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Bracketing effects on risk tolerance: Generalizability and underlying mechanisms

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Abstract

Research has shown that risk tolerance increases when multiple decisions and associated outcomes are presented together in a broader "bracket" rather than one at a time. The present studies disentangle the influence of problem bracketing (presenting multiple investment options together) from that of outcome bracketing (presenting the aggregated outcomes of multiple decisions), factors which have been deliberately confounded in previous research. In the standard version of the bracketing task, in which participants decide how much of an initial endowment to invest into each in a series of repeated, identical gambles, we find a problem bracketing effect but not an outcome bracketing effect. However, this pattern of results does not generalize to the cases of non-identical gambles nor discrete choice, where we fail to find the standard bracketing effect.

Keywords: choice bracketing, myopic loss aversion, risk tolerance, framing effects.

1 Introduction

The standard economic model of choice under risk, expected utility theory, accommodates risk aversion though a concave utility function over final states of wealth. Behavioral decision research has routinely revealed levels of risk aversion that are too large to be plausibly accommodated by such a function (e.g., Rabin, 2000). It has been argued that loss aversion provides a better descriptive account of decision under risk (Kahneman & Tversky, 1979). On this account, the possible outcomes of a choice are evaluated in terms of gains and losses relative to a reference point, rather than final wealth states, and potential losses have a larger impact than potential gains.

The level of risk aversion exhibited in people's choices, furthermore, varies systematically as a function of how the choices are "bracketed" (Read, Loewenstein, & Rabin, 1999). Samuelson (1963) first made the observation that a gamble with positive expected value (e.g., 50% chance to either win \$200 or lose \$100) is more attractive when it is to be played many times than when it is to be played only once. While this observation is not necessarily at odds with expected utility theory (see Nielsen, 1985; Lippman & Mamer, 1988; Ross, 1999; Aloysius, 2007), it does imply that risk tolerance may depend on how the decision is framed (i.e., as a single play, or as one in a series of plays). In Samuelson's example, of course, the prospect of playing the gamble once is objectively different from the prospect in which the gamble can be played multiple times. Numerous studies have demonstrated ways in which single-play and repeated-play decisions are made differently (e.g., Wedell & Bockenholt, 1994; Li, 2003; DeKay & Kim, 2005). Here we focus on bracketing or framing effects in which an identical sequence of decisions is made differently depending on whether they are faced one at a time or in broader brackets, which arguably represents a more direct violation of expected utility theory (Redelmeier & Tversky, 1992).

Gneezy and Potters (1997), for instance, compared decisions under risk made sequentially with decisions made in broader "brackets". Specifically, on each of 12 trials, participants were endowed with some money and had the opportunity to invest as much of it as they wanted in a positive-expected-value gamble that offered a 1/3 chance of returning 2.5 times the amount invested (plus the original investment) and a 2/3 chance of returning nothing. Some participants made the 12 decisions one at a time, learning after each trial whether or not the investment paid off. Others made decisions in sets of three, such that the amount invested would be binding for the next three trials, after which the aggregate result of the three outcomes would be presented. Participants in the latter, broadly bracketed condition invested more (i.e., exhibited less risk aversion) than those in the narrowly bracketed condition. Thaler, Tversky, Kahneman, and Schwartz (1997; see also Kliger & Levit, 2009) obtained similar results in a more naturalistic financial investment simulation in which participants chose, on each round, how to

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allocate an investment between a riskier stock fund and a less risky bond fund.

Loss aversion alone is not sufficient to account for these findings; instead, it must be further assumed that, in the absence of a broad bracketing manipulation, people tend to make decisions "myopically", that is, one at a time in isolation from one another. If people naturally tended to integrate the consequences of a repeated set of decisions they faced, then the bracketing manipulation should have no effect. The results of Gneezy and Potters (1997) and Thaler et al. (1997), by contrast, suggest that, even when faced with a set of identical, repeated decisions, people tend to evaluate the possible outcomes of each decision in isolation and to exhibit loss aversion with respect to possible gains and losses from the reference point. Other findings are also consistent with this conclusion (e.g., Benartzi & Thaler, 1995; Camerer, Babcock, Loewenstein, & Thaler, 1997).

