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The influence of quantity of information and goal framing on decision

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Abstract

The paper examines how goal framing (i.e. formulating the decision problem in terms of acceptance vs. rejection) interacts with the quantity of information to determine judgment and choice. We trace the interaction between goal framing and information quantity to the effect of frames on the weight associated with positive and negative information. In three experiments we show that as the quantity of information increases, the differences in choice (Experiments 1 and 3) and judgment (Experiment 2) between accept and reject frames increase as well.

1. Introduction

Framing effects occur when different formulations of a decision problem lead to different decisions. Such effects received considerable attention in recent research because they shed light on questions about human rationality, and because the study of these effects is useful in gaining understanding of the psychological processes underlying judgment and choice. Much of this research was inspired by the prospect theory of Kahneman and Tversky (1979; Tversky and Kahneman, 1981), and examined the effects of framing decisions problems in gain vs. loss terms (e.g. Meyerowitz and Chaiken, 1987; Puto, 1987; Kramer, 1989). In this paper we use the concept of framing somewhat differently. We compare decisions in which the goal of the decision was framed as acceptance (e.g. Which of two job candidates would you accept?) to decision in which the goal of the decision was framed as rejection (Which of two candidates would you reject?). We call this type of framing *goal framing*.

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Goal framing may impact decisions by influencing the extent of processing of positive vs. negative information. If the decision is framed as an acceptance decision, people are likely to test hypotheses concerning the acceptance of alternatives, and therefore they tend to attend to, and rely on, positive information more than on negative information. On the other hand, when the decision is framed as a rejection decision, the reverse is likely to occur. Consider for example the impact of framing on information search. Snyder and Campbell (1980) found that when people are asked to decide whether a target person is an extrovert, they primarily ask questions associated with extroversion, while when they are asked to decide whether the target is an introvert, they primarily ask questions associated with introversion (see also Snyder, 1981; Skov and Sherman, 1986; Devine et al., 1990). Thus, *confirmation bias* (e.g. Wason, 1960; Skov and Sherman, 1986) may mediate the effect of framing in general, and goal framing in particular, on the processing of different aspects of the input information. Recently, Westenberg and Koele (1990,1992) provided a direct demonstration of the effect of goal framing on decision processes. They found a higher tendency towards conjunctive strategy, a strategy that emphasizes the negative aspects of the input information, when the decision was framed as a rejection decision rather than when it was framed as an acceptance decision.

Consider now how goal framing affects the weight of positive vs. negative features as a function of the quantity of the input information. For simplicity, we will consider only objects that are described by an equal amount of positive and negative features (although the number of features may vary from object to object). When the number of features increases, there is more pressure on processing capacity, and consequently there is a shift in attention from frame-incompatible features to frame-compatible features. As a result, the disparity between the attention allocated to the frame-compatible features and the frame-incompatible features increases with an increase in the number of features. Since attention is a major determinant of decision weight (e.g. Anderson, 1981), increase in the number of features is associated with an overall increase in the weight of frame-compatible features and an overall decrease in the weight of frame-incompatible features (see Ganzach and Schul, 1993, for a formal model describing this process). Thus, the basic hypothesis of this paper is that when the quantity of information increases, so does the difference between preference in an accept frame and preference in a reject frame.

Mathematically this hypothesis can be expressed as follows. Let $Pa(n)$ be the preference towards an object with n positive and n negative features in the accept frame; let $Pr(n)$ be the preference towards this object in the reject frame; and let $D(n)$ denote the difference in preference between the two frames $D(n) = |Pa(n) - Pr(n)|$. Our discussion above suggests that $D(n)$ is an increasing function of n.

Recently, Shafir (1993) conducted a number of experiments that demonstrated the dependence of decision on goal framing. He compared preference towards enriched alternatives (alternatives which are described by very positive features and very negative features) to preference towards impoverished alternatives (alternatives which are described by neutral features). He showed that the degree of

extremity of the features' valence interacts with the valence of the frame in determining preferences. That is, enriched alternatives are often seen as superior to impoverished alternatives in a positive frame, but inferior to them in a negative frame (see also Lehman et al., 1992, for a similar example).

