Value Atrophy in Consumer Assessment of Risky Options

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We show that perceived value (negative or positive) of a risky option decreases upon addition of further risky prospects of the same valence. As a result, consumers can perceive normatively more dangerous (beneficial) options to be less dangerous (beneficial), and normatively less dangerous (beneficial) options to be more dangerous (beneficial).

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What’s Risky? New Perspectives on “Risk” Aversion
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Paper #1: Risk is Weird
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Paper #2: Gamblers Are Fun (But They Aren’t Risk Takers)
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Paper #3: The Unattractiveness of Hedges: Implications for the
Conception of Risk Preferences
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Paper #4: Value Atrophy in Consumer Assessment of Risky
Options
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SESSION OVERVIEW
Psychologists, economists, and marketing researchers spend significant amounts of effort thinking about risk preferences, and for good reason. It helps us develop normative theories about how we should use our time and money and descriptive accounts of how others actually do use theirs. But are researchers and practitioners focusing on the right things? What are we really capturing when we ask people to consider uncertain outcomes?

Risk assessment has traditionally been characterized by a mental balancing of probabilities and outcomes, and changing these parameters has been thought to influence our perceptions of a prospect. While this is certainly part of the story, we wonder what else changes simultaneously with risk that can cause shifts in preferences. How much of risk preference is really related to risk itself, and how much is caused by these other changes? The four papers in this session examine this more closely and propose alternative drivers of “risk preferences” beyond risk per se.

Why would putting a gift card inside of a box reduce its value by 30 percent? Mislavsky and Simonsohn propose that some forms of risk aversion are simply negative reactions to “weird” scenarios or unusual mechanisms. In four experiments, they show that, even in the absence of objective risk, mechanisms used to introduce uncertainty lower valuations.

When is a quarter worth less than nothing? Kelly and Simmons investigate why people would rather say “no” to a gamble than “yes” to $0 and why giving up a gamble for $0 is more attractive than giving it up for $0.25. Ultimately, framing gambles differently (e.g., as a yes/no proposition or as a choice between action and inaction) and altering compensation for not gambling changes risk preferences in counternormative ways, in part because people believe that accepting different types of gambles says different things about their personalities.

Why would somebody prefer a drug that may cause cancer and constipation to one that may only cause cancer? Khan and Kupor show that “value atrophy” causes prospects to appear less risky when additional risky outcomes are added. This occurs because increasing the number of outcomes decreases the perceived probability of any individual outcome and holds in the domains of both positive and negative outcomes.

Why are people reluctant to pay for a sure thing? Frederick, Meyer, and Levis explore why people who are told that they will win $10 if a coin flip comes up heads pay significantly less than $5 to also bet on tails (even though that purchase would guarantee them $10). In fact, rather than being negatively correlated (as normative theory would predict) values of hedges are often positively correlated with their associated gambles.

Taken together, these papers cast doubt on current models of risk preference and provide new perspectives on the mechanisms behind “risk” aversion.

Risk is Weird: The Weirdness of Risky Transactions Causes “Risk” Aversion

EXTENDED ABSTRACT
What exactly do we mean when we talk about risk aversion? At its most basic, risk aversion exists when a person is willing to forgo an uncertain outcome for a certain one, despite the uncertain outcome having a higher expected value. That is, a risk-averse person may prefer getting $30 for sure, rather than taking a 50% chance of winning $100 (and a 50% chance of winning nothing). To date, most explanations of this phenomenon have focused on how we mentally balance the probabilities and magnitudes of positive and negative outcomes (Gneezy, List, & Wu, 2006; Kahneman & Tversky, 1979; Tversky & Fox, 1995), although recent accounts have suggested that uncertainty itself may have negative utility (Simonsohn, 2009).

However, we propose that much of what has previously been considered “risk aversion” has little to do with risk or uncertainty per se. It is instead caused by the specific mechanisms that are used to introduce uncertainty. For instance, buying a lottery ticket, flipping a coin with a friend, and sitting down at a blackjack table are all relatively typical ways to encounter risk in the world. In fact, these are generally domains where people show relatively little risk aversion and are often risk-seeking (Conlisk, 1993). On the other hand, betting on an experimenter pulling a red ball from an urn with an unknown ratio of black and red balls (Ellsberg, 1961) is much less common and may give pause to those asked to value the gamble. Unsurprisingly, this paradigm typically creates significant risk aversion (Fox & Tversky, 1995; Keren & Gerritsen, 1999).

