

PREFERENCE JUDGMENTS AND CHOICE: IS THE PROMINENCE EFFECT  
DUE TO INFORMATION INTEGRATION OR INFORMATION EVALUATION?

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1. INTRODUCTION

People are constantly faced with the need to make preference judgments of objects or acts. Sometimes, the preferences concern options in a choice situation. In decision theory it has been taken for granted that choice and preference are closely intertwined inasmuch as choice is seen as equivalent to selecting the most preferred option from an offered set of alternatives.

However, several studies have shown that preference is not necessarily synonymous with choice. In particular, the most preferred object from a set of objects presented in a non-choice context is not necessarily chosen when the same objects are options in a choice situation (Lichtenstein & Slovic, 1971, 1973; Tversky, Sattah, & Slovic, 1988). Recently, the present authors have run a series of studies on how preferences differ from choice. We have found repeatedly that choice is less predictable than preference from a combined multi-attribute and expectancy-value model (e. g., Lindberg, Gärling, & Montgomery, 1988, 1989a, 1989b). In a recent paper we tested two possible explanations for this finding (Lindberg, Gärling, Montgomery, 1989a). The first possibility was that choice subjects in contrast to preference subjects restructure the given information by modifying their beliefs or values. More precisely, we hypothesized that choice subjects attempt to find a dominance structure, i. e., a structure in which one alternative at least approximately dominates other options (Montgomery, 1983). The second possibility was that choice subjects adopt simplifying heuristics for instance by taking into account only the most important attributes or attributes. The results supported the second explanation whereas the dominance structuring hypothesis was not clearly supported by the data. (However, simplifying may be seen as one kind of dominance structuring, as noted by Montgomery, 1989.)

Our research on the choice-preference discrepancy bears some resemblance to a recent study by Tversky, Sattah, and Slovic (1988). In their study, preferences were operationalized in terms of a

matching procedure in which the decision maker adjusted one option to another. It was found that the more prominent dimension loomed larger in choice than in matching (see also Slovic, 1975). Does this finding - the prominence effect - also hold if preference is elicited in a more direct way, i. e., through preference judgments of single options? This question is addressed in the present study. As was the case in the Tversky et al study we presented subjects with sets of two options described on two attributes of different importance and asked the subjects to make a choice. However, in difference to Tversky et al we asked subjects to evaluate how good or bad each option was as a whole. In our case the prominence effect would imply that choices more often follow the more important attribute than will be true for the preference judgments. (In the following, the expressions "more/less prominent attribute" and "more/less important attribute" will be used interchangeably.)

Assuming that the prominence effect occurs also for preference judgments and choices, how could it be explained? We think that the two types of explanations which we offered to account for the differential predictability of preferences and choices basically are applicable also in this case. One possibility is that choice subjects evaluate the information about the options differently than preference judgment subjects do. More precisely, they may modify their beliefs or values in such a way that there will be a larger discrepancy between the options on the more important attribute than on the less important attribute. In this way the support for a choice in line with the more prominent attribute will be more consistent. Both the importance order of the attributes and the differences between the options on the attributes then will speak in favor of a choice in line with the more important attribute. The fact that making a choice implies more commitment and conflict than preference judgments (cf. Abelson & Levi, 1985) may create a greater pressure to find consistent support for choices than for preference judgments. The other possibility is that choice and preference judgment subjects differ with respect to how they integrate the given information. That is, there may be differences with regard to the selection and weighting of the information that is used as a basis for the preference judgments and choices, respectively. In line with Tversky's et al (1988) discussion of the prominence effect in the case of choice vs. matching it may be hypothesized that choice subjects in contrast to preference judgment subjects often just ignore the less important attribute and simply choose the option which is better on the more important attribute. This would imply that choice subjects follow a lexicographic information integration rule (Svenson, 1979). In that case, no modifications of beliefs or values are needed, since there is no conflict in the information on which the choice is based (i. e., the ordering of the alternatives on the more important attribute).

In the present study we tested these two explanations by asking subjects to evaluate the aspects (e. g., price levels, skill levels) that were used for characterizing the options on each of the two attributes. If the prominence effect covaries with these evaluations (i. e., larger discrepancies between the evaluations of the aspects on the more important attribute in choice tasks as compared to preference judgment tasks and/or vice versa for the less important attribute) then this would be in line with the information evaluation

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explanation. If on the other hand the prominence effect occurs without any concomitant variation in the evaluations of aspects across preference judgment and choice tasks this would be evidence for the information evaluation explanation.