Our work differs from Shafir's work in two respects. First, we study the interaction between goal framing and information quantity rather than the interaction between valence framing and information extremity. Second, our work explores the influence of goal framing under different integration contexts. In particular, we show that the influence of valence framing on decisions depends on the integration biases induced by the integration context. In particular, it depends on the operation of *negativity bias* – the tendency for negative information to have a higher weight on decision than positive [negative] information, and on the operation of *positivity bias* – the tendency for positive information to have a higher weight on decision than negative information.

2. Experiment 1: Preference choice

In this experiment we ask subjects to choose between two persons, one described by many (positive and negative) features, and the other by a few (positive and negative) features. The choice is described either as an acceptance decision or as a rejection decision. Our prediction, derived from the discussion above, is that there will be higher preference to the many-features person in the accept frame than in the reject frame.

2.1. Method

Subjects

Eighty students participated in the experiment. Participation was voluntary. The experiment was conducted individually. Subjects were randomly assigned to one of two conditions.

Procedure

Subjects received a booklet containing three pages. Each page contained descriptions of two potential roommates, one roommate was described by six features, three of which were positive and three were negative. The other roommate was described by 12 features, six of them positive and six negative. In the accept condition subjects had to choose which person they would accept as a roommate, while in the reject condition they were to chose which person they would reject as a roommate.

Stimulus

The features describing the two potential roommates were adjectives taken from Anderson's list of personality trait words (Anderson, 1968). Eighteen positive adjectives and eighteen negative adjectives were selected from this list. From these

adjectives, three descriptions, each containing six positive adjectives and six negative adjectives, were constructed by randomly selecting from the 18 positive and 18 negative adjectives. We will label these descriptions the 6/6 descriptions to denote that they contain six positive and six negative adjectives. Each 6/6 description was further divided into two 3/3 descriptions by random assignment of half of the positive adjectives and half of the negative adjectives into each of these two descriptions. The three 6/6 descriptions and the corresponding 3/3 descriptions are presented in Appendix 1.

The actual choice problems employed in the experiment were constructed by pairing each of the three 6/6 set with each of its two 3/3 sets. Each choice problem had two versions, one in which the 6/6 set was the first and one in which the 3/3 set was the first. Thus, a total of 12 choice problems were available. Four questionnaire versions were constructed from these problems by randomly selecting without replacement three problems to each questionnaire, with the constraint that each questionnaire will not have more than one choice problem containing the same 6/6 set, and more than two problems in which a 6/6 set was the first set.

2.2. Results and discussion

In order to simplify the discussion, we will present the results of the reject condition, as well as the accept condition, in terms of preference. Out of the 120 choices made by the subjects in the positive frame condition, 52.5% favored the 6/6 description. Out of the 120 choices in the reject condition, only 34.2% of the choices favored the 6/6 description. These results are consistent with the hypothesis that there will be higher preference towards the many-features object in the accept frame than in the reject frame.

In order to test the difference in preference towards the many-features objects statistically, we counted for each subject the number of preferences for the 6/6 description. This measure can range from zero to 3, with higher scores indicating stronger preference towards the 6/6 descriptions. The mean for the reject condition was 1.025 ($SD = 0.698$) and the mean for the accept condition was 1.575 ($SD = 0.844$). The difference is significant at the 0.001 level $t(78) = 3.14$.

One interesting aspect of the findings is the asymmetry in absolute preference towards the many-features objects. While there was a clear preference for 3/3 description in the reject condition, there was only a small preference for the 6/6 description in the accept condition. The null hypothesis of no relationship between preference and information quantity can be tested by comparing the mean number of preferences to the 6/6 descriptions to 1.5. This comparison was significant in the reject condition, $t(39) = 4.24$, $p < 0.001$, but not in the accept condition, $t(39) = 0.2$. This asymmetry could be the result of a negativity bias in impression judgment. In the reject condition, the added weight of negative features induced by the negativity bias joins forces with the effect of frame, leading to clear preference of few-features persons over many-features persons. On the other hand, in the accept condition, the added weight to the negative features induced by the negativity bias conflicts with the added weight to the positive features

induced by the accept frame. Consequently, these opposing effects cancel each other, which results in indifference between many-features and few-features persons. We test this hypothesis directly in Experiment 3.

