the respondents who bought a safety device for the car (a car radio with a detachable panel), “learned” to stop using it within a year after purchasing the device. This finding is discussed in the context of the expected effect of insurance and different safety enhancing interventions.

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1. Introduction

Empirical studies of safety related decisions reveal an interesting difference between “using” and “buying” decisions. On one hand, individuals often fail to use safety devices even when the usage of these devices is likely to be beneficial (see e.g., Zohar, 2000). This behavior can be described as reflecting risk seeking and/or underweighting of rare

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(low-probability) aversive outcomes. On the other hand, individuals tend to buy insurance even when the expected value of this action is negative. This behavior can be described as risk aversion (see [Bernoulli 1738/1954](#); [Schade et al., 2003](#)) and/or as overweighting of rare events (see [Kahneman and Tversky, 1979](#)).

According to the economic explanation of this pattern, the two tendencies may balance each other. That is, if the insurance premium is cheaper than the cost of taking safety measures, rational considerations might lead individuals to buy insurance and behave recklessly. In fact, a classical moral hazard problem is that coverage against a loss may increase the risk-taking behavior of the insured ([Milgrom and Roberts, 1992](#); see also [Johnson, 1996](#)). Prospect theory ([Kahneman and Tversky, 1979](#)) implies a second contributing factor to the empirical pattern. It suggests a discontinuity around zero of the probability weighting function. As a result, decision makers neglect or underweight outcomes that occur with very small probabilities (like the probability of an accident in a particular moment) and overweight slightly more probable rare outcomes (like the probability of a car theft during a particular year).

The main goal of the current paper is to highlight the importance of two additional contributors to the tendency to buy insurance-like products but behave recklessly. The first contributing factor considered here is a presentation effect: When a low-probability event is explicitly presented, it is likely to be overweighted. A second contributing factor is the tendency to rely on recent personal experience (see [Barron and Erev, 2003](#); [Yechiam et al., 2005](#)). Since low-probability events are not likely to occur “recently,” the availability of personal experience tends to reduce the weighting of these events. This pattern implies lower weighting of small-probability aversive outcomes in “small” repeated decisions (like the decision not to use safety devices) than in “bigger” decisions (like the decision to buy safety devices).

The paper starts with a brief review of recent experimental research that demonstrates the contradicting effects of presentation and experience. A study of Israeli drivers evaluates the implications of these effects to real-world safety related decisions. In certain settings drivers tend to buy safety devices (detachable car radio panels), but the tendency to use these devices decreases with experience. That is, while decision makers exhibit high sensitivity to the low-probability aversive outcomes (radio theft) in initial using decisions, this sensitivity decreases with experience. The paper is concluded with a discussion of the implications of the current findings to the expected effect of insurance and safety interventions. It appears that to some extent, the effects can be utilized by designers of safety related devices and interventions.

2. Description and experience-based decisions

Laboratory studies show different weighting of low-probability events in different types of decisions. This section provides a brief summary of the different types of decisions studied. It then discusses how the experimental literature may be generalized to real-world situations involving the response to low-probability events (e.g., a work accident or a theft) by using safety products.

In description-based decisions, decision makers typically select one of the possible prospects based on descriptions of their payoff distributions. For example, in the studies used to validate prospect theory ([Kahneman and Tversky, 1979](#); [Tversky and Kahneman, 1992](#)), decision makers were presented with problems of this type:

tries to address this difficulty by postulating two effects, that of explicit presentation and that of experience.

Explicit presentation involves a verbal description of the choice problem. Relevant examples are choices among alternative safety products or insurance policies. Explicit presentation is likely to trigger a representation of the aversive outcomes because when decisions are presented explicitly, they are presumably more elaborative and conscious (see [Deshon and Alexander, 1996](#); [Rasmussen, 1982](#); [Ryan, 1970](#); [Thorndike and Rock, 1934](#)). A similarity in the effect of explicit presentation and the choice regularities observed in decisions from descriptions is therefore expected, since at least part of the tendency to overweight small-probability outcomes in decisions from description is assumed to be a product of a perceptual bias (see [Kahneman and Tversky, 1979](#)), uniform initial beliefs ([Viscusi, 1989](#)), and/or an attention bias (see [Birnbaum, 1997](#)). According to this interpretation, the mere consideration of a possible aversive outcome increases the weight it receives. Therefore, this effect is likely to emerge in explicitly presented decisions. For example, it is hard to ignore the outcome of “radio theft” while comparing radios with different security features.

