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The Affect Heuristic and the Attractiveness of Simple Gambles

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ABSTRACT

Prior studies have observed that the attractiveness of playing a simple gamble (7/36 to win $9; otherwise win nothing) is greatly enhanced by introducing a small loss (7/36 win $9; otherwise lose 5¢). The present studies tested and confirmed an explanation of this finding based on the concept of evaluability and the affect heuristic. Evaluators of the ''no-loss'' gamble lack a precise feeling for how good $9 is, hence give it little weight in their judgment. In the second gamble, comparison with the small loss makes $9 ''come alive with feeling'' and become weighted in the judgment, thus increasing the attractiveness of the gamble. These results demonstrate the importance of contextual factors in determining affect and preference for simple risk-taking opportunities. They show that the meaning, utility, and weighting of even a very familiar monetary outcome such as $9 is not fixed, but depends greatly on these contextual factors. Copyright © 2007 John Wiley & Sons, Ltd.

KEY WORDS affect heuristic; preference construction; evaluability; gambles

INTRODUCTION

The gamble has been to decision research what the fruit fly has been to biology—a vehicle for examining fundamental processes with presumably important implications outside the laboratory. Judgment and decision researchers have been studying people's preferences among gambles for more than 50 years. This

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paper will describe a series of experiments with gambles that add to the growing literature on preference construction (Lichtenstein & Slovic, 2006) and provide what we hope are useful insights about the interplay of affect, reason, risk, and rationality in life's most important gambles.

In recent years there has been much interest in using the concept of affect to understand a wide range of decision behaviors (Loewenstein, Weber, Hsee, & Welch, 2001; Peters, Västfjäll, Gärling, & Slovic, 2006; Slovic, Finucane, Peters, & MacGregor, 2002). In this paper, experimental studies with simple gambles are used to examine the roles of affect and the related concept of evaluability in determining judgments and decisions. We begin by providing some theoretical background on the key concepts. We next describe experiments demonstrating an anomalous finding: introducing a small loss as a component of a gamble increases its attractiveness. We then hypothesize an explanation for this anomaly based upon affect and describe several experiments that test and confirm this hypothesis. Finally, we discuss evidence that the subtle, context-dependent valuations we have observed with gambles in simple laboratory experiments appear to occur as well in many types of important decisions outside the laboratory.

BACKGROUND AND THEORY: THE IMPORTANCE OF AFFECT

In this paper, following Slovic et al. (2002), we use the term *affect* to refer to experienced feeling states associated with positive or negative qualities of a stimulus. Slovic et al. (2002) present a wide range of evidence supporting the notion that images, marked by positive and negative affective feelings, guide judgment and decision-making. In light of this evidence, they propose that people use an *affect heuristic* to make judgments. That is, in the process of making a judgment or decision, people consult or refer to the positive and negative feelings consciously or unconsciously associated with the mental representations of the task. Then, just as imaginability, memorability, and similarity serve as cues for probability judgments (e.g., the availability and representativeness heuristics), affect may also serve as a cue for many important judgments and decisions (Kahneman, 2003). *Affective responses* tend to occur rapidly and automatically. As such, using an overall, readily available affective impression can be quicker and easier—and thus sometimes more efficient—than weighing the pros and cons or retrieving relevant examples from memory, especially when the required judgment or decision is complex or cognitive resources are limited.

The concept of *evaluability* has been proposed as a mechanism mediating the role of affect in decision processes. Affective impressions vary not only in their valence, positive or negative, but in the precision with which they are held. There is growing evidence that the precision of an affective impression substantially impacts judgments. In particular, Hsee (1996a,b, 1998) has proposed the notion of evaluability to describe the interplay between the precision of an affective impression and its meaning or importance for judgment and decision-making. Evaluability is illustrated by an experiment in which Hsee (1996a) asked people to assume they were looking for a used music dictionary. In a joint-evaluation condition, participants were shown two dictionaries, A (with 10,000 entries in ''like new'' condition) and B (with 20,000 entries and a torn cover), and were asked how much they would be willing to pay for each. Willingness-to-pay was far higher for Dictionary B, presumably because of its greater number of entries. However, when one group of participants evaluated only A and another group evaluated only B, the mean willingness to pay was much higher for Dictionary A. Hsee explains this reversal by means of the *evaluability principle*. He argues that, in *separate evaluation,* without a direct comparison, the number of entries is hard to evaluate, because the evaluator does not have a precise notion of how good 10,000 (or 20,000) entries is. However, the defects attribute is evaluable in the sense that it translates easily into a precise good/bad response and thus it carries more weight in the independent evaluation. Most people find a defective dictionary unattractive and a ''like-new'' dictionary attractive. Under *joint evaluation,* the buyer can see that B is far superior on the more important attribute, number of entries. Thus the number of entries becomes evaluable through the comparison process.

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According to the evaluability principle, the weight of a stimulus attribute in an evaluative judgment or choice is proportional to the ease or precision with which the value of that attribute (or a comparison on the attribute across alternatives) can be mapped into an affective impression. In other words, affect bestows meaning on information (cf., Mowrer, 1960a,b; Osgood, Suci, & Tannenbaum, 1957) and the precision of the affective meaning influences our ability to use information in judgment and decision-making. Evaluability can thus be seen as an extension of the general relationship between the variance of an impression and its weight in an impression-formation task (Mellers, Ordóñez, & Birnbaum, 1992).