The results of this experiment could also be explained in terms of reliance on a conjunctive-choice strategy (a strategy in which an alternative is rejected if one aspect is below the rejection threshold) in the reject condition but not in the accept condition. This explanation is consistent with the low preference towards the many-features description in the reject condition: The probability of finding an aspect below the rejection threshold is higher for the many-features description. However, it should be emphasized, that a conjunctive explanation is consistent with the idea that in the reject condition the negative features have a heavier weight than the positive features; a conjunctive choice strategy is a special case of a strategy in which the more negative the feature, the higher its weight (Ganzach, 1993, 1994; Ganzach and Czaczkes, 1994). This latter strategy is more general than the simple conjunctive choice strategy, since it is relevant not only to judgment but also to choice. Experiment 2 demonstrates the effects observed in the current experiment for a judgment task.

3. Experiment 2: Preference judgment

This study examines the joint effects of information quantity and goal framing on preference judgment. If the processes underlying preference judgment are similar to the processes underlying preference choice, it should be expected that, the larger the quantity of information, the more positive the difference between positively and negatively framed judgments. Therefore, in this study we compare preference judgments of two groups. Both groups judge stimuli which vary systematically in regard to the amount of information. However, for one group, judgments are framed in positive terms, while for the other they are framed in negative terms.

3.1. Method

Subjects

Thirty students participated in the experiment. Participation was voluntary. The experiment was conducted individually. Subjects were randomly assigned to one of two conditions.

Stimulus

The stimuli used in the experiment were 30 descriptions of various "potential roommates", each described by several positive and negative traits. The traits were taken from Anderson's (1968) list of personality trait words. Thirty positive adjectives and thirty negative adjectives were selected from this list (see Appendix 2). From these adjectives we created six categories of descriptions: 2/2 descriptions, 4/4 descriptions, 6/6 descriptions, 8/8 descriptions, 10/10 descriptions and

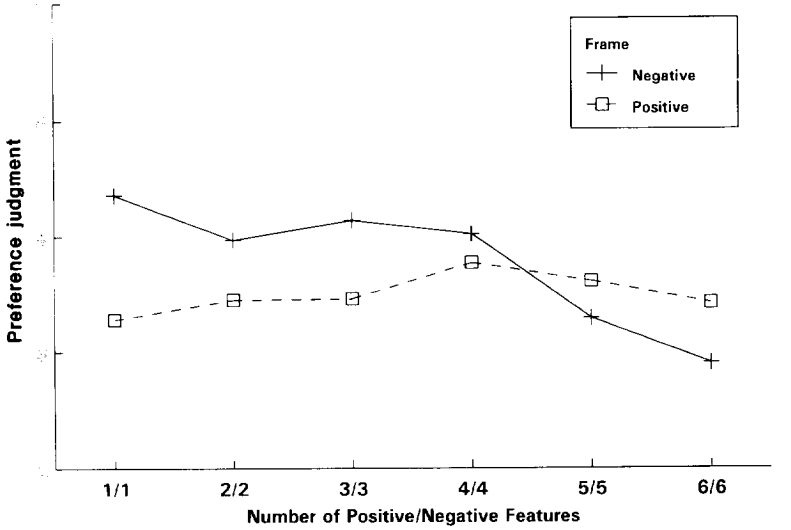

Fig. 1. Averages preference judgment in Experiment 2 by frame and category. Judgments in the reject condition were reversed and are expressed in terms of preference.

12/12 descriptions. The descriptions were created by randomly assigning the appropriate number of adjectives from the positive list and from the negative list to the descriptions, with the constraints that an adjective cannot appear more than once in a description, and that no more than three positive or negative adjectives would be adjacent. The serial position of descriptions in the booklet was also determined randomly.

Procedure

Subjects received a booklet containing the 30 descriptions, five from each category. In the accept condition, subjects made judgments about their "tendency to accept the described individual as a roommate" on a 1 to 7 Likert type scale where 1 was anchored as "very low" and 7 as "very high". In the other condition, subjects judged their tendency to reject the described individual on the same 1 to 7 scale.