In the present research, we investigate the operations underlying the bracketing effect on risky choice. We examine, in particular, whether the bracketing effect exerts its impact via how individuals perceived the choices they currently face, or by how they evaluate the outcomes of the choice they have just made. In both the Gneezy and Potters (1997) and Thaler et al. (1997) studies, by design, the bracketing manipulation confounded the framing of the decision problem with the presentation of the decision outcome. In the Gneezy and Potters' study, for example, in the broad bracket condition, decisions were framed and had to be made in sets of three, and the outcomes of the three decisions were pooled and presented as a single sum. Consequently, we do not know whether the bracketing effect influenced how participants anticipated the possible outcomes of the decisions they faced (e.g., realizing that just one win out of the three gambles would be more than enough to offset losses on the other two) or instead influenced how participants evaluated the outcomes of the decision they had just made (e.g., observing that one realized gain more than offset the other two realized losses).

Gneezy and Potters (1997) reported no systematic change in the level of risk aversion observed over the sequence of decisions in their study. This lack of change could be taken to suggest that the bracketing effect is not outcome-dependent. However, Shiv, Loewenstein, Bechara, Damasio and Damasio (2005) did find a tendency toward increased risk (or loss) aversion over a sequence of risky decisions. Presenting an aggregate outcome may interfere with the participant's ability to identify and learn from the outcomes of individual decisions (Klos & La Poutre, 2005). As such, broadly bracketed (i.e., aggregated) outcomes, as they were presented in Gneezy & Potters (1997), may not have been influential in terms of supporting learning over the course of the study.

In the present research, we attempt to disentangle the effects of decision problem framing (i.e., narrow versus broad problem bracket) and of decision outcome framing (i.e., narrow versus broad outcome bracket) as determinants of risk tolerance in repeated decision making.

We also investigate the generalizability of the bracketing effect on risky choice, in two ways. First, we test whether broadly bracketing a set of risky decisions enhances risk tolerance when the bracketed decisions are not identical. Previous research has investigated bracketing effects exclusively in the context of repeated, identical gambles. In related research, however, it has been suggested that perceived fungibility (the extent to which gains from one decision are seen as directly offsetting losses from another decision) moderates the discrepancy between single- and repeated-play decisions (DeKay & Kim, 2005). This might be taken to suggest that bracketing effects are limited to the case of identical gambles, because it may be less computationally taxing to simultaneously consider identical rather than non-identical gambles. Indeed, Langer and Weber (2001) suggest that mixed, non-identical lotteries are seen as less risky when presented in segregated fashion than when presented in aggregate. Thus, we may find a reversed problem bracketing effect among non-identical investment decisions. Further, presentation of non-identical gambles may alter the relative impact of problem versus outcome bracketing.

The second way in which we test the generalizability of the bracketing effect is to investigate its impact on a discrete choice task. That is, in contrast to previous research examining how bracketing affects how much of an initial endowment is invested into a risky gamble, we also investigate how bracketing affects discrete choices in which participants must choose between a sure thing and a gamble of higher expected value. It is an open question whether, compared to the continuous investment task, discrete choices are more or less susceptible to bracketing effects. Because there are fewer response options in the discrete choice task (either taking the gamble or not, as opposed to deciding exactly how much to invest), it could be computationally easier to integrate the options and possible outcomes across multiple decisions. If such integration occurs spontaneously, we would not expect the bracketing manipulation to have any further effect, but if it does not occur spontaneously, then the bracketing manipulation might have a larger impact on discrete choice than on continuous investment decisions. We also investigate how problem and outcome bracketing separately influence discrete choices in this context, as well as whether the results vary depending on whether identical or non-identical gambles are bracketed.

