Comparing Gains and Losses

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Abstract

Loss aversion in choice is commonly assumed to arise from the anticipation that losses have a greater effect on feelings than gains, but evidence for this assumption in research on judged feelings is mixed. We argue that loss aversion is present in judged feelings when people compare gains and losses and assess them on a common scale. But many situations in which people judge and express their feelings lack these features. When judging their feelings about an outcome, people naturally consider a context of similar outcomes for comparison (e.g., they consider losses against other losses). This process permits gains and losses to be normed separately and produces psychological scale units that may not be the same in size or meaning for gains and losses. Our experiments show loss aversion in judged feelings for tasks that encourage gain-loss comparisons, but not tasks that discourage them, particularly those using bipolar scales.

A loss has more influence on choices than a gain of the same magnitude (Kahneman & Tversky, 1979), a pattern of loss aversion that has been observed in a wide variety of contexts (e.g., Camerer, 2000; Hardie, Johnson, & Fader, 1993; Kahneman, Knetsch, & Thaler, 1990; Novemsky & Kahneman, 2005; Thaler, 1985). This asymmetry is commonly thought to occur because people expect the pain of losing something to exceed the pleasure of gaining it (Ariely, Huber, & Wertenbroch, 2005; Kahneman & Tversky, 1984; Kermer, Driver-Linn, Wilson, & Gilbert, 2006; Zhang & Fishbach, 2005). Ample evidence of negativity biases in nonmonetary domains would seem to reinforce this belief (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Cacioppo & Berntson, 1994; Rozin & Royzman, 2001).

Empirical evidence for loss aversion in judged feelings, however, is mixed (see Rozin & Royzman, 2001, p. 307).[1] Several studies have found no asymmetry in the intensity of feelings about monetary gains and losses (e.g., Mellers, Schwartz, & Ritov, 1999). For example, Mellers, Schwartz, Ho, and Ritov (1997) asked people to rate their emotional reactions to outcomes of mixed gambles (e.g., win or lose $16) on a standard bipolar scale from –50 (*extremely disappointed*) to +50 (*extremely elated*) and found that gains and losses were rated as roughly equal in intensity. Other studies have provided only limited evidence of an asymmetry. Kermer et al. (2006) found that changes in experienced happiness after a

$3 loss were about the same size as changes in experienced happiness after a $5 gain. Harinck, Van Dijk, Van Beest, and Mersmann (2007) found loss aversion in anticipated feelings for amounts of at least €40. However, for small amounts (e.g., €1), people anticipated that their feelings after losses would be *less* intense than their feelings after gains of equal magnitude. Similarly, three of Liberman, Chen Idson, and Higgins's (2005) four studies of price changes, wage changes, and negotiation outcomes indicated that losses elicited less intense feelings than gains. Given the powerful role that loss aversion plays in choice, it is unclear why this pattern apparently does not consistently extend to judged feelings about choice outcomes.

Comparing Gains and Losses

A key feature of choice is that decision makers must resolve the conflict between the advantages and disadvantages of the alternatives. Gains and losses appear together in one view, which makes it easy to compare them while resolving the conflict. We propose that one reason for the discrepancy between the results for choice and those for judged feelings is that loss