3.2. Results

To simplify exposition, we reversed the judgments in the reject condition (by subtracting them from 8), so that judgments in both conditions would be expressed in terms of preference. The averages of the preference judgment of each category over all subjects in each of the two conditions are given in Fig. 1. It is clear from the figure that in the reject condition, judgments become more negative as the quantity of information increases. On the other hand, in the accept condition,

there is a (weak) tendency for judgments to become more positive as the quantity of information increases. These results are similar to the results of Experiment 1.

To test the effects of framing, we calculated for each subject the average judgment in each of the six categories, and regressed these averages on the number of adjectives of the categories. The average regression slope in the reject condition was -0.26 ($SD = 0.15$), which is significantly different from zero, $t(14) = 6.9$, $p < 0.0001$. The average regression slope in the accept condition was positive, $M = 0.043$, $SD = 0.10$, but it was not significantly different from zero, $t(14) = 1.7$, $p < 0.12$. The difference between these two slopes was significant, $t(28) = 6.7$, $p < 0.0001$. [1]

It is interesting to note that the results of Experiments 1 and 2 differ from Shafir's (1993) results with regard to the locus of the framing effect. Whereas Shafir found a larger framing effect in positive than in negative framing, we found a larger effect in negative framing. In our view, such differences are associated with the existence of negativity/positivity biases. That is, keeping information valence constant, the effect of quantity of information on decision will be stronger in positive framing than in negative framing when positivity bias is the dominant integration bias, and in negative framing than in positive framing when negativity bias is the dominant integration bias. This issue is further addressed in Experiment 3. [2]

4. Experiment 3: Choices concerning morality vs. choices concerning ability

Experiments 1 and 2 demonstrate an asymmetry between the impact of positive and negative frame on decision. In both experiments, the effect of information quantity on judgment and choice was significant under negative frame, but not under positive frame. We suggested that this asymmetry is the result of the concurrent operation of two effects: The effect of frame and the effect of negativity bias.

While a negativity bias and not a positivity bias is the most common finding in impression formation (e.g. Wyer, 1970; Kanouse and Hanson, 1972; Levin et al., 1973; Fiske, 1980; see Skowronski and Carlston, 1989, for a recent review), there may be contexts in which positivity, rather than negativity, occur. Recently,

[1] The judgments were also analyzed in a two way mixed-model ANOVA in which frame served as a between-subjects factor and the information-quantity as a within-subjects factor. Analysis of the linear contrast of information quantity revealed a significant frame by information-quantity interaction, $F(1,28) = 44.47$, $p < 0.001$. None of the other frame by trend-component interactions achieved significance.

[2] It is also important to note that Shafir did not control for the overall valence of the information. That is, it is possible that his enriched options were simply more positive than his impoverished options. The effect of negative framing could have been, therefore, primarily to eliminate the preference towards the enriched options.

Skowronski and Carlston (1987) contrasted judgments concerning morality with judgments concerning ability, and demonstrated that while the former exhibit a negativity bias, the latter exhibit a positivity bias. They argue that this difference stems from the fact that in morality judgment negative information is perceived to be more diagnostic than positive information, while in ability judgment positive information is perceived to be more diagnostic.

In this experiment we employ these two domains to illustrate the concurrent effects of goal framing and negativity/positivity bias on the relationship between the quantity of information and decision. These effects are examined in an experiment in which subjects receive "information about behaviors of two individuals". The information about one individual (the 1/1 individual) includes one positive behavior and one negative behavior, and the information about the other individual (the 4/4 individual) includes four positive and four negative behaviors. The design was 2 (domain: morality vs. ability) × 2 (goal framing: accept vs. reject) design. Our discussion above suggests that the 4/4 individual would be most preferred in the accept/ability condition, least preferred in the reject/morality condition, and moderately preferred in the accept/morality and in the reject/ability conditions. This discussion does not suggest a prediction regarding the rank order of preference for the 4/4 individual in the latter two conditions, since this preference depends on the impact of the domain factor relative to the impact of the frame factor.

4.1. Method

Subjects

Five hundred fifty-five students participated in the experiment. The experiment was conducted in various classes in the Business Administration and Sociology departments. Participation was voluntary. Subjects were randomly assigned to one of two conditions by means of the questionnaire they received.