2 Studies 1a and 1b

Studies 1a and 1b involved nearly identical tasks, so they are reported together here.

2.1 Method

2.1.1 Participants

University of Waterloo undergraduates (Study 1a, $N = 80$; Study 1b, $N = 84$) participated for course credit. Participants were informed that there was a chance of winning real money based on their performance.[1]

2.1.2 Procedure

A 2 (broad vs. narrow problem) by 2 (broad vs. narrow outcome) between-subjects design was used in each study. Participants were brought into testing rooms either alone or in pairs, and were seated at individual computer terminals separated by dividers to allow for privacy. An experimenter then informed the participants that they would be participating in a computer-based gambling task. Participants would be endowed with 100 cents for each trial, some or all of which could be "invested" in a risky gamble.

In Study 1a, participants were presented with the same positive expected-value gamble twelve times, in which there was a 33% chance of earning 2.5 times the amount invested (plus the original investment) and a 67% chance of losing the invested money (as in Gneezy & Potters, 1997). This information was presented to the participant on each trial. In Study 1b, participants were presented with 24 similar but non-identical gambles, all of which were variants on the gamble presented in Study 1a. The gambles were constructed such that the probability of winning varied from 30% to 37% (and thus the probability of losing varied from 63% to 70%) and all had positive expected value. Fewer gambles were presented in Study 1a on the assumption that presenting an identical gamble more than 12 times would become tedious for participants.

Participants were randomly assigned to one of four conditions:

In the narrow-problem/narrow-outcome condition, participants were presented with the investment opportunities one at a time, and received outcome feedback after each trial.

[1]Payouts in studies 1a and 1b were determined by selecting three trials, at random, and paying out the rewards in full. Participants were informed verbally by the experimenter that, while the lab conducting this research did not have funds available to pay out all trials in full, some trials would be randomly selected to pay out in real money. They were instructed to complete all trials as though they were for real money.

In the narrow-problem-broad-outcome condition, participants were presented with the investment opportunities one at a time, and received feedback after each trial. In addition, they also received aggregate outcome information following every third trial, which summed total earnings from the previous three trials.

In the broad-problem/narrow-outcome condition, investment opportunities were presented in sets of three, all of which remained on the screen until the three investments had been made. Participants were instructed to invest as much or as little as they wished on each investment. Thus, unlike the original study by Gneezy and Potters (1997), in this study, participants could invest different amounts across the three gambles in the broad problem condition if they wished. Feedback was presented after all three trials were responded to, and informed participants of the outcomes of each of the three individual investments. However, critically, no summary information (i.e., total earnings) was provided for the set of three trials.

In the broad-problem/broad-outcome condition, investment opportunities were again presented in sets of three, all of which remained on the screen until the three investments had been made. Feedback was identical to that of the broad problem-narrow outcome condition, although here, total earnings for the three investments was also provided.

2.2 Results and discussion

A 2 (broad vs. narrow problem) by 2 (broad vs. narrow outcome) by 2 (Study 1a vs. 1b) mixed-effects ANOVA was conducted. The dependent measure was the average amount (proportion of endowment) each participant invested over all trials; thus, higher scores indicate greater risk tolerance. Figure 1 presents the mean proportion invested in each condition for each study.

Across both studies, a significant effect of problem bracketing was found, $F(1, 162) = 7.22$, $MSE = 3649.91$, $p = 0.008$, suggesting that broadly bracketed problems yielded larger investments. This main effect was qualified by a significant problem framing by study interaction, $F(1, 162) = 4.29$, $MSE = 2166.92$, $p = 0.04$.

