AD/A-001 760

CONSISTENCY OF CHOICE BETWEEN EQUALLY-VALUED ALTERNATIVES

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Prepared for:

Office of Naval Research
Advanced Research Projects Agency

4 November 1974

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Consistency of Choice Between Equally-Valued Alternatives

Technical Report

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November 4, 1974	~~30~~ 33	17
N00014-73-C-0438 NR(197-026) ARPA Order No. 2449	Oregon Research Institute Research Bulletin, Volume 14. No. 11.	

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Subjects in four experiments were asked to choose between pairs of alternatives which they had previously equated in value. Within each pair, one alternative was superior on an important dimension but so inferior on a lesser dimension that this disadvantage cancelled its advantage. The majority of subjects resolved these choices by consistently selecting the alternative that was superior on the more important dimension. This result supports the contention that choices are determined by mechanisms that are easy to explain and justify to oneself and to others. Some practical implications of this contention are discussed.

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What happens when a decision maker is faced with a choice between two alternatives that are of equal value to him? An extreme possibility is exemplified by Dante's perplexed soul who, unable to decide between two equally attractive foods, died of starvation.[1] More likely he would "flip a coin" or devise some deterministic rule in order to resolve his indecision.

The "coin flipping" hypothesis finds widespread theoretical support among students of human choice behavior. Most theories embody the assumption that choice is a probabilistic phenomenon where the probability of choosing object x over object y, denoted $p(x,y)$, is some function of the scale values of the utilities, $u(x)$ and $u(y)$, of the two objects. This latter property has been labeled "simple scalability" (Krantz, 1964; Tversky, 1972). For these theories, $p(x,y) = .5$ implies that $u(x) = u(y)$. While less attention is given to the reverse implication, it seems clear that it, too, is expected to hold. Davis (1958) is particularly explicit in his expectation that indifference between equally-attractive alternatives will lead to random choice, and Restle (1961, p. 64) comments, "Presumably, [the subject's] choice will be governed only by the differences between the alternatives offered. If the alternatives are of similar total value but very different in their qualities, like two vacations, then the subject will choose with a probability near 1/2. . . ."

A contrary position is taken by those who agree with Abelson (1964, p. 259) that "Randomness does not appear consistent with the image of man as a rational decision maker." Recent empirical work has depicted the decision maker as one who is continually searching for systematic procedures that will produce quick and reasonably satisfactory decisions (Slovic, Lichtenstein, & Edwards, 1965; Slovic, 1972; Tversky, 1969). Shepard (1964) has also offered an intriguing hypothesis which suggests that difficult choices are resolved in some nonrandom manner; ". . . there may be a tendency to achieve a spurious resolution of a conflictual decision problem by temporarily accepting a special state of mind . . . that--although it will prove untenable in the long run--at least has the advantage of entailing a system of weights that clearly favors one alternative over its competitors and permits the decision to be consummated" (p. 258).

Restle (1961) proposed a similar mechanism for resolving conflict. He hypothesized that the decision maker might suppress aspects of the alternatives one at a time until the remainder of the aspects permit a clear decision to be made. However, whereas Shepard was not explicit about the processes involved in the resolution of conflict, Restle assumed that suppression of aspects would be carried out in a random fashion, thus again raising the possibility of random choice.

The hypothesis that difficult choices will be resolved in some systematic manner is also suggested by Tversky's "elimination by aspects" model (Tversky, 1972). This model deals with alternatives that can be viewed as a set of aspects (e.g., cars described with respect to price, model, color, etc.). At each stage in the choice process an aspect is selected with probability

proportional to its importance; alternatives not including the selected aspect are eliminated. In choosing a new car, for example, the first aspect selected might be automatic transmission. If so, all cars without this feature would be eliminated. Among the remaining alternatives another aspect, say a $4,000 price limit, would be selected and more expensive cars would thus be excluded. The process would continue until all cars but one were eliminated.

Tversky argues that elimination by aspects is an appealing process because it is easy to apply and easy for the decision maker to justify. It permits the choice to be resolved in a clear-cut fasion without reliance on relative-weights, trade-off functions, or other numerical computations, thus easing the demands on the decision maker's limited capacity for intuitive calculation.

There has been little empirical work relevant to the hypotheses discussed above. The remainder of this paper describes four experiments designed to provide insight into the mechanisms used to resolve difficult choices. In each study, subjects were first asked to equate pairs of alternatives and, at a later time, were asked to make choices between the equally-valued alternatives within each pair.

Each choice alternative studied here was defined by two dimensions, differing in intrinsic importance. Within each equally-valued pair, one alternative was superior on the more important dimension but inferior on the lesser dimension, such that its advantage was cancelled by its disadvantage.