Design

The design was a between-subjects design. In addition to the four primary conditions described above, nested within each of them were 10 counter-balancing conditions. The purpose of these conditions was to insure that overall, the valence of the 4/4 descriptions would be similar to the valence of the 1/1 descriptions. These conditions are described below.

Procedure

Subjects received one 1/1 description and one 4/4 description, printed on the same page. They were asked to read the description carefully and answer a single question which appeared on the bottom of the page. In the ability conditions they were asked to decide either "who is more intelligent" ("accept" frame) or "who is more stupid" ("reject" frame). In the two morality conditions they were asked to decide either "who is more honest" (accept frame) or "who is more deceitful" (reject frame).

Table 1
Percent subjects who evaluated the 4/4 description as more positive in Experiment 3

	Framing		
	Positive	Negative	Total
Type of decision			
Morality	49%	32%	40%
Ability	63%	58%	61%
Total	56%	45%	

Stimulus

The stimuli used in this experiment were adapted from Skowronski and Carlston (1987). In the morality conditions we used their five "moderately honest" behaviors and their five "moderately dishonest" behaviors. In the ability conditions we used their five "moderately intelligent" behaviors and their five "moderately stupid" behaviors. In each domain, the ten behaviors were divided into five pairs, each including one positive and one negative behavior. The pairs are presented in Appendix 3.

In constructing the experimental stimuli, each pair of behaviors corresponded to 1/1 individual. Each such 1/1 individual had a corresponding 4/4 individual, who was described by the remaining four pairs of behavior. This resulted in five pairs of individuals. Across these five pairs of individuals, each pair of behaviors appeared an equal number of times in the 4/4 individuals (four times) and equal number of times in the 1/1 individuals (one time).

Results

The results are displayed in Table 1 in which choices in each condition are presented in terms of the percent of the subjects who preferred the 4/4 individual; that is, the percent of subjects who thought that this individual is more honest (in the two morality conditions) or more intelligent (in the ability conditions).

In agreement with our prediction, the 4/4 individual is most preferred in the accept/ability condition and least preferred in the reject/morality condition. The results also indicate that preference for this individual in the reject/ability condition is higher than in the accept/morality condition, which suggests that the domain factor is more potent than the frame factor. The difference between the two factors can also be seen in the marginals in Table 1. While overall the two TYPES of individual are about equally preferred, the domain manipulation results in about 10% deviation from equal preference, while the frame manipulation results in a 5% deviation.

To obtain a significance measure of the two effects we performed a log-linear analysis. This analysis revealed a significant main effect for framing, $\chi^2(1) = 6.8$, $p < 0.01$, a significant main effect for type of decision $\chi^2(1) = 22.0$, $p < 0.001$, and a nonsignificant interaction, $\chi^2(1) = 2.1$, $p > 0.10$.

5. General discussion

The studies reported here demonstrate the effect of goal framing on decision. The results indicate that when the quantity of information increases so does the difference between the response in an accept frame and the response in a reject frame. The findings also indicate that additional effects, and in particular positivity/negativity bias, may mediate the effect of goal framing on decision.

We suggest that the effect of goal framing observed in the studies reported in this paper is due to frame dependent weight of positive and negative features. Goal framing is likely to influence decisions through a confirmation bias (Wason, 1960; see also Klayman and Ha, 1987, for a recent review), a bias that makes frame-compatible features more salient, and therefore more important, in determining decisions. Confirmation bias may affect saliency by focusing attention on frame-compatible features, or by inducing a search which is biased towards these features. Note that while in our studies there is no direct evidence for the mental processes that lead to the difference between decisions under accept and reject frames, Westenberg and Koele's studies (1990, 1992) provide more direct information about these processes through process tracing techniques. They show that the search for information in the reject frame, but not in an accept frame, is consistent with a conjunctive strategy.