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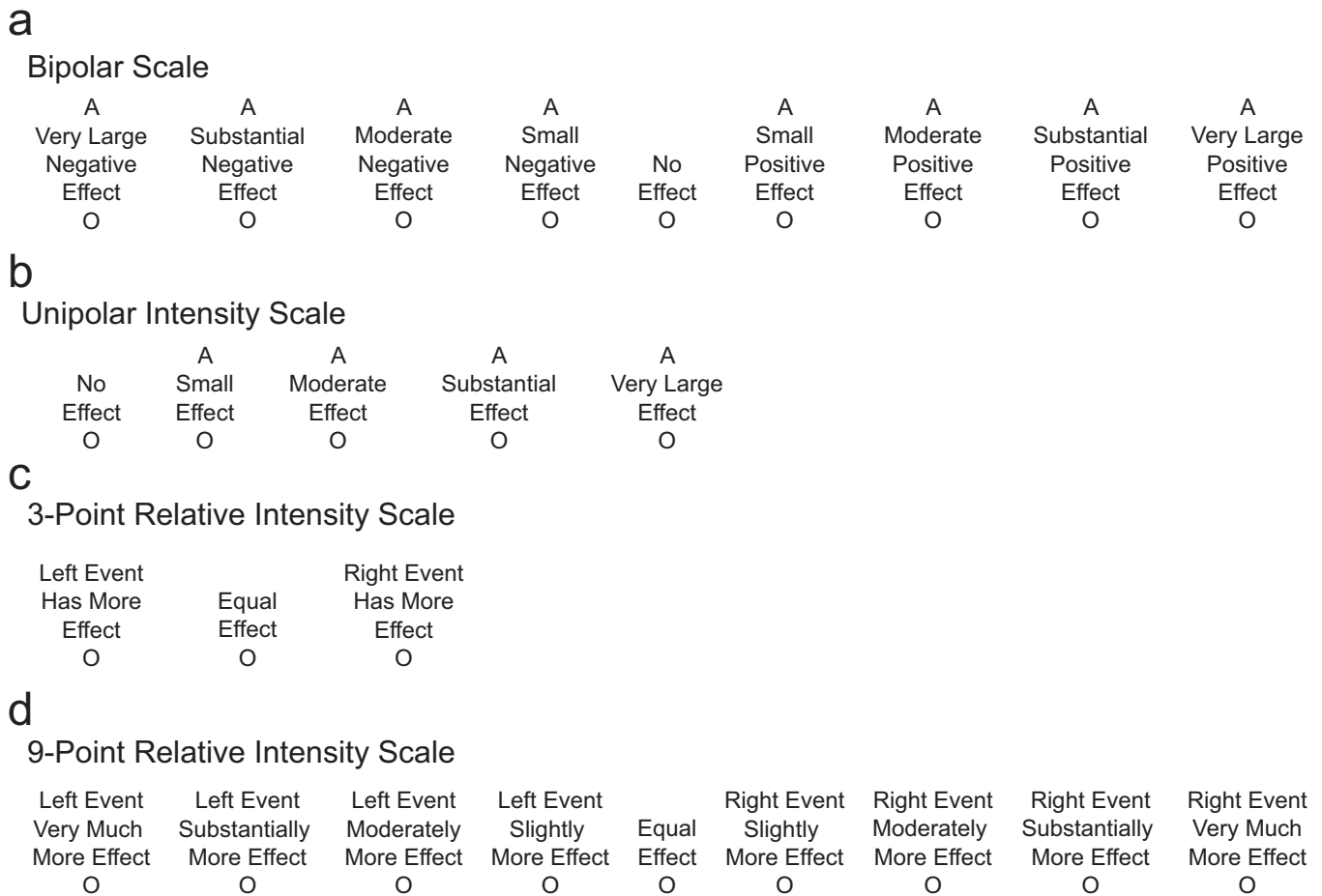E-mail: peter.mcgraw@colorado.edu

aversion is more likely to be observed when people compare gains and losses directly. Whereas choice usually enables or even compels this comparison, the task of judging feelings often does not. Consider the following experience:

> You are about to travel to a long-anticipated conference in an exotic international location. You have carefully arranged the details and have a nonstop flight, which you have upgraded to business class with your dwindling stock of airline miles. The day of your departure, you find that your flight as been cancelled, and the airline has helpfully rebooked you on an itinerary that requires three flights on three different airlines, all in coach. How would you feel? (on a scale from *very bad* to *very good*)

What is readily apparent is that this is a bad and not a good thing. But how bad is it? Perhaps the most immediately accessible comparison is with other travel disasters (e.g., "not as bad as not being able to leave Belize because of the coup, but worse than that musty hotel room in Cleveland"). Another quick reaction might include consideration of other types of negative events (e.g., "not as bad as hearing that my elderly mother had to have emergency surgery, but worse than watching some student take the last space in my lot while I was trying to park"). In contrast, it would seem very odd to compare this experience with good things, like the pleasure of eating your favorite pastry at the bakery or the thrill of hearing that your first grandchild was born. The natural context for judging how good or bad an event would make you feel is a set of events with the same valence, and more generally events that are similar to the target event (Kahneman & Miller, 1986).