Hsee's work on evaluability is noteworthy because it shows that even very important attributes may not be used by a judge or decision maker unless they can be translated precisely into an affective frame of reference. The implications of these findings may be quite wide-ranging: Hsee (1998) demonstrates evaluability effects even with familiar attributes such as the amount of ice cream in a cup. Slovic et al. (2002) demonstrate similar effects with decisions about options saving different numbers of human lives.

EVALUABILITY AND THE ATTRACTIVENESS OF GAMBLES

In this section we propose evaluability as an explanation for some early findings in the judgment and decision literature pertaining to gambles. In subsequent sections we shall discuss a series of newer studies, also conducted with gambles, which test this explanation.

A number of studies have found that attractiveness ratings of simple gambles are influenced more by probabilities than by payoffs. Evidence for this claim can be found in Slovic and Lichtenstein (1968), Goldstein and Einhorn (1987), Schkade and Johnson (1989) and, more recently, in data from a pilot study conducted by the present authors at the University of Oregon. In this pilot study, the relative importance of probabilities and payoffs was evaluated with 16 gambles, created by crossing four levels of winning probability (7/36, 14/36, 21/36, and 28/36) with four levels of payoff ($3, $6, $9, $12). University of Oregon students ($N = 297$) were randomly assigned to one of the 16 gambles and were asked to rate its attractiveness on a 0 *(not at all attractive)* to 20 *(extremely attractive)* scale. The mean ratings, shown in Table 1, indicated that attractiveness increased monotonically as probability increased, with the largest (and statistically significant differences) occurring when the two highest probabilities (21/36 and 28/36) were compared with the two lowest (7/36 and 14/36). Mean attractiveness varied little across a four-fold increase in payoffs (no column mean differences were significant statistically). A subsequent study using the same probabilities but increasing the payoffs to $30, $60, $90, and $120 showed essentially the same weak influence of payoff.[1]

The concept of evaluability provides one possible interpretation of these results. Following Hsee's reasoning one may argue that, because probabilities are represented on a fixed scale from 0 to 1, they can be more readily mapped into a relatively precise affective response: A probability close to zero can readily be interpreted as a 'poor' chance to win. By contrast, payoff outcomes such as those in Table 1 have less obvious affective connotations, at least in the absence of further context. To illustrate the point, ask yourself the question 'how good is $9'? This $9 question, we contend, has no clear answer without further context. For instance, while it may be difficult to evaluate the goodness of an abstract and context-free $9, when further context is provided, the same amount of money may then 'come alive with feeling' (Slovic et al., 2002). For instance, although a $9 tip on a $30 restaurant bill may immediately be judged good by a waiter, a $9 increase

[1]There are also some circumstances in which payoffs are given more weight than probabilities. This occurs when people use a pricing response to evaluate a gamble (e.g., Goldstein & Einhorn, 1987; Lichtenstein & Slovic, 1971; Schkade & Johnson, 1989) and also when the gamble offers massive, highly exciting gains, as with a lottery (Loewenstein et al., 2001). Preferences within certain pairs of gambles can be predicted by a ''priority heuristic'' which looks at a gamble's minimum gain as a first reason for choice (Brandstätter, Gigerenzer, & Hertwig, 2006). The priority heuristic, however, would not predict the type of anomalous preferences that are the focus of the present study.

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Table 1. Mean attractiveness ratings in the pilot study

	Payoff				
Probability	$3	$6	$9	$12	Mean
7/36	5.3	5.3	8.9	6.2	6.4
14/36	6.5	7.8	8.4	9.0	7.9
21/36	12.8	13.8	11.9	12.2	12.7
28/36	13.2	13.3	15.0	14.5	14.0
Mean	9.4	10.1	11.2	10.8	

Note: Each respondent saw one probability/payoff combination (e.g., 14 chances out of 36 to win $6) and was asked to rate the attractiveness of playing this gamble on a 0 (not at all attractive) to 20 (extremely attractive) scale.

on a monthly salary of $2000 may be judged quite negatively by an employee. If it is accepted that, in the context of these studies, probabilities are more evaluable than monetary outcomes, evaluability implies that attractiveness ratings will be relatively more sensitive to probabilities than to payoffs.[2]

In what follows, we seek to construct a test of the hypothesis that context may influence the evaluability of a stimulus and hence the affect and importance of that stimulus to judgments and decisions about simple gambles.

Testing the evaluability principle: The base task

Consider the decision task described in Figure 1. In this task, an individual is required to rate the attractiveness of a bet offering a probability of 7/36 to win $9 (otherwise win nothing). We shall refer to this as the USbase task (when data are collected in the U.S.). The bet is described in terms of winning numbers on a roulette wheel and subjects respond on an attractiveness scale having 20 intervals ranging from 0 (''not at all an attractive bet'') to 20 (''extremely attractive bet''). Applying the reasoning of the previous section, we should expect the winning probability (7/36) to produce a fairly precise affective impression. It is an unattractive chance; one is much more likely to not win than to win. In contrast, the affective impression of $9 may be diffuse, reflecting the difficulty of evaluating this sum of money without any particular context in which to place it apart from this novel gamble. Thus, the impression formed by the gamble offering $9 to win with no losing payoff is expected to be dominated by the relatively precise and unattractive impression produced by the 7/36 probability of winning.

