

Research Report

THE RELATIVE WEIGHTING OF POSITION AND VELOCITY
IN SATISFACTIONChristopher K. Hsee, Robert P. Abelson, and Peter Salovey
Yale University

Abstract—*Satisfaction with a desired outcome depends both on its position (i.e., the actual value of the outcome) and on its velocity (i.e., the change in the value). In a questionnaire study, we investigated factors that influence the relative weighting of position and velocity in satisfaction and found that the relative weight of velocity loomed larger when the outcome was (a) framed in terms of change (rather than in terms of overall position), (b) related to consummatory (rather than instrumental) behaviors, or (c) internally (rather than externally) controlled. The findings suggest that the relative importance of position and velocity in satisfaction varies, depending on the condition and nature of the outcome.*

An important topic in social psychology and decision research is the relation between desired outcomes and satisfaction, for example, between a student's grades and her satisfaction with the grades, or between a worker's salary and his satisfaction with the salary.¹ An obvious relation is that satisfaction depends on the actual level, which we shall call position, of the outcome. For example, a worker will be happier if he earns \$30,000 per year than if he earns \$20,000 per year.

However, satisfaction also depends on the change, which we call velocity, of an outcome. Regardless of the actual level of his salary, for example, a worker will be happier if his salary increases (i.e., velocity is positive) than if it decreases (i.e., velocity is negative). There has been abundant evidence for this no-

tion in social psychology and related areas (e.g., Aronson & Linder, 1965; Brickman & Campbell, 1971; Brickman, Coates, & Janoff-Bulman, 1978; Carver & Scheier, 1990; Diener, 1984; Frank & Hutchens, 1988; Frijda, 1988; Hsee & Abelson, 1991; Loewenstein & Sicherman, 1989; Murray, 1988). In an early study, for example, subjects toward whom a confederate changed her attitudes from negative to positive felt more positive about the confederate than subjects toward whom the confederate expressed constantly positive attitudes (Aronson & Linder, 1965). In a more recent study, subjects watched a series of hypothetical outcomes changing in real time on a computer screen, and indicated greater satisfaction with outcomes having more positive velocities than those having less positive (or more negative) velocities (Hsee & Abelson, 1991).²

More often than not, satisfaction is determined by both the position and velocity of an outcome (Hsee & Abelson, 1991; see also Tversky & Griffin, in press). Roughly speaking, satisfaction is a weighted sum of the two attributes:

$$\text{Satisfaction} = w \text{ Position} + (1 - w) \text{ Velocity} \quad (1)$$

where w indexes the relative weighting of the two attributes. The question here is, How do we determine w ? We believe that the relative weighting is not fixed; it varies from situation to situation. The purpose of this article is to investigate factors that influence the relative weighting.

2. Strictly speaking, velocity indexes both direction of change (i.e., increase versus decrease) and speed of change in a given direction (e.g., slow increase versus fast increase) (cf. Hsee & Abelson, 1991). In this article, for clarity and simplicity, we limit the notion of velocity to direction of change only.

FRAMING: AVERAGE
VERSUS CHANGE

People's preference for two normatively identical options can be altered by the semantic framing of these options (Kahneman & Tversky, 1979; Loewenstein, 1988; Payne, Laughhunn, & Crum, 1980; Tversky & Kahneman, 1981). For example, framing a safe option and a risky option in terms of money to be saved induces people to choose the safe option, but framing the same two options in terms of money to be lost leads people to choose the risky option (Kahneman & Tversky, 1984). This finding suggests that people often encode external events according to the way in which the events are presented rather than to their underlying values. Based on this notion, we propose that, if an outcome is framed such that its position appears more salient, then the position effect would weigh more heavily; if an outcome is framed such that its velocity appears more salient, then the velocity effect would weigh more heavily.