The suggestion that an event is more likely to be compared with events of the same valence is especially relevant when researchers ask people to judge events on a bipolar scale that permits both positive and negative responses (see, e.g., Fig. 1a). If people make the first, relatively effortless, part of the judgment (is it good or bad?) and then naturally focus on the side of the bipolar scale devoted to that valence, it may be difficult to observe the asymmetry in feelings predicted by loss aversion because positive and negative responses will not be scaled relative to one another. Related research shows that the underlying mechanisms of negativity and positivity are separable and partially distinct (e.g., Cacioppo & Berntson, 1994;

a
Bipolar Scale

A Very Large Negative Effect	A Substantial Negative Effect	A Moderate Negative Effect	A Small Negative Effect	No Effect	A Small Positive Effect	A Moderate Positive Effect	A Substantial Positive Effect	A Very Large Positive Effect
O	O	O	O	O	O	O	O	O

b
Unipolar Intensity Scale

No Effect	A Small Effect	A Moderate Effect	A Substantial Effect	A Very Large Effect
O	O	O	O	O

c
3-Point Relative Intensity Scale

Left Event Has More Effect	Equal Effect	Right Event Has More Effect
O	O	O

d
9-Point Relative Intensity Scale

Left Event Very Much More Effect	Left Event Substantially More Effect	Left Event Moderately More Effect	Left Event Slightly More Effect	Equal Effect	Right Event Slightly More Effect	Right Event Moderately More Effect	Right Event Substantially More Effect	Right Event Very Much More Effect
O	O	O	O	O	O	O	O	O

Fig. 1. Scales used in Studies 1 through 3. The bipolar response scale (a) was used in all three studies, the unipolar intensity scale (b) was used in Study 1, the 3-point relative intensity scale (c) was used in Studies 1 and 2, and the 9-point relative intensity scale (d) was used in Study 3.

Larsen, McGraw, & Cacioppo, 2001), which contributes to this neutral-point anchoring on bipolar scales (Marsh, 1983). For instance, increasing the range of gamble wins without increasing the range of losses leads people to rate small wins as less pleasant, but not as unpleasant; judgments do not "cross" the neutral point of the bipolar scale (Marsh & Parducci, 1978). Our suggestion that events are more likely to be compared with like events is also supported by research on shifting standards of judgment (e.g., Biernat, Manis, & Nelson, 1991). For example, a woman whose height is 5 ft 9 in. will be judged to be tall on a subjective scale of height because respondents naturally compare her with other women, but she will be judged to be shorter if people are prompted to compare her with the average person (male or female).

The common and seemingly innocuous decision to ask people to evaluate gains and losses on a bipolar scale has important unintended consequences if researchers subsequently compare the intensity of ratings on the two sides of the scale. Such cross-valence comparisons are common in studies examining loss aversion in judged feelings. If judgments of feelings do not necessarily pit gains against losses, however, drawing inferences about loss aversion from ratings on bipolar scales is problematic. Loss aversion entails that the intensity of feeling elicited by a loss is larger in psychological magnitude than that elicited by a gain. But if respondents do not consider losses when judging the intensity of their feelings in response to gains (and vice versa), the intervals on the two sides of a bipolar scale are not normalized against the same set of objects. As a result, gains and losses will essentially be measured on two distinct scales. As is the case with any two distinct scales, there is no reason that units on the two sides of a bipolar scale must have the same psychological size or meaning. Comparisons of results on two different scales are difficult to interpret and render any conclusions about differences in the underlying phenomena dubious. To make the comparison meaningful, gains and losses must be judged on the same scale.