Now consider a variant of this task, modified so that the stated gamble below the first sentence in Figure 1 reads instead:

7/36 to win $9

29/36 to lose 5¢

The text alongside the gamble is changed from ''you win nothing'' to ''you lose 5¢.'' We shall refer to this task as US − 5. Notice that this new task is identical to the baseline task except that the zero outcome associated with the 29/36 probability has been replaced by a very small loss of 5¢. Consequently, the modified

[2]This interpretation is consistent with the link between evaluability, affect, and monetary worth put forth by Hsee, Loewenstein, Blount, and Bazerman (1999). They observed that: ''. . . an attribute can be difficult to evaluate even if its values are precisely given. . . . For example, everybody knows what money is . . ., but the monetary attribute of an option can be difficult to evaluate if the decision maker does not know the evaluability for that attribute in the given context. . . . To say that an attribute is difficult to evaluate . . . means that the decision maker has difficulty determining the *desirability* of its value in the given decision context'' (p. 580, italics in the original).

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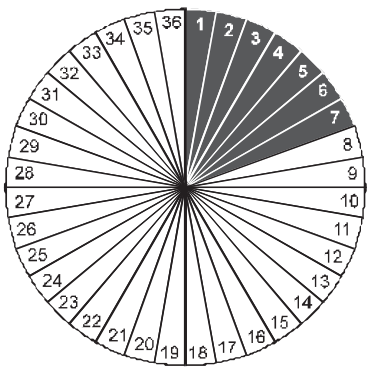
Evaluating the Attractiveness of a Bet

We would like you to rate how attractive the prospect of playing the following bet is to you.

7/36 to win **$9.00**

This means that there are 7 chances out of 36 that you will win the bet and receive **$9.00** and 29 chances out of 36 that you will win nothing.

Visualize a roulette wheel on the left with 36 numbers along the circumference. If a ball lands on any of the 7 numbers between 1 and 7 inclusive, you win **$9.00**. If it lands on numbers 8–36, you win nothing.



Indicate your opinion of this bet's attractiveness by **circling** one number on the rating scale below:

There is no right or wrong answer, we are interested only in your opinion about the **attractiveness** of playing this bet.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Not at all an attractive bet — Moderately attractive bet — Extremely attractive bet

Figure 1. Instructions for the attractiveness rating task

gamble is dominated by the base gamble and so any preference theory embodying the principle of monotonicity would imply that the modified gamble is strictly worse.

The evaluability principle, however, suggests a contrary implication because adding a very small loss to the payoff dimension provides new context for evaluating the $9. For instance, notice that the combination of a possible $9 gain and a 5¢ loss is a *very attractive* win/loss ratio. Hence introducing the small loss provides new perspectives from which the gamble can be evaluated. Whereas the imprecise mapping of the $9 carries little weight in the averaging process, the more precise and now favorable impression of ($9; −5¢) potentially carries more weight. Hence following the logic of evaluability, the modified gamble could, in principle, receive a higher rating.

Over a period of years, we have conducted numerous studies in the US and the UK exploring behavior in relation to this and related tasks. We now bring these results together here for the first time.[3]

[3]The motivation for the earlier studies predates our interest in affect and evaluability. Rather, notions of compatibility (Slovic, Griffin, & Tversky, 1990) stimulated the original design. However, recent research has led us to interpret these studies and design new ones within the framework of the affect heuristic.

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Table 2a. Baseline studies of the attractiveness of three gambles on a 0–20 rating scale

Group	Gamble	Mean rating
USbase	(7/36, +$9.00; 29/36, win nothing)	9.4
US − 5	(7/36, +$9.00; 29/36, −$0.05)	14.9
US − 25	(7/36, +$9.00; 29/36, −$0.25)	11.7

Table 2b. Mean attractiveness ratings for three tasks

Task	Gamble	Mean rating
UKbase	7/36 + £9; 29/36 win nothing	9.28
UK-5	7/36 + £9; 29/36–£0.05	13.24
UK-25	7/36 + £9; 29/36–£0.25	12.61

The original studies were conducted with three groups of subjects at the University of Oregon. Each group evaluated only one gamble, either USbase (7/36 win $9; otherwise win nothing), US − 5 (7/36 win $9; otherwise lose 5¢), or US − 25 (7/36 win $9; otherwise lose 25¢). The gambles were rated on the 0-20 scale of attractiveness shown at the bottom of Figure 1. The results are shown in Table 2a. The gamble US − 5 was rated more attractive than the gamble with no loss ($p < 0.001$) as was gamble US − 25 ($p < 0.05$). Gamble US − 25 was rated less attractive than gamble US − 5, but the difference was not statistically significant.

These findings have more recently been replicated in the United Kingdom with 105 students (three groups of approximately 35) from the University of East Anglia (UEA). One group faced a task (UKbase) identical to USbase task but with a payoff of £9 (UK pounds) instead of $9. As in the Oregon experiments, the UEA experiments included a second task (UK–5) which replaced the otherwise win nothing outcome in the base task with a small loss (5 pence) and a third task (UK-25) which involved a larger (but still small) loss of 25 pence.