A second postulated effect is that of personal experience. Several studies ([Barron and Erev, 2003](#); [Erev and Barron, 2005](#); [Hertwig et al., 2004](#); [Yechiam and Busemeyer, 2005](#)) have suggested that the insensitivity to low-probability events can be a product of a tendency to rely on recent personal experience. When the aversive outcome is of low-probability, most exposures to risk are likely to be associated with good outcomes. Thus, a tendency to base future decisions on recent outcomes implies insensitivity to low-probability events. In the current setting, this process reduces the tendency to behave cautiously.

Notice that the effects of presentation and experience may contradict each other. The current interpretation of the experimental research, summarized above, suggests that the weighting of low-probability events increases with explicit presentation and decreases with experience. This interpretation provides two clear predictions of common safety related decisions: First, it predicts higher sensitivity to low-probability aversive outcomes in “buying” and “planning” decisions than in routine “using” decisions. This prediction is based on the assertion that in typical buying and planning decisions, the low-probability events are explicitly presented. Accordingly, it is hard to avoid the reference to low-probability events when selecting among safety devices. The second prediction involves the effect of experience. The current analysis predicts that personal experience with a particular safety problem reduces the tendency to take safety measures. A study summarized below tests these predictions.

3. Study: detachable radio panels

This study evaluates the assertion that in certain cases people may buy safety devices, but “learn” not take the necessary measures to benefit from them. The study focuses on detachable radio panels. The detachable radio panel is an example of a safety device (against theft) that can be effective only when it is used (detached).

Notice that the main role of a detachable panel to a car radio is its value as a safety device. The decision not to detach the panel is made without explicit presentation and is likely to be shaped by repeated experience. Thus, the current analysis predicts a decrease in the tendency to use the panel with experience, since the small probability of theft is underweighted.

Table 1
Questionnaire items and aggregate responses on the topic of buying and using detachable car radios ($n = 57$)

Item	Question	Results
1	Did you buy a detachable or permanent radio?	55 (96%) detachable 2 (4%) permanent
2	Did you have the option to choose between the two types of radio?	51 (89%) yes 6 (11%) no
3	To your best recollection which type of radio was more expensive?	55 (96%) detachable 2 (4%) permanent
Answer the following questions only if you bought a detachable radio		
4	In the first 2 weeks after buying the radio, when leaving the car, with what frequency did you detach the panel? (7 point scale, 1 = Never 7 = Always)	Mean = 5.4 SD = 3.8 24 (42%) Never
5	About a year after buying the radio, when leaving the car, with what frequency did you detach the panel? (7 point scale, 1 = Never 7 = Always)	Mean = 3.5 SD = 4.9 42 (74%) Never

3.1. Method

Participants: Fifty-seven Technion students (35 males and 22 females) volunteered to fill out the questionnaire whose items appear in Table 1 after indicating that they had, at some time, purchased a car radio for their vehicle.

Measures: Participants were asked to fill out the questionnaire that appears in Table 1. They were asked if they had bought a detachable radio panel, and whether it was more expensive than a permanent panel. Next, participants were required to report the frequency that they detached the panel in the first 2 weeks after buying it, and a year later.

3.2. Results

The results (see Table 1) show that when buying a radio the majority (96%) preferred the type with a removable panel even though it was remembered as being more expensive. Item two in Table 1 shows that the majority of responders had a choice between the two types of radio.

Those who bought a detachable radio tended to remove it frequently in the first 2 weeks. The mean response for frequency of detaching was 5.4 (on a scale of 1–7). However, the mean response for detaching after 1 year falls to 3.5. This difference is highly significant ($t(54) = 7.25, p < 0.001$). A similar pattern was observed in an additional analysis without the respondents who did not have the option to choose between the two types of radio ($t(48) = 6.86, p < 0.001$ in this analysis).