Comparative Judgments of Feelings: Our Studies

Our studies contrast judgments made on three kinds of response scales that vary in the degree to which they encourage comparisons of gains and losses. First, our bipolar scale (see Fig. 1a) allowed respondents to treat the positive and negative sides of the scale separately. Second, our unipolar scale presumably measured the intensity of feelings in the same units for gains and losses (see Fig. 1b), thus implicitly encouraging comparisons. Third, our scales of relative intensity (see Figs. 1c and 1d) explicitly asked respondents to judge whether one stimulus had a greater effect on their feelings than another. These scales are similar to those used in the judgment tasks that have provided evidence for loss aversion, such as judging the magnitude of a gain that would offset the risk of a particular loss (i.e., a certainty-equivalents task; see Harinck et al.,

2007; Tversky & Kahneman, 1992). They are also the most similar to the scales used in choice tasks employed in the empirical literature on loss aversion. Thus, we expected to observe little or no loss aversion in judged feelings on the bipolar scale, at least some loss aversion on the unipolar scale, and the most loss aversion on the relative intensity scales.

Study 1a

In our first study, we asked people to judge their feelings about a gain and a loss that could result from a gamble and examined rates of loss aversion for the three kinds of response scales.

Method

Eighty-four undergraduates were asked to imagine that they would play a single gamble with a 50% chance to win $200 and a 50% chance to lose $200. Respondents were randomly assigned to use a bipolar, unipolar intensity, or relative intensity scale to judge their anticipated feelings about the outcomes. Participants in the bipolar and unipolar intensity conditions made two judgments on a 9-point bipolar scale (see Fig. 1a) or a 5-point unipolar intensity scale (see Fig. 1b), respectively. Specifically, they indicated how they would feel if they won $200 and how they would feel if they lost $200. Whether the gain was rated first or second was counterbalanced across participants. Participants in the relative intensity condition made one judgment. Specifically, they indicated whether winning $200, compared with losing $200, would have more influence on their feelings, the same influence on their feelings, or less influence on their feelings $200 (see Fig. 1c). Whether the gain was presented on the left or right of the page was counterbalanced across participants. For the bipolar scale, we used the absolute value of participants' responses to assess the intensity of anticipated feelings.

Results

First, we compare results for the bipolar and unipolar scales. We analyzed the intensity of judged feelings using a 2 (response scale: bipolar, unipolar; between subjects) × 2 (valence: gain, loss; within subjects) mixed-model analysis of variance. There was no difference between judgments of the gain and loss on the bipolar scale (M_{gain} = 3.40 vs. M_{loss} = 3.36), but there was a significant difference on the unipolar scale (M_{gain} = 3.11 vs. M_{loss} = 3.57), $t(27)$ = 3.30, p_{rep} = .97, d = 0.76 (see Fig. 2). The interaction between valence and response scale was significant, $F(1, 52)$ = 4.40, η^2 = .08, p_{rep} = .89. Loss aversion was absent when feelings were judged on the bipolar scale but was present in judgments on the unipolar scale.

Next, we compared all three response scales, by analyzing the percentage of participants whose judgments were loss averse. Because valence was manipulated within subjects, we could recode each participant's responses on the bipolar and unipolar scales into one of three categories (loss > gain, loss = gain, loss < gain) for comparison with the 3-point relative
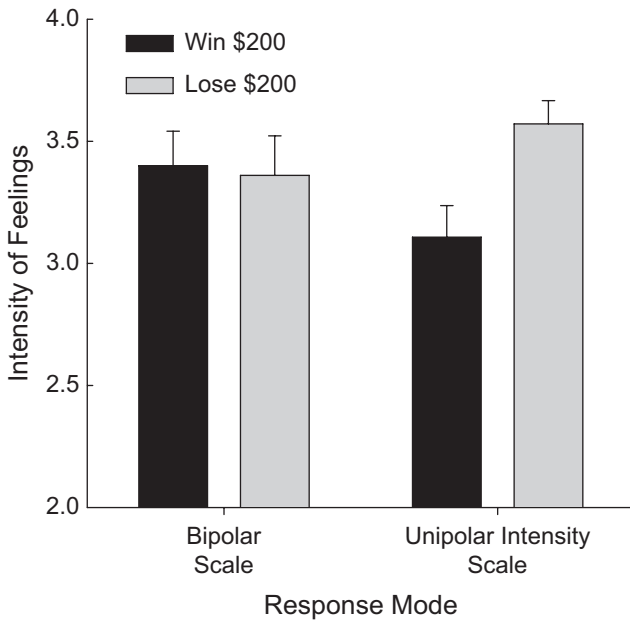
Fig. 2. Mean judged absolute intensity of anticipated feelings in response to the $200 gain and $200 loss in Study 1a. Results are shown for the bipolar scale and the unipolar intensity scale. Error bars represent 1 *SEM* above the mean.