We tested this hypothesis (and the other hypotheses to be discussed later) on 96 undergraduates at a large state university who participated in return for \$2.00 each. In a questionnaire, we asked them to indicate their relative satisfaction (RS) between two hypothetical outcomes, one having a greater overall position but a negative velocity (denoted here as the Greater Position Outcome or GPO), and the other having a smaller overall position but a positive velocity (denoted here as the Greater Velocity Outcome or GVO). The questionnaire had two parallel versions; in one, the outcome was salary, and in the other the outcome was grades. Each subject completed both versions; order was counter-balanced. Take the salary version as example. The two hypothetical outcomes were:

GPO: Your salary was \$18,000 for the first year, \$17,000 for the second year, \$16,000 for

Correspondence and reprint requests should be addressed to Christopher K. Hsee, Department of Psychology, Yale University, Box 11A Yale Station, New Haven, CT 06520.

1. Satisfaction is a rather generic concept, referring to the positiveness or negativeness of affect.

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the third year, and \$15,000 for the last year.
*GVO: Your salary was \$12,000 for the first year, \$13,000 for the second year, \$14,000 for the third year, and \$15,000 for the last year.*³

Subjects were asked to suppose that they had worked for a company for four years and that, as previously planned, they would quit the job to resume school.⁴ Then they rated the two outcomes on a 9-point scale with "1" indicating greatest satisfaction with *GPO* and "9" greatest satisfaction with *GVO*. These ratings represented a control condition.

Next we reframed the above two outcomes in two different ways (conditions), and, in each condition, asked subjects to rate the two outcomes again. In the *average condition*, we framed the two outcomes in terms of their cumulative averages so that the overall position of the outcomes would appear more salient:

GPO: Your salary was \$18,000 for the first year; your average salary over the first two years was \$17,500, over the first three years was \$17,000, and over the entire four years was \$16,500.

GVO: Your salary was \$12,000 for the first year; your average salary over the first two years was \$12,500, over the first four years was \$13,000, and over the entire four years was \$13,500.

In the *change condition*, we framed the two outcomes in terms of their increase or decrease so that the velocity of the outcomes would be more salient:

GPO: Your salary decreased \$1,000 for each of the four years you worked, and your salary for the last year was \$15,000.

GVO: Your salary increased \$1,000 for each of the four years you worked, and your salary for the last year was \$15,000.

We compared subjects' RS (relative

3. To make the two versions parallel, we constructed the questions such that each number in the grade version was the corresponding number in the salary version divided by 5,000. For instance, \$14,000 in the salary version was transformed to 2.8 grade points in the grade version, and \$16,000 to 3.2 grade points.

4. We asked subjects to assume that they had terminated the job because we did not want them to extrapolate future salary from its current trend.

satisfaction) ratings in the latter two conditions with those in the original (control) condition. Our assumption is that if *RS* shifted toward the *GPO* direction in a certain condition as compared with that in the control condition, it means that the relative weight of position loomed larger in that condition. The reason is that *GPO* had a more favorable position than did *GVO*, and the fact that relative satisfaction shifted toward the *GPO* direction suggests that satisfaction became increasingly dominated by the position effect. Conversely, if *RS* shifted toward the *GVO* direction, it means that the relative weight of velocity loomed larger.

As Figure 1(a) illustrates, compared with the control condition, *RS* shifted toward the *GPO* direction in the average condition ($F(1, 92) = 11.03, p < .005$,