The mean attractiveness ratings for the three tasks are shown in Table 2b. The overall pattern of results is almost identical to the results obtained earlier in the United States. Application of *t*-tests and Mann-Whitney tests (these always agreed) showed that Bets UKbase and UK–5 differed at $p < 0.01$, UKbase and UK-25 differed at $p < 0.05$ and UK–5 and UK-25 did not differ significantly (though the lesser attractiveness of the gamble with the 25p loss replicated the result found in the original U.S. study).

Joint evaluation

Perhaps the enhanced attractiveness of the gamble with the small loss is due, not to increased appreciation of the $9 or £9 payoff but rather to the attractiveness of taking a small risk? An additional study in the U.K. speaks to this explanation. Forty-four subjects from the UEA saw both gambles, UKbase and UK–5 together. They rated each gamble on the 0–20 scale of attractiveness. The results were almost the mirror-image of the between-groups findings described above. Under joint evaluation, the base gamble was judged far more attractive (mean rating 13.09) than the gamble with the small loss (mean rating 9.82). The difference was statistically significant ($t = 2.50$; $p < 0.02$). Much as Hsee (1996a) has demonstrated preference reversals in going from joint to separate evaluations, the same occurred here with these gambles. The results do not support the hypothesis that our subjects are attracted by the risk of a small loss. They also show that there are several ways to create a context to evaluate these gambles: by adding a small loss or by adding another gamble for comparison (see also Parducci, 1995 and Birnbaum, 1999 for further examples of these sorts of contextual effects).

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Table 2c. Mean attractiveness ratings for SUNY Plattsburgh tasks

Task	Gamble	Mean rating
NYbase	7/36 + $9; otherwise win nothing	8.66
NY − 5	7/36 + $9; 29/36 + $0.05	12.20
NY + 5	7/36 + $9; 29/36 + $0.05	11.40
NYbase*10	7/36 + $90; 29/36 + $0.05	10.48

Other variations

A subsequent study was conducted at the State University of New York at Plattsburgh with five separate groups each comprising 50 subjects. Each subject was presented with just a single gamble to rate (Bateman, Dent, Slovic, & Starmer, 2006). The gambles studied were analogs of USbase and US − 5 (designated NYbase and NY − 5) plus two new gambles: ''NY + 5'' replaced the small loss outcome with a small gain; ''NYbase*10'' is the base problem but with the winning outcome increased by a factor of 10. Participants in each group rated only one gamble. The results are shown in Table 2c.

Comparing NYbase and NY − 5 we see the now familiar effect of between-groups studies with these gambles: introducing a small loss increases the mean attractiveness rating ($t = 3.31$, $p < 0.001$). Interestingly, the mean for NY + 5, offering the possibility of either $9 or a 5¢ *gain*, was 11.40. Although this is still significantly higher than NYbase ($t = 2.81$, $p < 0.01$), it is slightly lower than the mean for NY − 5 with the 5¢ loss. The difference between the mean rating of NY + 5 and NY − 5 is not statistically significant ($t = 0.75$), but their relative ordering appears to stem from a small percentage of high ratings for NY + 5 (only 24% of subjects gave it a score of 16 or above) relative to those for NY − 5 (which had 42% of ratings at 16 or above). We can speculate that, relative to the positive affect of the NY − 5 bet, the prospect of winning just 5¢ rather than $9 causes the NY + 5 bet to be viewed somewhat negatively; i.e. while NY − 5 offers a ''good loss'' relative to the possible payout, the $0.05 outcome of NY + 5 might be perceived as a ''bad gain.'' However, as NY + 5 has no possibility of loss, it also received fewer low ratings than NY − 5 such that, the variance of the distribution of ratings for NY − 5 is greater (33.0) than the variance for NY + 5 (23.4), though the difference is not statistically significant (Levene's test statistic is 1.89, $p = 0.17$).

The mean rating for NYbase*10 was only 10.48. This is not significantly higher than the rating for the base problem and it is *lower* than the ratings for NY − 5 and NY + 5 which feature a prize one-tenth as large. This result provides further evidence that the rating response scale is not particularly sensitive to variation of payoffs.

Taken together, these results show that very small changes (in terms of expected value) in the patterning of gamble payoffs can have very large effects in gamble evaluations, while large changes (in expected value) can have negligible effects. We also suggest that these effects have a natural interpretation as consequences of affective responses. The basis for this claim is that the hypothesis based on affect provides a way of making sense of what would otherwise appear perverse effects. In particular, why would the introduction of a small loss *increase* its attractiveness? The joint evaluability study in the UK did not support an explanation based on an attraction to the risk of a small loss. We suggest, instead, that affect and evaluability provide a credible explanation for this anomalous effect.

Later in this paper we provide specific evidence supporting this interpretation based on affect. Before doing so, however, we turn to two additional studies, which address a possible criticism of our results so far.