A 2 (narrow vs. broad problem) by 2 (narrow vs. broad problem) ANOVA was conducted for each study separately. In Study 1a (identical investments), a significant main effect of problem bracketing was found, $F(1, 79) = 8.85$, $MSE = 5573.75$, $p = 0.004$, whereby broadly bracketed problems yielded greater risk tolerance than narrowly bracketed problems. There was no significant main effect of outcome bracketing, $F < 1$, nor was there a significant interaction between problem and outcome bracketing, $F < 1$. Thus, in Study 1a we replicate Gneezy and Potters' (1997) finding, despite a few task differences

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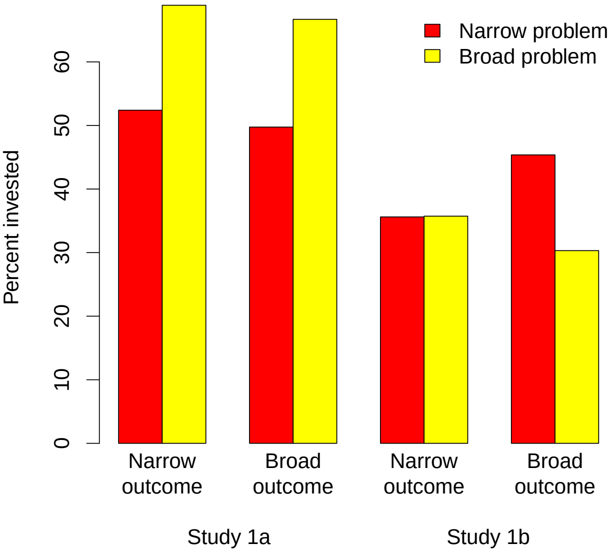
Figure 1: Investment behavior of Studies 1a and 1b: continuous investment.



(most notably, removing their constraint that participants' investments across the three broadly bracketed gambles had to be equal, and also providing individual gamble outcomes as well as total earnings across the three gambles in the broad outcome condition).

We also examined whether investments changed over the course of the session. The sequence of decisions was divided into four blocks of three trials each, and was subjected to a 2 (narrow vs. broad problem) by 2 (narrow vs. broad outcome) by 4 (block) mixed-effects ANOVA. A main effect of block was found, $F(1, 76) = 10.43$, $MSE = 4553.31$, $p = 0.002$, reflecting an overall linear increase in amount invested across blocks. However, the block by problem frame, block by outcome frame, and 3-way interactions were non-significant, $Fs < 1$, suggesting that no changes in investment behaviour developed differentially by condition as the study progressed, and that the effects reported above do not require lengthy learning or become more robust with repetition.

The results of Study 1a indicate that increased risk tolerance in broadly bracketed decisions under the condition of identical, continuous investment is attributable to problem framing (eliciting decisions for three simultaneously presented gambles) rather than to outcome framing (providing aggregate outcome results across three gambles).

Results of Study 1b (non-identical investments) were quite different from those of Study 1a. No significant main effect of problem framing was observed ($F < 1$). Also in contrast to Study 1a, an almost-significant effect of outcome bracketing was observed, $F(1, 83) = 3.03$, $MSE = 1173.16$, $p = 0.09$. This result is qualified by an almost-significant problem by outcome bracket interaction, $F(1, 83) = 3.12$, $MSE = 1209.01$, $p = 0.08$. When problems were narrowly bracketed (presented one at a time), broad outcome bracketing (presenting summed earnings for each set of three gambles) had no effect on risk tolerance, $p > 0.90$. By contrast, when problems were broadly bracketed (presented in sets of three), broad outcome bracketing actually reduced risk tolerance, $F(1, 40) = 6.71$, $MSE = 2382.04$, $p = 0.01$. Put differently, broad problem bracketing had the effect of increasing risk tolerance only in the narrow outcome condition (in which summed earnings were not presented).