In addition to the mean response, we also examined the proportion of individuals who reported that they did not use the removable panel at all (reported: “Never”) in the different time periods. Only 42% of the participants did not use the panel at all in the first two weeks as compared to 74% who did not use it a year later. The proportion difference was highly significant ($Z = 3.48, p < 0.001$). That is, responders behaved as if they gave more

weight to the probability of theft in their initial using decision than in their using decisions after a year of experience.

4. Discussion

The effect of experience on using a safety device was demonstrated in a study that examined the choice to buy and use a detachable radio panel. It was found that, whereas the majority of drivers chose to buy the panel and to make some initial use of it, most drivers stopped removing the panel after a year of experience. Note that the most direct comparison is between the initial use decision and the use after year. As predicted, more experience on the part of drivers was associated with less effective use of the safety device. The buying decision can be attributed to the presentation effect, but it might also be affected by social influence and prestige factors.

More generally, the present paper suggests that psychological mechanisms may increment economic considerations in explaining the observation that people buy safety devices but fail to use safety-measures. Based on laboratory studies (e.g., Kahneman and Tversky, 1979; Barron and Erev, 2003), it was argued that people are much more sensitive to negative rare events in decisions that are presented explicitly, and when they have none or little personal experience with the relevant choice. Accordingly, the tendency to buy safety devices is facilitated by the availability of explicit presentation of the relevant risks. However, experience may reduce the tendency to use those safety devices (e.g., in earthquake insurance; see Kunreuther, 1996; Weinstein, 1989).

The use of safety measures represents a situation where both factors may lead to riskier behavior. In the use of safety measures decision makers often gain experience. Moreover, the choice often does not include an explicit presentation either inherently (e.g., in the case of a detachable radio panel) or because decision makers refuse to be exposed to the same information over and over again (see Ariely, 2000). In an attempt to illustrate the potential importance of this pattern we chose to conclude with a discussion of three related predictions.

Designing safety devices: The present results suggest that in certain cases people are willing to buy safety devices, but fail to use them. This observation implies that safety can be facilitated by the design of safety devices that do not require active users. One example of a move in this direction is provided by the recent development in software updating and virus protection procedures. The observation that users do not update their software to protect it from computer viruses (fail to use the available safety device), led software designers to develop automatic updating procedures (see Yechiam et al., 2002).

The enforcement of safety rules: One of the main difficulties in enforcing safety rules in industrial settings comes from workers' reactions. In many cases, the workers feel that obeying the rules is not an efficient strategy to get the work done (e.g., Lawton, 1998). The current results suggest that the resentment of the workers can be reduced if the introduction and/or discussion of the rules occurs before the workers gain experience with behavior that violate these rules. In this case, the workers are likely to make description-based decisions and see the value in the rule and the suggested enforcement system.

The effect of insurance on reckless behavior: From the point of view of policy makers, the availability of high-quality insurance against accidents is expected to have desired and undesired consequences. The desired consequences involve improved fairness and helping the unfortunates. The unfortunate individuals that will be injured will receive better

treatment. The undesired consequences involve the cost of the policy and the possibility that the availability of the good insurance increases the economic attractiveness of reckless behaviors (Milgrom and Roberts, 1992).

Thus, in designing efficient insurance systems policy makers have to evaluate and weight the two types of consequences. The current results can be relevant to this evaluation process. They suggest that the effect of the quality of the insurance on reckless behavior may not be as large as predicted under the assumption of rational agents. To the extent that reckless behavior is a result of underweighting of rare events in experience-based decisions, the negative effect of a better insurance policy is expected to be small. Additional research is necessary in order to improve our understanding of the relative importance of the two factors.

5. Conclusion

Human sensitivity to negative low-probability outcomes appears to be affected by the explicitness of the presentation and the availability of personal experience. This pattern can lead to maladaptive behavior. One example is the investment in safety devices and a failure to use them. Nevertheless, this pattern can also lead to desirable outcomes, such as overcoming fear of aversive stimuli (see Kleinknecht, 1982). The current analysis suggests that a better understanding of this pattern can be used to derive constructive methods to facilitate safety.

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