Response mode robustness

One limitation of the results we have provided so far is that they are all generated from rating tasks using a similar response mode. A natural question to ask, therefore, is whether our results are peculiar to that type of task? It seems at least possible that this could be so. For instance, recall that our response scale was bounded on the attractiveness interval 0–20 with its midpoint at 10. Notice that probabilities also have bounds and a

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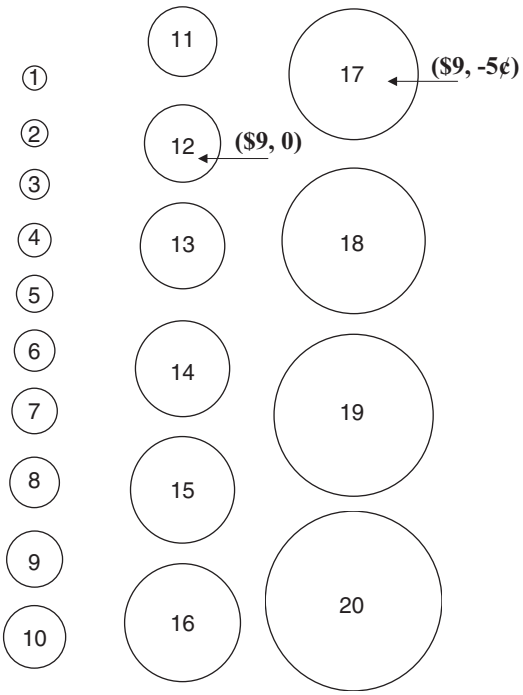

Figure 2. Size of median circles indicating the attractiveness of two gambles

midpoint at 0.5. Note also the jump in mean attractiveness going from 14/36 to 21/36 (crossing the midpoint) in Table 1. Maybe it is simply easier to map 7/36 onto this bounded, linear attractiveness scale (below the midpoint) than to map $9 onto it, without the aid of a small loss? If so, it could be that the effect we are observing is a feature of this particular response scale and not a more general result of affective reactions to the gamble stimuli.

We provide a first test of this conjecture by replicating the study with a response mode that is unbounded and without a midpoint. Specifically, 201 students at the University of Oregon were asked to indicate the attractiveness of a gamble (either USbase, or US − 5), by drawing a circle. According to the instructions, the more attractive the gamble, the larger the circle that should be drawn.[4] USbase was evaluated by 98 persons, and 103 judged the gamble US − 5. A scoring template made up of different sized circles was constructed and placed over the responses in order to assign a number to each circle drawn. The median responses, presented in Figure 2, showed a strong and statistically significant difference in attractiveness favoring US − 5 ($p < 0.01$; median test). Thus, the 5¢ loss effect does not depend upon the 0–20 scale of attractiveness.

While this replication is reassuring, the 'circles' response mode still has a generic similarity with the initial response modes: both are rating tasks requiring the responder to indicate the attractiveness of a single gamble. In view of this, a second robustness check was performed by testing for our original effect in a *choice task* rather than a rating task. Two studies, one in the U.S. and one in the U.K., used choice as the mode of response.

The choice experiments compare the attractiveness of the base gamble (USbase or UKbase) and the small-loss gamble (either US − 5 or UK − 5) against a sure gain. Of course, if the sure gain is large, many

[4]Specifically, instead of responding to the gamble on the 0–20 scale of attractiveness, respondents were instructed to: ''Indicate your feeling about the attractiveness of playing this bet by drawing a circle on the back of this page. If the bet appears rather unattractive, draw a small circle. If it appears very attractive, draw a large circle. If it is somewhere in between, drawn an in-between size circle.

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may choose it, thus obscuring any differential attractiveness of the two gambles. We therefore used two different values for the sure gain, one half the size of the other.

The U.S. study asked 96 University of Oregon students to choose between playing a gamble and receiving a sure gain of \$4. For 45 (51) students, the gamble was USbase (US − 5). Whereas only 29.9% chose USbase over the \$4, 35.5% chose US − 5. This difference, however, was not statistically significant ($\chi^2 = 1.83$; $p < 0.20$). The same subjects made a second choice with \$2 as the sure gain. This again favored the gamble with the small loss (US − 5) which was chosen over the \$2 gain by 61.0% participants, compared to 33.3% who selected USbase over the sure gain. The difference was statistically significant ($\chi^2 = 7.22$; $p < 0.01$).

The U.K. study tested 120 adults in Aberdeen, Scotland, with essentially the same design, except for the payoffs being in pounds and pence. The results were quite similar to those in the U.S. study. Against the sure gain of £4, UK − 5 was selected by 36.7% of the respondents compared with 33.3% for UKbase. This difference was not statistically significant. However, as in the U.S. study, the gamble with the 5p loss (UK − 5) was selected far more often against the sure gain of £2 (63.3%) than the gamble without the loss (41.7%; $p < 0.02$).

Together, the studies employing circle responses and choices suggest that the increased attractiveness of the gamble with the small loss generalizes across response modes.

DIRECT TESTS OF THE AFFECT ACCOUNT

Rating affect

The affect explanation of the 5¢ loss effect proposes that \$9 within the payoff combination (\$9, win nothing) is not evaluable, and that adding the 5¢ loss makes \$9 ''come alive with feeling'' and causes it to become weighted in the judgment of attractiveness. In order to challenge this interpretation, more direct tests of the affect account were designed and conducted.

In these tests, subjects were asked to rate the affective valence of the stated probability and payoff as well as rating the overall attractiveness of the gamble. In the first of two experiments, 33 University of Oregon students rated the attractiveness of USbase and 34 rated US − 5. The now familiar result was obtained: the gamble with the loss was rated more attractive ($t = 1.82$; $p < 0.05$, 1 tailed test). In addition to rating attractiveness, subjects were asked to judge the affective valence of the 7/36 probability and the valence of the payoff combination (either \$9, win nothing or \$9, −5¢) by indicating how many people out of 100 would like or dislike these attributes to varying degrees (see instructions in Figure 3). The seven response categories were coded −3 (dislike very much) to +3 (like very much) for the analysis. Means and correlations are shown in Table 3.