In accordance with Tversky's arguments about the importance of choice

mechanisms that are easy to apply and justify, it was hypothesized that decision makers in the present experiments would systematically determine their choices by selecting the alternative that was superior on the more important dimension (MID). This prediction was labeled the MID hypothesis.

Experiment 1

Method

The subjects were 41 male undergraduates from the University of Michigan. They met in a group on three occasions. During Session 1, they equated pairs of choice alternatives. During the remaining two sessions, they chose between these previously equated alternatives.

Stimuli. There were two critical pairs of stimuli, one involving baseball players, the other pairing baseball teams.

Pair 1 consisted of two players, described only by their batting average (BA) and the number of home runs (HR) they had hit during the previous season. Each subject was randomly assigned to one of four groups. The left-hand side of Table 1 shows the way in which the two players were displayed to each group. One player, Player BA, was superior in batting average. The other, Player HR, was superior in home runs. Note that one value from the description of one of the players was always missing and this missing value differed for each group. Each subject was asked to "estimate what the missing value would have to be in order to make the two players of equal ability and value to their teams." This method of equating alternatives is similar to the "Method of Reproduction" and the "Method of Adjustment" used in psychophysics (Guilford, 1954).

The second critical pair consisted of two baseball teams, described

by the percentage of games won against the first-place team and the percentage won against the last-place team. The right half of Table 1 indicates how the two teams were described to subjects in each of the four groups. Team LP had won more games against the last-place team. Team FP was superior in the number of games won against the first-place team. Again one value for one team was always missing. Each subject was asked to "estimate what the missing value would have to be so that each team would have an equal chance of finishing ahead of the other in the final league standings."

Insert Table 1 about here

In addition to equating members of the two critical pairs, subjects performed a number of other tasks during the first session. These included equating different pairs of players defined on a variety of other dimensions and performing several unrelated judgment tasks. The purpose of these additional tasks was to draw attention away from the critical pairs and make it less likely that subjects would remember their specific estimates.

Choice procedure. The second experimental session was held three weeks after the first. During this session, each subject again made a varied assortment of judgments. Included among these was the task of rank ordering four baseball players according to their ability and value to their team and ranking four teams according to their overall standing in the league. Among the four players were the two that subjects had previously equated. Similarly, the four teams also included the two that had been equated. The players and teams were described by the same two dimensions

used in Session 1.

The third and last session was held one week after the second. Again each subject rank ordered a set of four players and four teams, each of which included the previously equated pairs. Within each set, the two nonequated pairs differed from those used in Session 2. These critical choices were also made in the midst of other judgment tasks.

The three-week duration between Sessions 1 and 2 and the week between Sessions 2 and 3, as well as the large number of filler tasks, were designed to reduce the ability of subjects to identify pairs of stimuli that they had equated or to remember their previous choices. All this was done in pursuit of the ideal of "independent replication" of choices.

Hypothesis. Strong arguments can be made for the case that batting average is a more important aspect of ability than capacity to hit home runs. A pilot questionnaire given to 14 subjects showed that 12 of them agreed with this assertion. Similarly, percentage of games won against a first-place team is clearly a more important aspect than the percentage won against a last-place team.

The MID hypothesis described above thus leads to the prediction that subjects will consistently give a more favorable ranking to the player with the higher batting average and to the team with the better record against the first-place team.

Results

Table 2 presents the distribution of subjects' rank orderings of the equally-valued players and teams. Over 2/3 of the subjects ranked the players consistently in both sessions. Rankings of teams were even more

consistent across sessions. A chi-square test indicated that each distribution of choices differed significantly from that expected under the hypothesis of random choice.

Insert Table 2 about here

Subjects' choices were not just consistent in the sense that the same player was ranked higher on both occasions. The majority of subjects also agreed with one another in their rankings. As predicted by the MID hypothesis, choices were dominated by one dimension--BA in the case of players, and FP in the case of teams. This result was independent of the particular dimension that subjects had to estimate when equating the alternatives.

Experiment 2

To further examine the generality and validity of the MID hypothesis, a second experiment was conducted. This experiment employed the same method of equating stimuli that was used in Experiment 1. However, it differed from Experiment 1 in several respects. First, subjects made paired-comparison choices between alternatives they had previously equated, rather than rank ordering them within a larger set. Second, a greater variety of stimulus objects was used--ten different tasks--as compared with two in Experiment 1. Third, subjects were asked to estimate the relative importance of the two dimensions in each task.

Method

Stimuli. The stimuli were the ten pairs of two dimensional alternatives shown in Table 3. Again, the pairs were displayed with one dimension blank and subjects were asked to fill in the missing value to equate the alternatives

on a specified criterion. As in the first experiment, the dimension that needed to be estimated was varied across four groups of subjects.