intensity scale (see Fig. 3). The bipolar scale again showed no significant loss aversion, whereas the unipolar scale did (54% losses > gains vs. 11% gains > losses; sign test, p_{rep} = .97). The relative intensity scale produced even more loss aversion

(80% losses > gains vs. 6% gains > losses; sign test, p_{rep} = .99). Thus, the greatest rate of loss aversion occurred when participants were compelled to compare gains and losses directly.

Study 1b

We argued that the unipolar intensity scale in Study 1a encouraged comparisons of gains and losses by requiring them to be judged on the same scale. But the study's within-subjects design gave participants in both the bipolar and unipolar conditions the same opportunity to compare the outcomes if they so chose. In Study 1b, we tested our interpretation that gains and losses must be compared in order for the unipolar intensity condition to show loss aversion. We did this by examining only the unipolar scale and having a given respondent judge either a gain or a loss, which made cross-valence comparisons unlikely (e.g., Birnbaum, 1999; Brenner, Rottenstreich, & Sood, 1999; Hsee, Loewenstein, Blount, & Bazerman, 1999). By our account, people judging only a gain will norm their judgments against other gains, even when they use this unipolar scale. The same would follow for losses, but of course the norming would be against other losses. Thus, seeing only one valence should lead to a pattern similar to the one we found for the bipolar scale.

Method

Forty-five undergraduates were recruited from the same population as in Study 1a. They were presented with the
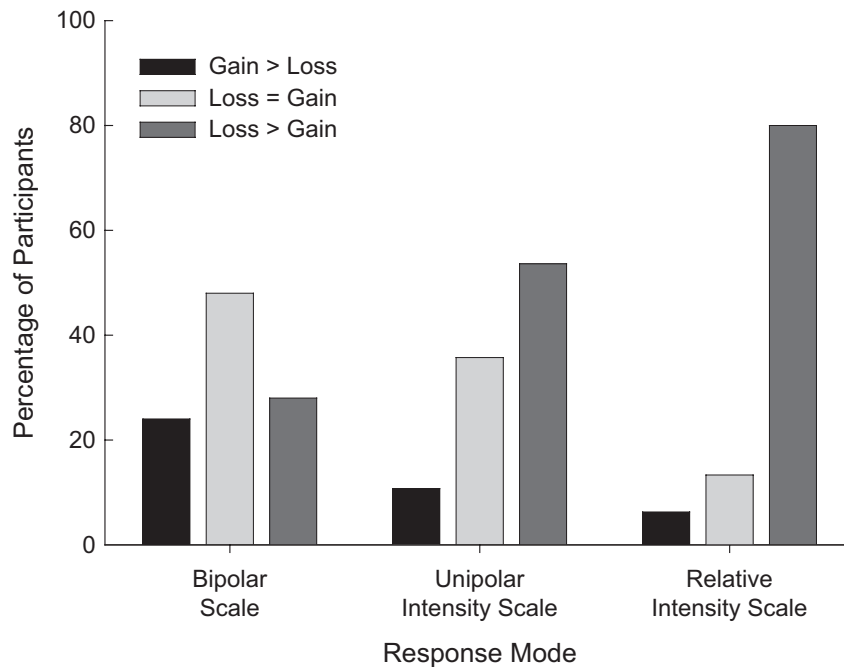
Fig. 3. The percentage of participants in Study 1a who rated the effect of the gain more intense than the effect of the loss (gain > loss), the loss and gain as equal in effect (loss = gain), and the effect of the loss more intense than the effect of the gain (loss > gain). Results are shown separately for the three response scales used in this study.

same gamble as before and were randomly assigned to judge either the gain or the loss using the unipolar intensity scale (see Fig. 1b).