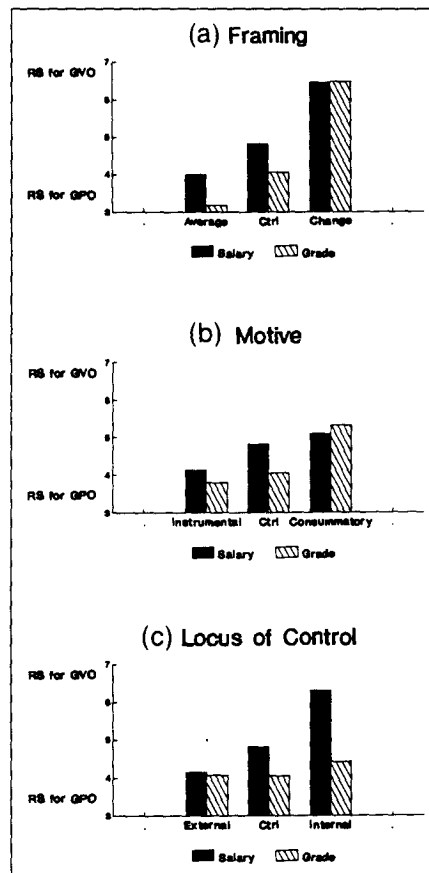


Fig. 1. Mean RS (relative satisfaction) between the greater position outcome (*GPO*) and the greater velocity outcome (*GVO*) as a function of (a) framing, (b) motive, and (c) locus of control. Higher numbers indicate greater RS and *GVO*, and, equivalently, lower numbers indicate greater RS for *GPO*.

over both versions), and shifted toward the *GVO* direction in the change condition ($F(1, 92) = 47.86, p < .0001$).⁵ In support of our prediction, the relative weight of position loomed larger when the outcomes were framed in terms of overall (average) position and that of velocity loomed larger when the same outcomes were framed in terms of change.

The present framing effect shares with the traditional reference point effect the same underlying assumption that people often passively encode information according to the way it is presented (Kahneman & Tversky, 1979; Loewenstein, 1988; Payne, et al., 1980). These two effects, nevertheless, are not identical. The traditional reference point effect is intra-dimensional, in the sense that it is achieved by linearly shifting a reference point along a single dimension (often the position dimension) so that a given value will be perceived differently (as gain or loss). By contrast, the framing effect implicated here is inter-dimensional, in the sense that it is achieved by shifting one's viewpoint from one dimension (say, position) to another (say, velocity) so that the value of an outcome on the latter dimension will look more salient, and hence weigh more heavily.

MOTIVE: INSTRUMENTAL VERSUS CONSUMMATORY

A second factor influencing the relative weighting of position and velocity in satisfaction is the (perceived) purpose of the behavior associated with the outcome. Some behaviors are primarily instrumental, that is, performed to achieve some extrinsic outcomes; others are chiefly consummatory, that is, performed because the behaviors per se are enjoyable (Millar & Tesser, 1986). For instance, painting is instrumental if the painter does so only because he wants to earn money selling his works, and it is consummatory if the painter does so only because he is fond of painting per se. We speculate that when people view the purpose of their behavior as instrumental, then they will weigh the position of the outcome more heavily, because

5. Unless otherwise specified, there was no significant interaction between version and the tested factors, and the reported results were from tests that included both versions.

position reflects the degree to which the behavior achieves the goal. On the other hand, when people consider the purpose of their behavior as consummatory, then position will be less relevant, and, comparatively, velocity will become more important.

To test this hypothesis, we asked our subjects to rate their *RS* between *GPO* and *GVO* (presented in their original format) two more times; each time, they first read a set of brief instructions and then rated the outcomes. One set of instructions represented an *instrumental condition*:

Suppose that the job itself was not interesting; the only reason you worked was to earn money. The more you earned, the better.

The set of instructions represented a consummatory condition:

Suppose that you were not short of money; and the only reason you worked was that you enjoyed working there. Whatever the salary was, the more it made the job enjoyable, the better.

Again, we compared subjects' ratings in these two conditions with the rating in the original (control) condition: As expected, *RS* shifted toward the *GPO* direction in the instrumental condition ($F(1, 92) = 4.27, p < .05$), and shifted toward the *GVO* direction in the consummatory condition ($F(1, 92) = 7.58, p < .01$) (see Figure 1(b)). In support of our prediction, the relative weight of position loomed larger when subjects were led to consider their behaviors as simply a way of achieving some extrinsic rewards (here, money): the relative weight of velocity loomed larger when subjects were led to consider their behaviors as enjoyable in their own right.⁶

This finding suggests that how people

perceive the motive for an activity influences how they evaluate and feel about the outcome of the activity. If the activity is extrinsically motivated, then feelings are primarily dominated by the final product of the activity; if the activity is intrinsically motivated, then feelings are influenced by the process (increase or decrease) of the outcome as well. This proposition echoes Scitovsky's (1976) contention that people who engage in activities for their intrinsic pleasure (e.g., playing for stimulation and cooking for fun) feel about their surroundings quite differently from those who engage in activities simply to seek economically valuable substances (e.g., working for money and eating for nutrition).