The results in Table 3 support the affect account of the 5¢ loss effect. First, the mean affect for the 7/36 probability was slightly negative for both gambles, and did not differ significantly between the gambles. However, the liking for the \$9, −5¢ payoff combination was much greater than liking for the \$9, win nothing combination ($t = 2.71$; $p < 0.01$). The correlations, across subjects, between attractiveness ratings and the valences are also revealing. Attractiveness was correlated primarily with liking for probability in the no-loss gamble and primarily with liking for payoff in the −5¢ loss condition. Thus, the −5¢ loss did seem to enhance the meaning and importance of the gamble payoffs.

In the second direct test, 285 University of Oregon students rated the attractiveness of one of three gambles: either USbase or US − 5 or a new gamble US + 5 (i.e., 7/36 win \$9; 29/36 win 5¢)

After making their rating, they were asked to indicate how they felt about the \$9 outcome on a 9-point scale going from very bad (−4) through neutral (0) to very good (+4). They were then asked to rate the other outcome of the gamble, either win nothing, lose 5¢, or win 5¢, depending upon which gamble they had seen. The results, presented in Table 4, again support the affect explanation. As before, the 5¢ loss enhanced attractiveness relative to the (\$9, win nothing) gamble ($t = 5.73$; $p < 0.001$). Note that the gamble with the 5¢ gain was less attractive than the gamble with the loss. Although this difference was not statistically significant, it replicates prior

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Now imagine 100 people like those who are participating in this experiment. Suppose these 100 people were looking at the bet you just rated:

7/36 to win $9.00
29/36 to lose 5¢

Think first about the 7/36 chance of winning. Of these 100 people, how many of them do you believe would dislike this probability, how many would feel neutral about it, how many would like it, etc.? Indicate your answers by putting numbers in the blank spaces below the 7/36. **These numbers should add to 100.**

Next, do the same for the bet's possible payoffs: win $9 or lose 5¢. How many of 100 would dislike these two payoffs, how many would feel neutral about them, how many would like them? Again, put the number of people in each blank space below the payoff.

Category Code	7/36	Number of people	$9 or –5¢	Number of people
-3	dislike very much	_____	dislike very much	_____
-2	dislike moderately	_____	dislike moderately	_____
-1	dislike slightly	_____	dislike slightly	_____
0	neutral	_____	neutral	_____
1	like slightly	_____	like slightly	_____
2	like moderately	_____	like moderately	_____
3	like very much	_____	like very much	_____
	Total	_____	Total	_____
		(should =100)		(should =100)

Figure 3. Instructions and Coding for the First Valence Rating Experiment

findings. Table 4 also shows that the affect valence for $9 was substantially more positive for US − 5 compared with the other two conditions. When $9 was paired with win nothing, 40% of its affect ratings were neutral compared with 21% when it was paired with −5¢. Similarly, the percentage of +3 and +4 (very good) ratings was only 9% for USbase compared to 44% for US − 5. These results provide clear support for the hypothesis that that $9 did indeed "come alive with feeling" when paired with a small loss.[5]

[5]The greater attractiveness of $9 in the loss condition perhaps may answer a puzzling question raised by the choice study reported above: Why did gambles US − 5 and UK − 5 fare only slightly better against the $4 (£4) sure gain than did their no-loss counterparts? Perhaps the relatively greater attractiveness of $9 in the loss bet also enhanced the attractiveness of the $4 alternative via an anchoring process. The $2 (£2) sure gain, being smaller, may not have been as influenced by the $9 anchor. This speculative answer could be tested using the methods described earlier for directly assessing affect.

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Table 3. Results of the first affect rating experiment

	USbase (7/36 $9; otherwise win nothing)	US − 5 7/36 $9; −5¢
Liking for Probability (7/36)[1]	−0.07	−0.16
Liking for Payoff Outcomes[1] ($9; win nothing) or ($9; −5¢)	0.16	0.92
Correlations with 0–20 ratings of attractiveness		
Liking for Probability	0.52	0.10
Liking for Payoff Outcomes	0.21	0.60

[1]Mean Values: The 7-category affect rating scale ran between dislike very much (coded −3) and like very much (coded +3).

Table 4. Results from the second affect rating study

	Condition		
	USbase ($9; win nothing)	US − 5 ($9, −5¢)	US + 5 ($9, +5¢)
Attractiveness (0–20)	7.2	12.8	11.8
Affect for $9	0.4	1.8	1.0
Affect for other outcome (0, −5¢, or +5¢)	−1.5	0.4	0.3
N	72	72	141

Note: The rating scale for affect ranged from −4 (very bad) to +4 (very good).

Turning to the ''other outcome,'' the valence was much more positive for the 5¢ loss than for the win nothing outcome ($t = 7.3$; $p < 0.001$). The 5¢ loss was even rated slightly more favorably than the 5¢ gain, though this difference was not statistically significant.