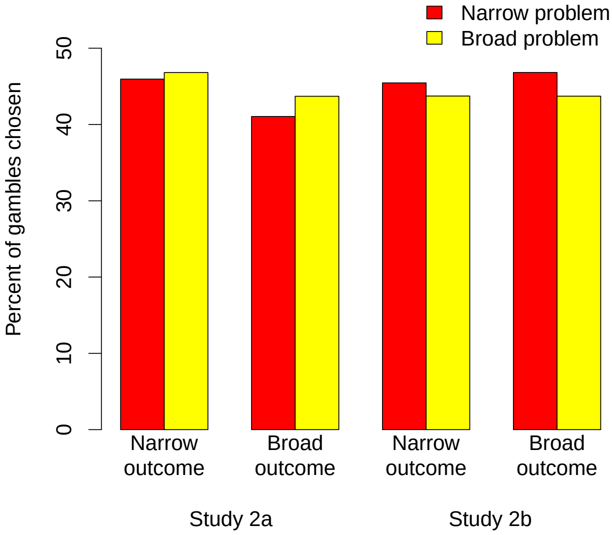
As was done for Study 1a, an additional analysis investigated changes in investment decisions over blocks of trials. Again, a quadratic main effect of block was observed, $F(1, 80) = 8.30$, $MSE = 191.72$, $p = 0.005$, reflecting an initial decrease, and subsequent increase, in investment behaviour. However, neither the 2-way nor 3-way interactions involving the block variable were significant, $Fs < 1$, indicating that the change in risk tolerance was uninfluenced by the problem and outcome bracketing manipulations.

Recall that there were twice as many trials in Study 1b as in Study 1a. For a more direct comparison of results across studies, the original analysis was run again but restricted to the first 12 trials of Study 1b. This analysis revealed a significant outcome bracketing effect, $F(1, 80) = 5.46$, $MSE = 8483.54$, $p = 0.02$, whereby a narrow outcome bracket increased risk tolerance relative to a broad outcome bracket. The problem by outcome bracketing interaction observed in the original analysis was non-significant for the first 12 trials, $F(1, 80) = 1.91$, $p = 0.17$, but suggested a similar trend: broad problem bracketing increased risk tolerance only when outcomes were presented narrowly (without aggregates). The outcome bracketing effect may have washed out over the second half of the study, perhaps because participants found the task lengthy or tedious. While unexpected, our results suggest that, among mixed non-identical investments, aggregated outcomes actually inhibit risk-taking.

Several observations arise in comparing the results of Studies 1a and 1b. First, and most importantly, broad problem bracketing enhanced risk tolerance when identical gambles were presented simultaneously (Study 1a) but not when the gambles were non-identical (Study 1b). A notable feature of the gamble used by Gneezy and Potters (1997) as well as in Study 1a is that it offers a 1/3 chance of paying out. Because the broad bracket condition presents three such gambles simultaneously, the 1/3 probability of winning on each can be readily translated into an expectation that one of the three gambles in the broad bracket will pay off and the other two will not. This may make investing in the gamble more attractive, as the one expected gain would be enough to offset the two losses. When the three broadly bracketed gambles are non-identical (in this case, varying in probability of payoff), this expectation may not be as readily generated and, as a result, broad problem bracketing may not enhance risk tolerance. Indeed, it has been suggested that mixed lotteries, akin to those of Study 1b, are seen as less risky when evaluated individually (Langer & Weber, 2001). As a result, under such conditions broad bracketing may not enhance risk tolerance.

A second observation in comparing the results of the two studies is that risk tolerance is lower, in each condition, in Study 1b compared to Study 1a, $F(1, 162) = 38.46$, $MSE = 20638.37$, $p < 0.001$. Indeed, while participants in Study 1a typically invested at least half their endowment in the gamble, participants in Study 1b invested only about a third of their endowment. It is possible that the variability of the gambles themselves across trials enhanced their perceived riskiness, resulting in less overall investment.

Figure 2: Percentage of gambles chosen in Studies 2a and 2b: discrete choice.



3 Studies 2a and 2b

In Studies 2a and 2b, participants made discrete choices between a sure gain and a gamble with higher expected value. Theoretically, myopic loss aversion predicts a similar bracketing effect in a discrete, all-or-none choice task as has been observed in previous studies in which the task was to decide how much to invest in a risky prospect. Given that the bracketing effect did not generalize to non-identical gambles, however, it is possible that it also does not generalize to discrete choices between a gamble and a sure thing.