Insert Table 3 about here

Subjects. The subjects were 57 female and 44 male undergraduates from the University of Oregon. They were paid for participating.

Procedure. The subjects were run in groups of about 30 to 35 individuals. Each subject participated in two experimental sessions spaced one week apart.

During Session 1, subjects first equated the alternatives in each of the ten stimulus pairs. Next, they worked on an extraneous task where they related the attractiveness of various jobs. After this, they were asked to choose one member from each pair of their equated alternatives as having higher value on the criterion dimension (i.e., higher value to the team, greater potential for success in college, etc.). This choice will be referred to as C_1.

At the beginning of Session 2, subjects were asked to rate the relative importance of the various pairs of dimensions for the type of judgments they were being asked to make. Thus for Pair 1 they were asked, "Is the number of home runs a more or less important consideration than batting average, generally speaking (i.e., when judging a large number of players)? Indicate the relative importance by dividing 100 points between the two dimensions." This was followed by some more judging of job attractiveness. Finally, subjects were again asked to make a choice (C_2) among the two equated members of each pair.

Results

The first column of data in Table 4 presents the mean importance rating given to the subject's more important dimension (MID). The size of this mean provides an indication of the degree to which one dimension dominated the other with regard to perceived importance.

Insert Table 4 about here

The second column of data in Table 4 indicates the percentage of subjects whose first choices were compatible with their MID. The MID hypothesis receives strong support from these figures. Across all ten pairs, 78% of C_1 choices selected the alternative that was higher on the subject's MID. The range was from 64% (Athletes) to 88% (Gift Packages).

The tendency to choose the alternative that is higher on the MID was strongest for the pairs whose dimensions differed most in importance (Gifts, Baseball Teams) and was somewhat weaker in cases where the dimensions were seen as more nearly equal in importance (Athletes). The rank-order correlation, across stimulus pairs, between mean importance of the MID and percentage of choices compatible with the MID was .52.

During the second session, the percentages of C_2 choices compatible with the MID were almost identical to the results from C_1 choices. In addition, 80% of the subjects gave the same response to C_2 as they did one week earlier for C_1. Across stimulus pairs this percentage of stable responses varied from 73% (Commercials) to 87% (Gift Packages).

Experiment 3

In Experiments 1 and 2, alternatives were equated by direct estimation.

MacCrimmon and Siu (1974, in press) have criticized this method claiming that it poses questions that are difficult to answer and fails to motivate subjects to think carefully about their responses. They argue that the best way to equate alternatives would be to observe choices and interpolate an indifference boundary across which preference is reversed. Inferring indifference from patterns of choices was first suggested by Thurstone (1931). Similar methods have since been used by Mosteller and Nogee (1951), Davidson, Suppes, and Siegel (1957), and MacCrimmon and Toda (1969).

To further test the validity of the MID hypothesis, subjects in Experiment 3 were asked to choose between alternatives selected from indifference curves determined by means of MacCrimmon and Toda's choice procedure.

Method

Stimuli. The stimuli were commodity bundles. Each bundle consisted of a certain number of cigarettes and a certain amount of money. For example, a typical bundle might contain four packs of cigarettes and $2.40. It seemed reasonable to assume that money would be the more important dimension here in the sense that it would be valued more than a quantity of cigarettes costing the same amount. Therefore, the MID hypothesis would predict that choice between a pair of equally-valued alternatives would be resolved in favor of the one that offered more money.

Determination of indifference. The method developed by MacCrimmon and Toda teaches subjects to determine, for each point in the cigarette-money space, whether that point would be preferred to a reference bundle (the accept region) or whether the reference bundle would be

chosen instead of it (the reject region). The boundary separating the two regions is the indifference curve. The subjects were trained to progressively narrow the region in which the indifference curve could fall until it became clear where the curve was and they could draw it in directly.

Subjects. The subjects were 14 male undergraduates from the University of Oregon. They were required to be cigarette smokers and have at least one year of college-level mathematics.

Procedure. Each subject participated in two sessions, spaced two to three days apart. Each session lasted about two hours.

During Session 1, subjects were instructed in drawing indifference curves and were given the opportunity to practice by drawing curves for bundles consisting of money and ball point pens. When they felt comfortable with the method, they were asked to draw four indifference curves in the cigarette-money space. Each curve was drawn on a separate sheet of graph paper. The reference points for the four curves were 0 cigarettes and $2.40, 0 cigarettes and $4.00, 9 packs of cigarettes and $0, and 19 packs of cigarettes and $0.