Affect ratings were correlated, across subjects, with attractiveness ratings. Affect for $9 correlated positively with attractiveness in each condition, but the highest correlation ($r = 0.73$) occurred when $9 was combined with the 5¢ loss. Affect toward the other outcome correlated most highly with attractiveness when that outcome was the 5¢ loss. Interestingly, that correlation was positive ($r = 0.36$; $p < 0.05$). The more attractive the 5¢ loss, the more attractive the gamble, consistent with our speculation that the 5¢ loss is a ''good'' loss.

These results confirm that the combination of $9 and −5¢ conferred a special affective quality on that gamble, enhancing the attractiveness and the importance of both the $9 payoff and the 5¢ loss.

One hallmark of affect is the degree to which subtle features of a stimulus representation can manipulate feelings and thus influence judgments and decisions, especially when other attributes of the stimulus are low in evaluability. An example of this is the importance of the book's condition (''like new'' vs. ''torn cover'') in Hsee's dictionary example described earlier. We attempted a ''torn cover'' type manipulation by varying the representation of the win nothing outcome for the $9 gamble. Two rating conditions, each with 50 subjects, were run in Plattsburgh, comparing:

US-NoWin 7/36 win $9; 29/36 you win nothing

and US-NoLoss 7/36 win $9; 29/36 you lose nothing

We predicted that the more positive tone of ''you lose nothing'' would cause US-NoLoss to be rated more attractive than US-NoWin where ''you win nothing.'' This prediction was confirmed. The US-NoWin gamble received a mean rating of 9.0; but the US-NoLoss gamble, where the 0 outcome was reframed as ''you lose nothing,'' received a much higher mean rating of 13.2 ($t = 3.8$; $p < 0.001$). Interestingly, the ''lose nothing''

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bet rating of 13.2 is significantly greater ($t = 2.51$; $p < 0.02$) than that for the bet with a potential \$90 payoff. This was the NYbase*10 bet (7/36 + \$90; 29/36 win nothing), for which the mean rating was 10.48.

DISCUSSION

What have we learned from inflicting these few simple gambles on hundreds of individuals, on both sides of the Atlantic? At one level, we have learned that the rated attractiveness of the gamble in the base task (7/36 to win 9 (\$ or £); 29/36 to win nothing) is reliably enhanced when the second outcome is changed to a small loss. This effect occurred with attractiveness expressed as the size of a freely drawn circle as well as with a numerical rating scale. The effect also occurred with choices between a gamble and a sure gain. Though some may be tempted to dismiss the basic effect as merely making a gamble more interesting or exciting by adding the chance of loss, this explanation fails because side-by-side comparison showed a clear attractiveness advantage for the gamble without a loss.[6]

Although these findings are certainly a narrow starting point for general theory, the plot thickened when affect was invoked as an explanatory factor and an affect account was supported by experiments in which the gambles' component attributes were rated on valence (i.e., their goodness, badness, or likeability). The \$9 outcome was found to evoke rather neutral feelings in the context of its alternative, ''win nothing.'' The mediocre attractiveness of the no loss gamble is driven by the somewhat negative feelings associated with its 7/36 probability of winning. But \$9 is seen in a favorable light and becomes an important factor contributing to the gamble's attractiveness, when it is paired with a 5¢ loss. This result is congruent with the concept of evaluability that has been shown to influence a wide range of judgments and decisions (Hsee, 1996b). The essence of evaluability is that affect conveys meaning upon information. Without affect, information lacks meaning and will not be given weight in decision making.

Taking a broader perspective, our studies of these few simple gambles demonstrate the importance of context in the ''construction'' of utility and preference. One might expect that a lifetime of learning would imbue us with a clear sense of the value of such a familiar quantity as \$9 or £9. Instead, we find that this value depends greatly on context. In this light, we see a link between the 5¢ loss effect and the many diverse observations that led Kahneman and Tversky (1979) to propose a value function for Prospect Theory that was defined on gains and losses (''goods'' and ''bads'') rather than on total wealth (likely to be less evaluable). Indeed the present findings contribute to a broader conception in which important preferences may not exist within us, waiting to be elicited but, instead, are constructed during the very process of elicitation or decision (Lichtenstein & Slovic, 2006; Slovic, 1995). In an interesting twist to this general story Peters, Västfjäll, Slovic, et al. (2006) hypothesized and found that the effect of the small loss is driven by individuals higher in ''numeracy'' (skill with numbers) presumably because they draw more meaning from the numerical comparison of the \$9 and 5¢ loss, compared to those low in numeracy.

Generalization to decisions with real consequences

Although the experiments described in this paper were all conducted with hypothetical payoffs, there is evidence that the affect-driven context dependency we observed would be as strong for gambles with real

[6]A referee of this article asks why the zero outcome does not provide as good a level of comparison as either the 5¢ loss or the 5¢ gain: ''Is it because people take the ratio of outcomes and don't know how to divide by zero?'' Our sense is that the description of the gambles called attention to the small loss and small gain, which were placed right under the 7/36 win \$9. The win nothing outcome appeared only in text in two places not immediately below the gamble (see Figure 1). This may have reduced any tendency to compare \$9 with 0. Also, the effect of the zero outcome is likely quite sensitive to subtle aspects of its description. As we saw in the Plattsburgh replication, placing 29/36 win nothing in the description of the gamble did not enhance its attractiveness and, in fact, produced a much lower rating than did 29/36 lose nothing.