## 2. METHOD

### 2.1. Materials

All subjects were presented with eight sets of two options, where each set corresponded to a (potential) choice situation. Each option was characterized on two attributes, one of which was assumed to be more important (primary attribute) than the other one (secondary attribute).

The selection of aspects on the attributes was guided by a pilot study in which ten subjects participated (psychology students at the University of Göteborg). The aim of the pilot study was to find combinations of aspects, which rendered the two alternatives equally attractive. Each of the ten subjects was presented with eight sets of two options which differed on two attributes. However, one of the options was described on only one of the attributes. Subjects' task was to complete the missing aspect so that the two options would be equally attractive. This task is identical to the matching task used in the Tversky et al (1988) study. In the present study, the missing aspect was always the less attractive aspect on the less important attribute.

Table 1 summarizes the eight situations presented to the subjects. The first column of the table describes the options. In Problems 5-8 the options concerned selection of candidates for jobs or for graduate studies. Three problems were taken from the Tversky et al (1988) study (Problems 1, 4, and 5) although two of them (Problems 1 and 4) were modified to fit Swedish conditions. (It may be noted that 1 Swedish Crown corresponds to approximately \$ 0.15). The second column of Table presents the attributes ordered in the same way as in the questionnaire. The attribute assumed to be more important is marked with a \*. The third column gives the aspects for each attribute. Again the information is presented in the same order as in the questionnaire. For example, in Problem 2 subjects were presented with the following information.

	Duration in days	Salary
Job x	65	40 000 Crs.
Job y	30	20 000 Crs.

### 2.2 Procedure

A questionnaire was administered to the subjects who served in small groups. Three versions of the questionnaire were used, one for choices and two for preference judgments. In all questionnaires the

eight sets of two options were presented in identical tables (see the example above). Also, in all questionnaires subjects were asked to rate each aspect on the attributes with respect to the extent it facilitated or counteracted what they wanted to attain in the (choice) situation. By this formulation we wanted subjects to consider their beliefs about the options and not only their values. The ratings were made on 13-point scales ranging from -6 to +6. The endpoints of the scales were defined as "Counteracts very much" (-6) and "Facilitates very much" (+6). Three intermediate scale values were defined as "Counteracts partly" (-3), "Does not influence" (0) and "Facilitates partly" (+3).

Table 1  
Summary of Problems Presented to Subjects

Problem No. Options	Attributes	Aspects	
1. Benefit plans for profit sharing	Payment in 1 year (Sw. Crs.)*	10 000	5 000
	Payment in 4 years (Sw. Crs.)	13 000	20 000
2. Temporary jobs	Salary (Sw. Crs.)*	40 000	20 000
	Duration of job (days)	65	30
3. Restaurants for hungry person	Deliciousness of food (on a 1 to 100 scoring scale)	62	90
	Size of portions (grams)*	400	250
4. Programs for reducing traffic accidents	Casualties (N of persons)*	650	750
	Cost (Sw. Crs. in millions)	450	150
5. Production engineers	Technical knowledge*	86	78
	Human relations	78	91
	(both attributes on a 40 to 100 scoring scale)		
6. Applicants to graduate studies	Intelligence*	77	87
	Working capacity	87	73
	(both attributes on a 1 to 100 scoring scale)		
7. Teachers	Knowledge	91	75
	Pedagogic skills*	74	90
	(both attributes on 1 to 100 scoring scale)		
8. Therapists	Therapeutic skills* (on a 1 to 100 scoring scale)	90	70
	Working hours	28	38

\*Primary attribute

In the choice condition subjects were asked to choose one of the two options (always denoted as x or y) in each situation. Each situation was described on a separate page. First, a brief background story for the choice was given. In all stories the subjects were asked to

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imagine that he or she had to choose between two options. Then the two options were described on the two attributes. Thereafter, subjects were asked to rate the aspects. Finally, the subjects were required to indicate their choice. One of the two preference judgment conditions were designed to be as similar as possible to the choice condition. The background stories were the same as in the choice condition except that the word "choosing" was replaced with "judging". Also in this condition the options were presented pairwise on the same page. Other differences as compared to the choice questionnaire were that the instructions for the aspect ratings (see above) referred to a "situation" and not a "choice situation", and that instead of choosing subjects were asked to evaluate how good or bad each option was on a scale ranging from 0 (maximally bad) to 100 (maximally good). In the other preference judgment condition, each option was presented on a separate page. In the background story given on each page only one option was referred to. Hence, in this condition each of the eight situations was referred to on two separate pages, one for each of the options. There were always seven pages between the presentations of options from the same situation. In all other respects this condition was identical to the first preference judgment condition.