Results and discussion

There was no difference in the intensity of judged feelings between the gain ($M = 3.36$) and the loss ($M = 3.30$) when they were evaluated on the unipolar scale in isolation from each other. Further, these means were nearly identical to those obtained with the bipolar scale in Study 1a ($M_{gain} = 3.40$ and $M_{loss} = 3.36$). There was no loss aversion observed in Study 1b despite the use of the unipolar scale. The results differ sharply from the asymmetry obtained with the unipolar scale in Study 1a ($M_{gain} = 3.11$ vs. $M_{loss} = 3.57$). It is evident that removing the opportunity for gain-loss comparisons eliminated the loss aversion we previously observed. It appears that it is not the unipolar intensity scale per se that elicits loss-averse judgments, but rather the opportunity to compare gains and losses combined with judging them on a common scale. When people are permitted to norm gains and losses separately, loss aversion does not appear.

Study 2

If people use anticipated feelings to guide their choices (see Mellers & McGraw, 2001), then loss aversion in feelings should predict choices. In Study 2, we examined whether judgments on a comparative scale (the relative intensity scale) would predict loss aversion in choices better than judgments on a bipolar scale.

Method

Sixty-one undergraduates were presented a single gamble with a 50% chance to win $50 and a 50% chance to lose $50. Participants were randomly assigned to judge their anticipated feelings for both outcomes using either the bipolar scale (see Fig. 1a) or the relative intensity scale (see Fig. 1c). After completing the judgment task, respondents were asked, "Would you play the gamble?" and responded either "yes" or "no" to the question.

Results

As in Study 1a, we recoded each participant's judgments on the bipolar scale into one of three categories (loss > gain, loss = gain, loss < gain). The bipolar scale again produced no loss aversion: The percentage of participants indicating that the loss would have a greater effect than the gain (30%) did not differ significantly from the percentage of participants indicating the opposite (28%). The relative intensity scale produced a majority (58%) of loss-averse judgments (with only 19% of participants showing the opposite; sign test, $p_{rep} = .93$). These results replicate the findings of Study 1a.

Participants were equally likely to play the gamble in the bipolar (27%) and relative intensity (32%) conditions. Thus, participants were equally risk averse across the conditions, and the use of different response scales did not affect the tendency to reject the gamble. By comparing the judgments of respondents who accepted and rejected the gamble separately for each response scale, we were able to see if judgments on the relative intensity scale, compared with judgments on the bipolar scale, were more sensitive to loss aversion among risk-averse respondents. As shown in Figure 4, judgments on the bipolar scale indicated the same (low) level of loss aversion whether participants accepted or rejected the gamble. For the relative intensity scale, only a small minority of those who chose to play the gamble indicated loss aversion (20%), whereas a decisive majority (76%) of those who rejected the gamble indicated loss aversion.