We hypothesize that these weird risk-creating mechanisms would also reduce valuations even in cases with no objective risk. There are several reasons why this may occur. First, unusual mechanisms may introduce skepticism that everything will work as intended. Second, people may assume larger transaction costs as a mechanism’s complexity increases, and risk aversion is merely an adjustment for these costs. Third, participants may believe that the mechanism is “biased against the person” (Keren & Gerritsen, 1999). That is, unless there is a compelling reason for increased complexity, participants may believe that the mechanism was specifically designed to produce unfavorable outcomes at the user’s expense.

We conducted four studies to test our hypothesis. We primarily rely on scenarios similar to those used in studying the uncertainty effect (Gneezy et al., 2006). We used this paradigm because it has previously provided one of the more extreme demonstrations of risk aversion and allows for clean manipulation of both risk and weirdness. In prior uncertainty effect experiments, it was found that risky gambles are often valued below the value of the worst possible outcome.

Study 1 presented participants with one of three scenarios where they were asked to provide either (1) their willingness-to-pay (WTP)
for two gift cards (the *certainty* condition), (2) the chance to win one of two gift cards (the *uncertainty* condition), or (3) the chance to choose one of two gift cards (the *choice* condition). WTP elicitation in the *certainty* condition consisted of a simple question (e.g., “What is the most you would be willing to pay for this gift card?”), while the elicitation in the *uncertainty* and *choice* conditions involved a more elaborate scenario, which asked participants how much they would be willing to pay to open a box on a table and take one of two gift cards, which were either labeled (*choice*) or unlabeled (*uncertainty*).

As demonstrated by prior studies of risk aversion and the uncertainty effect, participants provided a lower WTP in the *uncertainty* condition than in the *certainty* condition. However, they also provided a lower WTP in the *choice* condition, an objectively riskless condition where they would have had full control over the outcome and could have simply chosen their preferred gift card.

Study 2 replicated the results from Study 1, with one exception. The scenario in the *certainty* condition was modified to parallel those in the *uncertainty* and *choice* conditions. Instead of simply asking their WTP for a gift card, we asked their WTP to open a box and take the one gift card that was inside. We then used this as our baseline valuation to compare the *uncertainty* and *choice* valuations. We found no difference between valuations in any of the conditions. This suggests that, holding the distribution mechanism constant, risk or uncertainty do not necessarily lower willingness-to-pay.

Study 3 replicated the pattern of results from Studies 1 and 2, but with a different weird scenario, which involved the purchase and redemption of tokens but had the same basic elements of *certainty*, *uncertainty*, and *choice*. Study 4 used both the box and the token scenarios and incorporated outcomes of different objective values ($50 and $100 gift cards). We again find the same pattern of results, with participants showing significantly less risk aversion in the token scenarios than in the box scenarios.

Taken together, the results of these studies have significant implications for both researchers and businesses. Theoretically, these results suggest that prior experiments designed to measure risk aversion may have, at least in part, actually captured negative reactions to weird mechanisms and stimuli. Practically, this supports the idea that businesses should be wary of being “too weird.” Businesses that try to distinguish themselves by relying on overly novel methods may be lowering customers’ willingness to engage with their promotions or pay for their products. Instead, they may be better served by introducing changes or new features more slowly, so that customers have time to adjust to a “new normal.”

**Gamblers Are Fun (But They Aren’t Risk Takers)**

**EXTENDED ABSTRACT**

Mixed gambles are frequently used by researchers to assess people’s willingness to take risks across various contexts. However, we found that subtle differences in framing considerably affected people’s willingness to accept a mixed gamble. In our first experiment, we found that people are more willing to accept a mixed gamble when it is framed as a choice between two options (gambling vs. not gambling) than when it is framed as a choice to accept or reject a single option (i.e., the gamble). People are also more likely to accept nothing than next-to-nothing as an alternative to gambling.

We had 1,201 participants imagine they were offered a mixed gamble (50% chance of winning $100 and a 50% chance of losing $100) and indicate whether they would take the gamble in real life. Participants were randomly assigned to one of three conditions. In the first condition, the gamble was framed as the decision to accept or reject a single option (e.g., “Would you accept this option?”). In the second, the gamble was framed as a choice between two options (the gamble versus “$0 for certain”). The third condition was identical to the second condition, except that the alternative to the gamble was “$0.25 for certain.” After participants made their choice, they rated how pleasurable it would feel to win $100, how painful it would feel to lose $100, and how pleasurable or painful it would feel to get the alternative outcome ($0 or $0.25). They also rated how exciting it would be to gamble and how boring it would be not to gamble.