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payoffs. Indeed, Bateman, Slovic, and Starmer (2006) have conducted a study in which both the UKbase gamble and the UK − 5 gamble were embedded in a set of 13 diverse items (e.g. you receive an envelope containing 5£; you receive a box of 11 handmade Belgian chocolates; you receive a free, medium sized box of Cornflakes; etc.). Each item was rated on the same 0–20 scale of attractiveness. At the outset, participants were told that, after they had rated each item, two of the eleven would be selected at random and they would receive the item they had rated more attractive. Thus, if the most attractive item in a pair was one of the gambles, they actually played the gamble and received either £9 or the other outcome (0 or −5p). The first-time ratings of the two real gambles were virtually identical to the ratings of the hypothetical gambles described in the present study. The gamble with the 5p loss was rated far more attractive.

One referee of this article questioned whether the results would generalize to gambles involving losses. Perhaps losing $9 would produce a more precise affective impression than winning $9. We did not test this hypothesis. However, there is ample evidence that numerical representations of large losses of life, as occur in mass murder or genocide, often convey little or no affect (Slovic, 2006). But some large numbers do appear to carry special affective ''prominence'' or meaning (Albers, 2001), as when the outcome reaches $1,000 or $1 million or, in the case of the lottery, hundreds of millions of dollars (see e.g., Associated Press, 2001).

One might also ask whether the present results could generalize to gambles evaluated in terms of buying and selling prices. Because prices have been shown to be constructed by means of an anchoring and adjustment process and because the likely anchor ($9) was the same for both loss and no loss gambles, we would expect little or no price advantage for the loss bet.

Another referee questioned the seriousness of the mistakes made by participants in our studies who found the 5¢ loss gambles attractive. What is the boundary of this effect? How large will the loss have to be before the attractiveness of the gamble with the negative outcome becomes equal in attractiveness to the gamble with the zero outcome? We found that boosting the loss to 25¢ or 25p decreased the attractiveness only slightly, compared to US − 5 or UK − 5 (see Table 2a), leaving the loss gamble still significantly more attractive than the base gamble. We did not examine gambles with losses any larger than 25¢ (25p).

On reflection, this is too narrow a perspective on the importance of the affect-induced contextual effects documented here. A broader perspective would take account of the fact that affective processes similar to those underlying the 5¢ loss effect can be seen as contributing to the construction of preferences in many areas of economic, social, and political life. Consider, for example, the well known asymmetric dominance effect observed in choice experiments. First studied by Huber, Payne, and Puto (1982), an asymmetrically dominated alternative is dominated by one item in the choice set but not by another. Huber et al. observed that adding such an alternative to a choice set can increase the probability of choosing the item that dominates it. This violates a fundamental assumption of most choice theories—namely that the addition of a new alternative cannot increase the probability of choosing a member of the original set (see also Bateman, Munroe, & Poe, 2005). Asymmetric dominance bears a resemblance to the 5¢ loss effect described in the present paper. If alternative X is paired with alternative Y in the original choice set, adding a new alternative, Z, that is dominated by X but not by Y, makes X ''look good,'' thus enhancing its attractiveness in competition with Y. Note the similarity with the effect that the 5¢ loss has in making $9 look good. Doyle, O'Connor, Reynolds, and Bottomley (1999), demonstrated the asymmetric dominance effect with real purchases in a grocery store. They concluded that the effect is robust, sizable, and of practical significance.

Other judgment and decision making contexts in which affective processes have been shown to be important include destination preferences for vacations, jobs, and retirement (Slovic et al., 1991), risk perception (Loewenstein et al., 2001; Slovic, Finucane, Peters, & MacGregor, 2004), consumer product scares (Mitchell, 1989; Powell, 2001), marketing and advertising (Packard, 1957; Clark, 1988), insurance purchases (Hsee & Kunreuther, 2000), punitive damage awards by juries (Kahneman, Schkade, & Sunstein, 1998), environmental protection (Slovic & Slovic, 2004/2005) and response (or non-response) to lifesaving opportunities (Fetherstonhaugh, Slovic, Johnson, & Friedrich, 1997; Slovic et al., 2002; Slovic, 2006).

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Affect and rationality

Contemplating the workings of the affect heuristic may help us to appreciate neuroscientist Antonio Damasio's (1994) contention that rationality is not only a product of the analytical mind, but of the experiential mind as well:

> The strategies of human reason probably did not develop, in either evolution or any single individual, without the guiding force of the mechanisms of biological regulation, of which emotion and feeling are notable expressions. Moreover, even after reasoning strategies become established ... their effective deployment probably depends, to a considerable extent, on a continued ability to experience feelings (p. xii).

Consistent with this view, Damasio documents the difficulties that individuals have in making good decisions when brain damage has impaired their ability to attach feelings to the anticipated outcomes of their actions. However, affective feelings are not always beneficial. Strong feelings can desensitize us to differences among probabilities and outcomes (Hsee & Rottenstreich, 2004; Loewenstein et al., 2001; Rottenstreich & Hsee, 2001; Sunstein, 2003).

In addition, affect can sometimes deceive us through its strong dependency upon context and experience (Slovic, 2001; Slovic et al., 2002). As we have seen in the present study, affect appears to have led the objectively inferior gamble to appear more attractive under certain circumstances. A challenge for future research is to better identify when affect facilitates good judgments and decisions and when it leads us astray.

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