CONTROL: EXTERNAL VERSUS INTERNAL

A third factor influencing the position-velocity relative weighting is the perceived locus of control of the outcome. If the outcome is perceived as internally controlled, the velocity effect will weigh more heavily because velocity in this case indexes one's progress in the desired direction (Carver & Scheier, 1990), and reflects one's ability and competence (e.g., White, 1959). On the other hand, if the outcome is perceived as externally controlled, then velocity will be less relevant, and, comparatively, consideration for the actual outcome will prevail. Some evidence for this proposition comes from a study where preference for an increasing profile in income was more pronounced when the income was from a salary, which was somewhat within internal control, than when it was from a lease, which was beyond internal control (Loewenstein & Sicherman, 1989).

To further test this hypothesis, we asked our subjects to indicate their *RS* between *GPO* and *GVO* for another two times, each time following a set of priming instructions. In the *external control condition*, the instructions were:

Suppose that in the company where you worked, the amount of salary one earns has nothing to do with the quality of his or her work. It is randomly assigned.

In the *internal control condition*, the instructions were:

Suppose that in the company where you worked, salary is strictly determined by indi-

vidual performance. The better you worked, the higher your salary.

As compared with that of the control condition, *RS* in the external control condition shifted toward the *GPO* direction, although the difference was not significant ($F(1, 92) = 2.30, ns$), and *RS* in the internal control shifted toward the *GVO* direction ($F(1, 92) = 12.72, p < .001$). There was a significant interaction between version and the locus of control conditions ($F(1, 92) = 13.80, p < .001$, excluding the control condition) (see Figure 1(c)). Further analyses on the two versions separately suggest that locus of control had significant effects on the salary version and not the grade version. In other words, for salary and not for grades, the position effect loomed larger when the outcome was perceived as externally controlled and the velocity effect loomed larger when the outcome was perceived as internally controlled.

The difference in versions, we realized in retrospect, occurred because the "default" locus of control for grade is internal ability. Although salaries sometimes also reflect internal control, it is probably much harder for subjects (all of whom were students) to imagine situations where their grades could be externally determined than situations where salaries could be. Thus, it is not that locus of control does not have an effect on the relative weighting, but that it cannot be sensibly manipulated for outcomes such as grades. It appears that the relative weighting of position and velocity depends not just on situational factors but also on the nature and default values of the outcome per se.

CONCLUSION

Satisfaction with an outcome is determined both by its actual value and by the change in the value. In this article, we demonstrated that the relative importance of the two determinants is not constant; it varies from situation to situation depending on the way the outcome is framed, the motive behind outcome-related behaviors, and the perceived locus of control of the outcome. These factors only illustrate, far from exhaust, the many factors that can influence the relative weighting. For example, the relative weighting may be related to personality variables such as individual differences

6. One reviewer implied that the instructions in the instrumental condition (which instructed subjects to evaluate the salary outcome by the amount they earned) involved demand characteristics. However, this demand was exactly what the instrumental condition, by definition, required. The "artifact" here is also the very phenomenon we tried to create. In addition, demand characteristics, even if they explained the effect of the instrumental condition, would not explain the effect of the consummatory condition.

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in the belief of locus of control (Rotter, 1966). Those who believe in internal control may appreciate the velocity effect more than those who believe in external control. The relative weighting may also depend on how people assess outcomes. People who judge the relative attractiveness of alternative outcomes may weigh the velocity effect more heavily than those who make a choice among the options (cf., Tversky & Griffin, in press; Tversky, Sattath, & Slovic, 1988). In sum, the proposition that both position and velocity determine satisfaction (Eq. 1) is but a general model. Without specifications of the relative weighting of the determinants, that model would have little descriptive power. The present research is an initial attempt toward such specification.

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