Participants chose the gamble significantly more often when it was framed as a choice between the gamble and $0 for certain (38.3%) than when it was framed as accepting or rejecting the gamble (25.1%), \( p < .001 \). More interestingly, however, is that they chose the gamble even more often when the alternative was $0.25 (48.0%) than when it was $0, \( p = .007 \). Therefore, by offering a trivially small alternative to taking the gamble, we nearly doubled the proportion of people willing to take the gamble relative to simply asking whether or not they would take it. This also suggests that people find the prospect of getting a $0.25 reward *less appealing* than a $0 reward. However, when we asked participants to rate how pleasurable or painful it would be to get the certain alternative, they rated that receiving $0.25 would be significantly more pleasurable than getting $0 under the two-choice framing, \( p = .039 \), and that getting $0 under the accept/reject framing would be more painful than getting $0 under the two-choice framing, \( p < .001 \). This pattern of results directly contrasts their choices. Furthermore, there were no significant differences between conditions in how participants rated the pleasure of winning $100 or the pain of losing $100.

What, then, can explain this pattern of choice? One possibility is that choosing a boring or uninteresting alternative feels worse than rejecting an interesting alternative. Our data provide partial support for this hypothesis. While there were no significant differences in ratings of how exciting it would be to take the gamble, participants in both two-option conditions rated *not* taking the gamble as more boring than those in the one-option condition, \( ps < .001 \). In sum, we find that people think that earning nothing is sometimes better than earning next-to-nothing, and that choosing an uninteresting option is worse than rejecting an interesting option.

Our second study (\( N = 202 \)) further explored how people perceive these gambles. In addition to indicating whether or not they would take a mixed gamble (50% chance of winning $100 and 50% chance of losing $100), participants also rated the personality of a hypothetical person who rejected the gamble. Each participant was exposed to both the one-option (accept/reject a gamble) and two-option (choose between the game and $0 for certain) gambles. To accomplish this, we embedded both framings of the target gamble in a set of eight filler gambles, randomizing the order of the one- and two-option framings of the focal gamble between participants.

In the personality judgment task, participants were asked to imagine that a person chose *not* to take the mixed gamble and then rated that person on whether they were more or less intelligent, wise, fun, boring, cautious, afraid of risk, and likable than average. The personality judgment task followed the same format as the choice task, and participants rated personalities for all gambles. The order of the gamble choices and personality judgment tasks were randomized between subjects.

We once again found that people were more willing to take the gamble when it was framed as a choice between two options (taking the gamble and getting $0 for certain) than when it was framed as a single option (whether or not to take the gamble). Particularly noteworthy is that these are *within-subjects* effects, meaning that a significant portion of people accepted a gamble when it was framed
as a choice between two options (33.7%), then rejected the same gamble when it was framed as accepting or rejecting a single option (15.8%), $p < .001$.

We also found that the framing of the gamble significantly affected the perceived personality of a person choosing not to take it. A person who rejected a two-option gamble was seen as significantly less fun, less likeable, more cautious, more afraid of risk, ($p < .05$), and marginally more boring ($p = .075$), than a person who rejected the one-option gamble. Furthermore, a bootstrap mediation analysis revealed that changes in how fun and likeable a person who rejected the gamble seemed, but not changes in how cautious or afraid of risk they seemed, partially mediated the overall framing effect on willingness to gamble.

The Unattractiveness of Hedges: Implications for the Conception of Risk Preferences

EXTENDED ABSTRACT

Analyses of choice under uncertainty typically treat risk aversion as a primitive and stylized fact; the certainty equivalent of a gamble is nearly always below its expected value—indeed, this is routinely used as the definition of risk aversion. For instance, the typical person is indifferent between a sure $3 and a coin flip for $10.

Matthew Rabin and others have noted that this degree of risk aversion over small stakes violates Expected Utility Theory, because it implies a degree of curvature that is radically inconsistent with other choices. For instance, someone who is indifferent between $3 and coin flip for $10 “should” (i.e., would have to, for consistency) prefer a sure $100 over a coin flip with an infinite payout. Prospect Theory attempts to accommodate such results by introducing a discontinuity at the reference point.

In this project, we investigate a different sort of inconsistency, by comparing subjects’ valuation of gambles (e.g., a voucher which pays $10 if HEADS obtains) with their valuation of hedges (e.g., a second voucher that pays $10 if TAILS obtains).