In all three conditions the order between the pages in the questionnaire was randomized individually for each subject. Each session lasted approximately 20 minutes.

### 2.3. Subjects

Eighty undergraduate students of psychology at the University of Göteborg served as subjects. None of these subjects had participated in the pilot study. Thirty-nine, 20, and 21 subjects were randomly assigned to the choice condition, the pairwise preference judgment condition, and separate preference judgment condition, respectively. The subjects were paid with a lottery ticket to the value of \$6 (buying price in stores).

## 3. RESULTS

### 3.1. Test of the prominence hypothesis

In order to make the choices and preference judgments comparable a score was derived for each pair of options. A score of 1 was assigned to a pair if the option that was superior on the more important attribute was chosen or was associated with a higher preference judgment than was the case for the other option in the pair. A score of 0.5 was assigned when the preference judgments were equal. Finally, a score of 0 was assigned when the option that was superior on the less important attribute was chosen or associated with a higher preference judgment.

The first three numerical columns of Table 2 present the mean choice or judgment scores (for pairwise and separate presentation of options, respectively) for each problem. It can be seen that significant prominent effects ( $p < 0.05$ , Kruskal) were obtained for only one of the eight problems. However, for six of the seven remaining problems the response pattern was consistent with the

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prominence effect. That is, for each of these problems choices were more often in line with the more important attribute than was true for the preference judgments. For Problem 3 (restaurants for hungry person) very few subjects chose or judged in line with the attribute assumed to be more important (size of portions) implying that in this case we failed to create a situation in which the prominence hypothesis could be tested. It might be tempting to regard the other attribute (deliciousness) as primary attribute, which would yield results in line with the prominence effect. However, we refrained from such post-hoc re-evaluations because of the risks for capitalizing on chance results. The grand means across all problems except Problem 3 (presented in the bottom row of Table 2) show that the judgment scores for pairwise judgments tended to fall between the choice scores and the judgment scores for separate judgments. As shown in Table 2, a one-way ANOVA of means across problems in the three conditions indicated a strongly significant effect regardless of whether Problem 3 was included or not,  $F(2,77)=6.88$ ,  $p=0.002$  and  $F(2,77)=8.34$ ,  $p=0.001$ , respectively. In both cases Tukey's test indicated that the difference between choices and pairwise judgments was marginally significant ( $p=0.055$ ;  $p=0.053$ ), whereas the difference between choices and separate judgments was strongly significant ( $p=0.008$ ;  $p=0.003$ ). (For simplicity, in the following we report only tests of grand means that excluded Problem 3.)

### 3.2. Aspect ratings and the prominence effect

The effects of choices vs preferences on the aspect ratings were assessed by computing for each pair of options the differences across options between the ratings of aspects on the primary and secondary attribute, respectively. The differences were always computed by subtracting ratings of the option that was inferior on the primary attribute from the ratings of the option that was superior on that attribute. Table 2 gives the means of these differences for each problem and condition. It can be seen that the differences between ratings of the primary attribute covaried significantly ( $p < .05$ ) with response conditions for seven of the eight problems, the exceptional problem being No 3, i. e., the problem for which the prominence effect could not be tested. Across problems these differences were greater for the choice and pairwise preference judgments than for separate preference judgments (cf. the grand means in Table 2). This covariation was strongly significant,  $F(2,77) = 23.415$ ,  $p = .000$ , one-way ANOVA. Tukey's test indicated significant differences between the choice and separate preference judgment conditions ( $p = 0.000$ ) and the pairwise preference and separate preference judgment conditions ( $p = 0.000$ ).

The differences between the ratings of the secondary attribute were not significantly related to response condition for any problem. However, across problems there was a significant effect of response conditions,  $F(2,77) = 3.483$ ,  $p = 0.036$ . The grand means in Table 2 show that the differences on the secondary attribute were greatest for pairwise preference judgments and lowest for separate preference judgments. This was the only discrepancy that was significant according to Tukey's test ( $p = 0.010$ ).