Choices are clearly related to loss aversion in judged feelings about choice outcomes when respondents are given an opportunity to compare their feelings. By requiring respondents to compare gains and losses and to judge them on a common scale, the relative intensity scale gives respondents such an opportunity; in contrast, the bipolar scale gives respondents little opportunity to compare gains and losses, so they ultimately norm gains and losses separately.
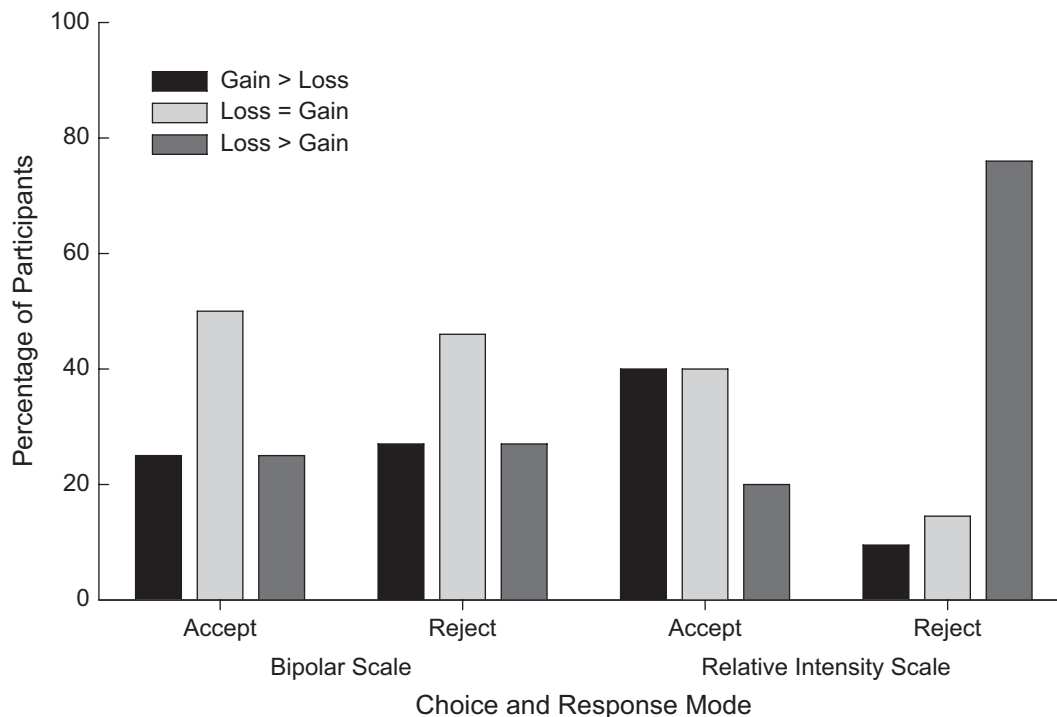
Study 3

Next, we investigated the generalizability of our findings to other types of stimuli by using emotionally evocative images. In Study 3, people made judgments of the intensity of their feelings on both bipolar and relative intensity scales, with the two ratings separated by a filler task. We identified pairs of positive and negative images that were judged to be equal in emotional intensity on the bipolar scale and examined whether the negative images were judged as more intense than their paired positive images on the relative intensity scale.

Method

We selected eight positive and eight negative images from the International Affective Picture System (Lang, Bradley, & Cuthbert, 1999) on the basis of Ito, Cacioppo, and Lang's (1998) normative ratings. In a pretest, the positive and negative images were matched in absolute intensity on the bipolar scale in Figure 1a.[2]

Twenty-seven undergraduates were first shown the 16 images in a random order on a computer screen so that they would be familiar with the range of stimuli. They then completed two judgment tasks, interrupted by an unrelated 10-min filler task. Participants were randomly assigned to a task order. In one task, the images were presented in random order, and participants judged the effect each image had on their current feelings, using a vertical version of the bipolar scale in Figure 1a. In the alternate task, participants were randomly presented

Fig. 4. The percentage of participants in Study 2 who rated the effect of the gain more intense than the effect of the loss (gain > loss), the loss and gain as equal in effect (loss = gain), and the effect of the loss more intense than the effect of the gain (loss > gain). Results are shown separately for participants who accepted the gamble and those who rejected the gamble, for each of the two response scales used in this study.

all possible pairs of images. For each pair, participants judged which image, if either, had a greater effect on their feelings, using the 9-point relative intensity scale shown in Figure 1d. Images were randomly assigned to the top or bottom part of the screen.[3]

Results

We coded the relative intensity ratings of the pairs from –4 (the negative image was judged to have *very much more effect*) to +4 (the positive image was judged to have *very much more effect*). For each participant, we identified all pairs of images comprising one image judged positive on the bipolar scale and another image judged equally negative on that scale (e.g., +3 and –3). The average participant had 11.4 (SD = 4.0) such pairs. The relative intensity results for these pairs showed clear evidence that the negative images were more intense: The mean relative intensity rating was –0.46 (SD = 1.08), which was significantly less than 0, $t(25) = -2.20$, $p_{rep} = .90$, $d = -0.43$. Moreover, a majority of participants (65%) had negative mean relative intensity ratings, whereas less than half that many (27%) had positive mean ratings (sign test, $p_{rep} = .86$).

With stimuli from the completely distinct domain of emotional images, we again found that ratings on a bipolar scale did not show an asymmetry in the emotional intensity of positive and negative stimuli. But when people were compelled to make a comparison, they judged negative stimuli as more intense.