Frame-dependent weight is not unique to the phenomena analyzed in this paper. Other findings in the decision literature can be understood as resulting from the dependence of weight on frame. Consider for example asymmetries in similarity judgment (Tversky, 1977). While these effects are not usually discussed in terms of framing, they can provide a good example of the relationship between framing, input saliency and decision outcome. As an illustration, consider Tversky's study concerning the asymmetry between judgment of similarity and judgment of difference. The results of this study show that the weight of the common features is higher in judgments of similarity than in judgments of difference, and that the weight of the distinctive features is higher in difference judgments than in similarity judgments. As Tversky notes, framing may influences the relative salience of the common and the distinctive features and thereby influence their weight in judgments. Tversky (1977) also reports framing effects that result from differences in the salience of the features of "good forms" and "bad forms"; in differences in the salience of the features of "complex forms" "simple forms"; and in differences in the salience of the features of the subject of comparison and the referent of the comparison. All of these findings can be viewed as resulting from the impact of framing on saliency, and therefore on weight.

The impact of framing on features' salience, and its subsequent influence on decision was also shown to play a role in decisions that do not involve similarity (or difference) judgment. Recently, Houston et al. (1989) showed that in choosing between a stimulus alternative whose features can be viewed by the subject and an alternative whose features have to be retrieved from memory, the unique features of the former alternative, being more salient at the time of decision, weighs more heavily than the unique features of the latter.

Our theoretical account for the effect of framing is based, primarily, on the tendency to divert attention from frame-incompatible aspects of the information to frame-compatible aspects of the information when pressure on processing capacity increases. This suggests that any manipulation that affects attention, and not just manipulating the amount of information, may affect the response difference between frames. In particular, it will be interesting in future research to examine how time pressure, or the allocation attention to additional task (in a dual task paradigm), influence the response difference between accept and reject frame.

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Appendix 1

The descriptions of Experiment 1

1. 6/6 description: helpful, patient, humorless, cold, intelligent, efficient, unfriendly, understanding, neat, bossy, jealous, cowardly.
   3/3 descriptions: cold, efficient, understanding, neat, jealous, cowardly. helpful, patient, humorless, intelligent, unfriendly, bossy.
2. 6/6 description: warm, disobedient, humorous, lazy, irritating, loyal, dependable, kind, irritable, impolite, responsible, conceited.
   3/3 descriptions: dependable, kind, irritable, impolite, responsible, conceited. warm, disobedient, humorous, lazy, irritating, loyal.
3. 6/6 description: greedy, honest polite, loud-mouthed, trustworthy, gloomy, talented, friendly, gossipy, snobbish, pleasant, narrow-minded.
   3/3 descriptions: honest, loud-mouthed, trustworthy, gloomy, friendly, snobbish. greedy, polite, talented, gossipy, pleasant, narrow-minded.

Appendix 2

Exhibit 2

Positive traits	*Negative traits*
responsible	short-tempered
forgiving	boring
cheerful	noisy
truthful	rude
efficient	selfish
trustworthy	jealous
polite	loudmouthed
ambitious	snobish
intelligent	humorless
honest	prejudiced
kind	self-centered
pleasant	bossy
friendly	greedy
helpful	irritating
talented	moody
warm	narrow-minded
happy	over-sensitive
loyal	critical
reliable	dominating
independent	gossipy
clever	lazy
patient	boring
imaginative	short-tempered
understanding	cowardly
trustful	angry
dependable	depressed
broad-minded	conceited
alert	disobedient
enthusiastic	cold
humorous	gloomy

Appendix 3

The behavior pairs in the morality condition

1. Reported all his taxable imcome. Cheated at poker.
2. Cut in front of some people who were waiting in line to buy tickets at a movie. Told the grocery clerk that the items on the shelf were mispriced too low.

3. Placed an ad in the paper concerning the puppy he found. Before he sold his car, he fixed it to hide that it had been in a serious accident.
4. Wrote a bad check. Worked hard when the boss was away.
5. Gave back extra change in the supermarket. Resold his defective phonograph.

The behavior pairs in the ability condition

1. Figured out how to fix a broken toaster. Fell because he piled boxes on a chair.
2. Made money in the stock market. Bought himself clothes that were the wrong size.
3. Got hit by a car because he failed to look both ways before crossing. Organized a successful committee.
4. Was in the chess team in college. Had trouble figuring out grammar in school.
5. Called the local bully dirty names. Compared prices at different stores before buying.

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