Logic requires three mutually entailed results: (1) The valuation of a gamble and the valuation of its hedge should sum to the prize. (Obviously, the joint possession of a $10 HEADS and $10 TAILS voucher guarantees $10, and, hence, is worth $10.) (2) The distribution of bet and hedge valuations should be perfectly negatively correlated; they should lie along the line $X+Y = \text{prize}$. (3) The valuation of a hedge should exceed its expected value. The local curvature invoked to explain why the certainty equivalent of a gamble falls below its expected value also demands that the certainty equivalent of the hedge exceed its expected value. Note that if a respondent is indifferent between $3 and a coin flip that pays $10 if the coin lands heads, they are effectively willing to sacrifice $7 from the good state (coin lands heads) to ensure $3 for the bad state (coin lands tails). Correspondingly, when faced with the opportunity to acquire a hedge, the strong desire to transfer wealth from a richer to a poorer state implied by their gamble valuation dictates a high valuation of the hedge; respondents should again be willing to sacrifice seven of the ten dollars if heads obtains to yield three if tails obtains.

Of course, none of these predictions are realized. Instead, gambles and hedges are positively correlated (between +.4 and +.6), they typically sum to less than the prize, and hedge valuations rarely exceed their expected value. Results hold across gambles with well specified probabilities (e.g. coin flips) and ambiguous probabilities (e.g. football games). Moreover, these logical violations are difficult to expunge. We presume that the symmetry between the hedge and the gamble coupled with an instinctive revulsion to valuing a prospect above its expected value suppress valuations of the hedge.
to smaller prizes. Consistent with the mediation documented in Experiment 1, the presence of additional smaller prizes reduced the perceived likelihood of the larger prize, which in turn mediated the effect.

Our explanation of value atrophy hinges on the notion of lay belief that larger prospects are less likely than smaller prospects. In Experiment 3A we document existence of such lay belief. Participants indicated that they were more likely to experience a smaller prospect than a larger prospect in a variety of scenarios in both positive and negative domains (e.g., participants believed that they were more likely to find a $1 bill than a $100 bill on the ground, and more likely to sustain small rather than large damage from an earthquake). Providing converging evidence, Experiment 3B similarly found that participants believed that both themselves and others would be more likely to obtain a small rather than a large prize from a lottery.

Because our theoretical framework suggests that value atrophy is in part driven by a contrast between smaller and larger prospects, we predict that value atrophy should only occur if a risky option contains a prospect that is relatively larger than the other prospects contained in it. Experiment 4 provides further support for our proposed theoretical account by testing this prediction. Participants viewed a pharmaceutical drug that either had a single minor side effect, multiple minor side effects, a single severe side effect, or the same severe side effects plus minor side effects. Value atrophy only occurred in the last two conditions when the magnitude of one prospect was larger than the other prospects.

If shifts in perceived probabilities underlie value atrophy, then the effect should not occur in contexts where there is no uncertainty regarding the likelihood of the prospects. In Experiment 5 we tested this prediction by manipulating whether the prospects were probabilistic or non-probabilistic. In the probabilistic context we told participants that they were choosing between two lotteries whereas in the non-probabilistic context we told them that they had earned additional compensation packages. We found value atrophy in the former context but not the latter. Specifically, we found that people chose a lottery offering a single large prospect over a lottery offering an equivalent large prospect plus a chance to win additional smaller prospects. However, we did not find this choice pattern in the compensation context.

The results are not only consistent with our proposed process, but also rule out several alternative possibilities. Specifically, value atrophy is unlikely to be driven by increased cognitive load or by decreased salience of the larger prospect. If increased load or decreased salience of the large prospect drove the effect, we would expect addition of prospects to produce value atrophy regardless of the prospects’ magnitude and/or probability. In contrast, we find that value atrophy occurs only in probabilistic options, and only when smaller prospects are included with a larger prospect. The effect also cannot be explained by an average value computation account whereby the overall value of a risky outcome is computed by averaging the magnitude of the prospects contained in it. This explanation is unlikely since the atrophy effect emerges only in probabilistic contexts and not in certain contexts where the perceived likelihoods of the prospects cannot shift.

Besides being theoretically interesting, the findings also have significant practical implications for marketers as well as policy makers since consumers evaluate the risks and benefits associated with their choices on almost a daily basis. Our research explains when bundling smaller prospects with larger ones may help or hurt marketing efforts. Our findings also have important implications for public policy. For example, consider FDA requirements to disclose all of a medical drug’s potential risks. Current findings suggest that disclosing minor side effects may ironically make a drug appear less risky. Thus, this research has direct consequences for the design of advertisements, promotions and policy.

REFERENCES