Because Studies 2a and 2b involve a similar task, we report their results together.

3.1 Method

3.1.1 Participants

University of Waterloo undergraduates ($N = 82$ for Study 2a and $N = 87$ for Study 2b) participated for course credit. Additionally, participants were given the chance to win real money based on their performance.[2]

3.1.2 Procedure

Participants made a series of choices between a sure gain and a gamble with higher expected value. In Study 2a, the same sure gain and gamble were presented 27 times. Participants chose between receiving $60 for sure or playing a gamble that offered a 33% probability of winning $195 and a 67% probability of losing $5. In Study 2b, participants were presented with 60 variants of the decision presented in Study 2a, in which the sure gain varied from $50 to $70, and where the gamble varied from a 1/3 chance of winning $160 to $235 and a 2/3 chance of losing $0 to $10. Each gamble was constructed such that its expected value slightly exceeded the value of the sure gain with which it was paired. In all other respects, the design and procedure of the studies were identical to those used in Studies 1a and 1b.

3.2 Results and discussion

A 2 (broad vs. narrow problem) x 2 (broad vs. narrow outcome) x 2 (Study 2a vs. Study 2b) mixed-effects ANOVA was conducted with the proportion of risky choices made by the participant as the dependent variable. Figure 2 presents the mean proportion of risky choices made in each condition separately for Study 2a and Study 2b.

No significant main effects or interactions were observed (all $Fs < 1$). Further, when results from each study were analyzed separately, no significant effects were observed either (all $Fs < 1$).

As was done with results from Studies 1a and 1b, the sequence of decisions was divided into three equal-length blocks (though participants were unaware of the blocking, and received no breaks between them) to examine any potential learning effects across the study. Mixed-effects ANOVAs including the block factor were conducted for each study individually.

In Study 2a, as in the previous studies, a marginally quadratic main effect of block was observed, $F(1, 78) = 3.41$, $MSE = 912.72$, $p = 0.07$, reflecting an initial in-

[2]Payouts in studies 2a and 2b were determined by selecting three trials, at random, and paying out 1% of the rewards in full. As in studies 1a and 1b, participants were informed of this verbally by the experimenter.

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Figure 3: Percentage of gambles chosen in Study 2a: outcome frame by block.

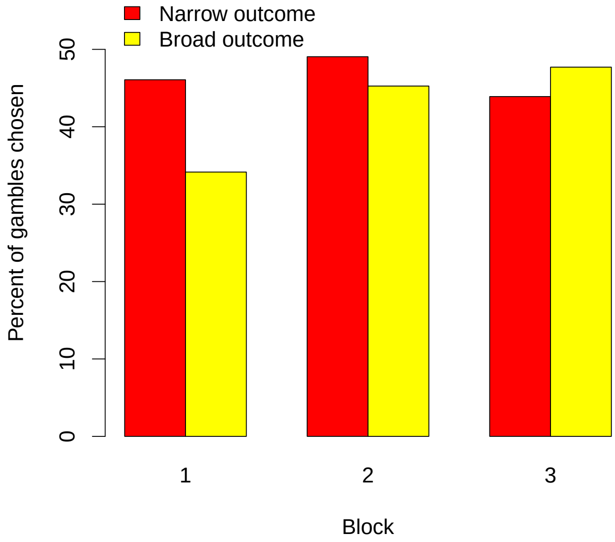
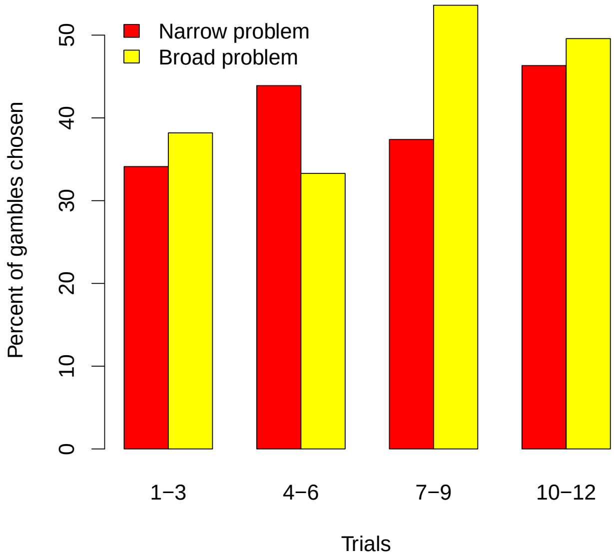