General Discussion

At the heart of loss aversion is a comparison between gains and losses (e.g., Ariely et al., 2005; Brenner et al., 1999; Carmon & Ariely, 2000; Kahneman et al., 1990; Kahneman & Tversky, 1984). When this comparison occurs, losses loom larger than gains. The question of whether or not there is loss aversion in judged feelings is thus in part a question about the context of judgment. If gains and losses are considered together in the same context, then the asymmetry follows. The strong form of this condition occurs when the comparison is compelled, as in our relative intensity task (and in choice); in such cases, the gain and the loss are explicitly the context for each other. When gains and losses are judged separately, but by the same person and on the same scale (as with our unipolar intensity scale), gains and losses are implicitly placed in the same context, and loss aversion is evident but weaker. It is only when gains and losses are not context for each other, and people can avoid the comparison entirely (as with the bipolar scale), that the asymmetry fails to appear. Judgment tasks that do not place losses in the context of gains answer the question, "How intense is this loss, compared with other losses?" whereas the results for tasks with gain-loss comparisons answer the question, "How intense is this loss, compared with the gain?" The psychological responses to both of these tasks are genuine and do not contradict each other—they simply answer different questions. There is no reason that the relative position of a loss among other losses should indicate how that loss compares with a gain.

We have shown that loss aversion is present in judged feelings when gains and losses are compared and judged on a common scale. The absence of this asymmetry with bipolar scales leads to the fundamental question of whether gain-loss comparisons change underlying affective experiences or merely how they are reported. That is, do comparative judgment tasks reveal or create loss aversion? A result in Study 2 hints that comparative judgment tasks may reveal an underlying experience of loss aversion. Respondents were equally risk averse (i.e., equally likely to play the gamble) regardless of whether they first judged their feelings on a bipolar scale or on a relative intensity scale, which suggests that the relative intensity task did not create an asymmetry in feelings that was absent for the bipolar task. Previous research also suggests that loss aversion may be present in the absence of direct comparisons. For example, Hardie et al. (1993) found that consumers react more strongly to price increases (a loss) than to price decreases (a gain). Moreover, evidence from nonmonetary domains indicates that negativity biases do not require direct comparisons. Early evidence comes from Miller's (1961) study demonstrating that the slope of avoidance gradients is greater than the slope of approach gradients for rats responding to punishments and rewards, respectively. Single-trial learning also often occurs for negatives (e.g., shocks and aversive tastes) but not positives (see Baumeister et al., 2001; Rozin & Royzman, 2001). Given our studies and this previous evidence, we suspect that loss aversion is a genuine asymmetry in affective responses that is manifested in tasks that place gains and losses in the same context. A more definitive answer to this important question must come from future research.

Our studies also extend research that shows how bipolar scales sometimes reveal and sometimes disguise psychological phenomena (e.g., Klockars, 1979; Schwarz, Knauper, Hippler, Noelle-Neumann, & Clark, 1991). For instance, the observation that a bipolar scale's neutral point cannot differentiate ambivalence from indifference (Kaplan, 1972) has prompted the development of unipolar measures of positivity and negativity (e.g., Kaplan, 1972; Larsen, McGraw, Mellers, & Cacioppo, 2004; Larsen, Norris, McGraw, Hawkley, & Cacioppo, 2009). Our findings similarly call for caution in drawing the conclusion that positive and negative stimuli that have been normed to elicit equally intense affective reactions using bipolar scales (e.g., Lang et al., 1999) actually elicit equally intense affective reactions. Thus, findings in the literature that rely on positive and negative stimuli normed using bipolar scales may need to be reevaluated.

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Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

Notes

1. Though we limit our discussion to published studies, we acknowledge that this article was motivated by numerous failures by ourselves and others to demonstrate loss aversion in judged feelings.
2. The positive images selected were 1440, 1710, 2360, 5660, 5950, 8040, 8130, and 8501. The negative images selected were 1220, 1274, 3140, 6360, 7030, 7361, 9230, and 9440.
3. Data from 1 participant were removed because he appeared to respond randomly.

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