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Table 2  
Means of Response Scores and Differences Between Ratings of Aspects on Primary and Secondary Attribute Across Options

Problem	Response scores				p	Diff. between ratings			
	C	P2	P1			C	P2	P1	p
1. Benefit plans	.59	.45	.40	.293	4.54 2.87	4.52 -3.62	1.65 -2.15	.018 .446	
2. Temporary jobs	.62	.48	.48	.373	3.51 -0.26	2.57 -3.24	-0.70 -0.25	.000 .116	
3. Restaurants	.15	.12	.23	.421	1.67 -5.82	4.91 -6.62	1.25 -4.10	.892 .112	
4. Accidents	.85	.83	.58	.010	6.00 -2.87	6.33 -2.00	1.25 -1.95	.000 .658	
5. Engineer	.54	.48	.38	.476	3.18 -3.89	2.86 -3.14	1.25 -2.00	.000 .129	
6. Graduate students	.51	.29	.30	.146	3.77 -3.05	2.91 -3.95	-0.45 -2.25	.000 .251	
7. Teacher	.97	.90	.87	.224	5.95 -2.46	6.00 -2.19	3.00 -1.40	.005 .349	
8. Therapeut	.80	.74	.72	.553	5.13 -4.26	5.81 -5.38	2.79 -4.63	.017 .476	
Grand mean (excl. Problem 3)	.70	.60	.53	.001	4.58 -2.81	4.43 -3.36	1.09 -2.08	.000 .036	
Grand mean (all problems)	.63	.54	.49	.002	4.22 -3.19	4.11 -3.77	1.13 -2.11	.000 .029	

Note. C = Choices, P2 = Preferences, pairwise, P1 = Preferences, separate. p = p-value, Kruskal or one way ANOVA. Differences between ratings on primary attribute are given above differences on secondary attribute.

It can also be seen that in the choice and pairwise preference judgment conditions the differences on the primary attribute are greater than on the secondary attribute whereas the reverse is true in the separate preference judgment condition. To assess the significance of this pattern the mean attribute differences across problems were subjected to a response condition X primary vs. secondary attribute ANOVA (with repeated measures of the latter factor). In this analysis the signs of the secondary attribute differences were reversed in order to make these differences comparable with the differences on the primary attribute. A strongly significant interaction was obtained,  $F(2,77) = 25.46$ ,  $p = 0.000$ .

Finally, we will examine the combined impact of response condition and rating differences on the response scores (i. e., preference or choice scores). To attain this end, we conducted an ANOVA of the mean response scores across problems as a function of response conditions with the mean rating differences on the primary and secondary attributes, respectively, as covariates. The condition factor turned

out to be non-significant,  $F(2,75) = 1.602$ ,  $p = .208$ , whereas the rating differences were strongly related to response scores,  $F(1,75) = 19.780$ ,  $p = .000$ , and  $F(1,75) = 11.605$ ,  $p = .001$ , respectively. Hence, the responses scores were not significantly related to response condition independently of the aspect ratings.

#### 4. DISCUSSION

Our first hypothesis - that the prominence effect will be obtained in choice vs preference judgments - was fully confirmed. Why does then this difference exist between choices and preference judgments? Is it because people when choosing are more inclined to use simplifying heuristics or is it because they interpret and evaluate the given information differently when they are choosing? Our data are definitely in favor of the latter hypothesis. The effect of response condition on the scores measuring subjects' tendency to respond in favor of primary attribute was almost completely mediated by subjects' evaluations of the aspects. Hence, the data indicate that the response condition affected the evaluations of aspects which in turn were the basis for the choice or preference judgment. We did not find any direct effect of response condition on the response scores.

However, it should be noted the problems in the present study had the simplest possible structure - two options described on two attributes. In more complex problems there might be direct effects of response task on response scores since the need for simplifying (e. g., skipping less important information) may be greater in choices than in preferences. This is because the task of choosing is more complex (the individual needs to compare several options) than the task of making preference judgments (the individual needs only one to evaluate one option at the time). In our earlier research on the choice-preference discrepancy we used more complex problems than in the present study. Perhaps this may explain the evidence that was obtained for the simplifying hypothesis in one of our earlier studies (Lindberg, Gärling, & Montgomery, 1989a).

There is not necessarily a conflict between simplifying and re-evaluation of given information. Each of these phenomena may occur at different stages of a decision process (Montgomery & Svenson, 1989). Both phenomena may help the individual to find a "good" structure for his or her choice such as a dominance structure (Montgomery, 1983). The "good" structures that we have evidenced in the present study may not primarily be characterized as dominance structures but rather as structures where the balance of arguments definitely is in favor of one alternative (importance order of attributes and order of attribute differences favoring the same alternative). Perhaps, different specifications of what might be meant with a good balance of arguments in a decision situation may make it possible to extend and complement the dominance search model.

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