Figure 4: Percentage of gambles chosen in the first 12 trials of Study 2a: problem frame by trial.



crease, followed by a slight decrease, in risky choice behavior. This main effect of block was qualified by an outcome frame by block interaction, F (1, 78) = 5.56, MSE = 2529.62, p = 0.02 (see Figure 3). Post-hoc comparisons reveal that choosing the gamble did not increase across blocks under the narrow outcome frame, ps > 0.20. Under a broad outcome frame, however, participants initially made somewhat fewer risky choices relative to those made under a narrow outcome frame, F (1, 80) = 3.62, MSE = 805.40, p = 0.06, but the proportion of risky choices increased from blocks 1 to 2 (t(40) = 2.81, p = 0.008) and 1 to 3 (t (40) = 3.48, p = 0.001). No significant change was found between blocks 2 and 3 in this condition, p = 0.56.

For a more direct comparison to Study 1a, we analyzed choices made over just the first 12 trials in Study 2a, divided into blocks of three trials each (Figure 4). A significant cubic problem frame by block interaction was observed, F (1,78) = 7.65, MSE = 6758.41, p = 0.007. To further clarify this relationship, post-hoc comparisons reveal that a narrow problem frame produced an increase in risk tolerance from the first trials onward (from trials 1–3 to 4–6, t (40) = 1.86, p = 0.07; from trials 1–3 to 10–12, t (40) = 2.29, p = 0.03). However, a broad problem frame required at least one round of problem-outcome pairing (from trials 1–3 to 4–6, t (40) < 1; from trials 4–6 to 7–9, t (40) = 2.87, p = 0.007; from trials 7–9 to 10–12, t (40) = 2.59, p = 0.01) before increasing risk tolerance was observed.

In summary, a problem framing effect only seemed to affect how risk tolerance initially increased. That is, it took at least 6 trials for participants choosing under a broad problem frame to become more risk-tolerant; however, participants choosing under a narrow problem frame began making more risk-tolerant choices after only three trials. Accordingly, the problem framing by block interaction may rely on seeing outcomes, regardless of whether an aggregate is included or not, which suggests that participants may need to experience winning and losing before they adjust their choosing behavior. The outcome-frame by block effects suggest that it takes additional rounds of trials for participants experiencing a broad outcome frame to incorporate aggregate outcome information into their decisions, whereas those experiencing a narrow outcome frame begin taking more risks sooner.

In Study 2b, by contrast, no significant effects by block were observed, in an analysis of all the trials or in an analysis looking at just the first 12 trials, all Fs < 1.

4 General discussion

The primary goals of this work were to examine the generalizability of the bracketing effect and its underlying mechanisms. Specifically, we attempted to disentangle the influences of problem and outcome bracketing on risk tolerance, which had been confounded in previous studies; and we tested whether bracketing effects generalize to decisions regarding non-identical gambles and to a discrete choice task.

We found that, when identical gambles are presented and the participant's task is to decide what proportion of an endowment to invest in the gamble — as was the case in the Gneezy and Potters (1997) study — a problem bracketing effect, but not an outcome bracketing effect, was observed. That is, presenting the investment decisions in sets of three increased risk tolerance relative to presenting them alone, but presenting an aggregated outcome over the three decision trials had no effect. This suggests that, in this version of the task, individuals evaluate potential gains and losses from a decision they currently face, rather than on evaluations of realized outcomes.

The same pattern of results did not hold, however, when non-identical gambles were presented in Study 1b. Here, outcome frame did play a role in determining how much participants invested, but in the opposite direction of the usual bracketing effect: when outcomes were presented individually, participants were more risk-tolerant, compared to when an aggregate outcome was also presented. It has been suggested that mixed choices are often thought of in a segregated fashion (Redelmeier & Tversky, 1992; Langer & Weber, 2001; DeKay & Kim, 2005); thus, it is possible that introducing even a modest amount of variability to the investment opportunities presented in these studies encourages thinking about them in isolation from one another. As such, perhaps a more explicit outcome bracketing manipulation may be necessary to produce a bracketing effect (for example, presenting only aggregates in the broad outcome frame; see Klos & La Poutre, 2005).

In both Studies 1a and 1b, risk tolerance increased across the sequence of decisions. This result is itself notable, because the payoffs and associated probabilities under consideration were explicitly described to participants and so, in this sense, the experience of making the decisions and learning the outcomes does not provide any new information that, normatively, ought to influence their decisions. The finding that such experience does in fact systematically influence levels of observed risk tolerance adds to a growing body of evidence that experience-based decisions can differ in significant ways from description-based decisions even when the experience-based decisions are made under conditions of risk (i.e., where outcomes and associated probabilities are known with complete precision) rather than uncertainty (e.g., Newell & Rakow, 2007; Jessup et al, 2008).

When we moved from continuous investments to a discrete choice between a sure gain and a gamble with higher expected value (Study 2a), we expected to replicate effects observed in Study 1a. While the bracketing manipulations did have some effect on the rate at which risk tolerance changed across the sequence of decisions, neither broad problem framing nor broad outcome framing increased the overall level of risk tolerance relative to their narrowly-framed counterparts. It is possible that the discrete choice task systematically changes how decisions are made relative to decisions about how much to invest. Deciding how much to invest, for instance, might be seen as loosely analogous to a pricing task, and it has been well-established that pricing and discrete choice elicitation methods can produce different responses to otherwise-equivalent decision problems (e.g., Tversky, Slovic, & Kahneman, 1990).

Finally, when participants were presented with a sequence of non-identical discrete choices, no effects of problem or outcome framing were observed. Further, this was the only study in which there was not a systematic increase in risk tolerance across the sequence of decisions. Both of these results are consistent with the interpretation that participants in this study evaluated each decision in isolation from the other decisions in the sequence, missing a critical component to the bracketing effect's mechanism.

The results of Gneezy and Potters (1997) and Thaler et al. (1997) have been interpreted as supporting the prescription that investors with a long horizon (e.g., saving for retirement) ought to evaluate their returns less frequently and focus on aggregate returns rather than performance of individual investments as a means of enhancing risk tolerance in the face of short-term volatility in individual investment returns (e.g., Thaler et al., 1997). Decisions typically faced by investors, however, may not be very well modeled by the task used in Study 1a (and in previous research) involving repeated, identical investments, which is the only study in which we found that broad bracketing led to an overall increase in risk tolerance relative to narrow bracketing.

The results of Studies 1b, 2a, and 2b were unexpected, so any explanation we might offer is necessarily speculative. However, given the finding that the standard bracketing effect does not readily generalize to tasks involving non-identical gambles or choices as an elicitation method, further research may be necessary before prescribing bracketing as means of enhancing risk tolerance among investors. Advising laypeople to broadly bracket investment opportunities and returns (e.g., to consider a collection of investments as a portfolio, and monitor the overall return of the portfolio infrequently) may be helpful only if the same investment opportunities are being reinvested, but not, critically, when new opportunities are being added or subtracted from a portfolio, or when risks or returns vary.

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