The subjects were told that their salary would be determined, in part, by randomly selecting a point in the stimulus space and comparing it with one of the reference points. If the selected point fell in their acceptance region, they would receive the amount of cigarettes or money designated by that point. If not, they received the commodity designated by the reference point. This was done to provide motivation for making careful judgments.

Between Sessions 1 and 2, the experimenter selected four points along each indifference curve drawn by the subject. These four points were exhaustively paired, producing six pairs of presumably equally-valued alternatives from each curve, a total of 24 pairs in all. These 24 pairs were, of course, unique for each subject. The positions of the four points along a given curve were determined by attempting to space the points about equally over the widest range possible on the x-axis. A secondary criterion was that the points represent an integral number of packs of cigarettes.

Each subject's 24 "indifference" pairs were intermixed with 24 filler pairs randomly chosen from within the money-cigarette space. The resulting 48 pairs were presented during Session 2. The subjects selected their most preferred alternative from each pair. They were told that one of the pairs would be selected at random after they completed their choices and they would receive the amount of money and cigarettes provided by their preferred alternative.

Results

Despite the extensive pretraining, the cigarette vs. money trade-off was strongly influenced by the reference bundle for five subjects. These subjects seemed to overvalue the reference point. This produced markedly different exchange rates and consistent but opposite choices depending upon whether the reference bundle contained cigarettes or money. Because indifference was so poorly captured for these subjects, they were excluded from further consideration.

The proportion of choices in which the alternative offering more money and fewer cigarettes was chosen over the equally-valued alternative offering more cigarettes but less money is shown, for the remaining nine subjects, in Table 5. Due to clerical errors in transferring the alternatives from

the indifference curves to the paired comparison booklets, a few of the pairs were incorrect. This accounts for less than 24 pairs being analyzed for some subjects.

Insert Table 5 about here

The first five subjects showed a systematic tendency to select the alternative which offered the most money, thus substantiating the MID hypothesis. The discrepancy from a .5 probability of choosing more money was highly significant for each of these subjects (binomial tests). The sixth subject was consistent in a different way. He preferred alternative B to each of the other points on the indifference curve. Alternative B offered the second largest amount of money and the next to least amount of cigarettes. For the 12 comparisons not involving alternative B, he invariably selected the alternative offering more money. The seventh subject had a systematic preference for the alternative offering more cigarettes. Only subjects 8 and 9 failed to show consistent preferences. The eighth subject commented after the experiment that he was choosing randomly among the equivalent alternatives.

Experiment 4

The first 3 experiments relied upon quantitative techniques for estimating indifference and equating alternatives. Although precautions were taken to insure careful and unbiased estimation, the possibility exists that neither of the methods, one direct and one indirect, adequately equated alternatives. Systematic underweighting of the MID in the equating process might have been responsible for the dominance of the MID in the choices.

The purpose of Experiment 4 was to provide a test of the MID hypothesis without dependence upon an empirical matching process.

This was accomplished by defining alternatives A and B, to be exactly matched on the basis of the subject's personal preferences. Quantitative descriptions of the alternatives were bypassed. The subjects were then asked to select which of these two abstract alternatives they preferred.

Method

Subjects. The subjects were 11 staff members and secretaries at the Oregon Research Institute. They were either professional typists or professionally dependent upon typists.

The task. The subjects were asked to imagine that they had to select one of two typists for a position at the Oregon Research Institute. Typist A was said to be faster to produce the final product, taking corrections into account. However, Typist B was superior with regard to quality of work--a variable that captures the fact that the final products of some typists look better--they are neater, spaced better, more aesthetically pleasing.

The subjects were told to assume that ". . . B's advantage in quality was exactly offset by A's advantage in speed. Thus you feel that the overall typing ability of each, which is a combination of speed and quality, is equal."

The subjects were also told that A and B were experienced typists, unlikely to change in speed or quality and that they were being considered for long-term employment under a variety of working conditions demanding both speed and quality. Finally, both typists were said to be at least average on both characteristics.

After making their choice, the subjects were asked to give a brief explanation describing how they arrived at that choice. At the time they

made their choice, they did not know they would later have to provide an explanation.

Results

It was hypothesized that quality would be viewed as a more important dimension than speed and that choices among typists defined to be equal in ability would be resolved in favor of Typist B, whose advantage was quality. The results supported the hypothesis--10 of the 11 subjects selected B. Typical of subjects' explanations were the following comments:

S-1: "I would prefer to have the final product look better since others viewing it will see the quality but will not know the speed with which it was produced."

S-2: "I really have no particular bias one way or the other. . . . However, personally speaking, I would prefer quality over speed."

S-5: "On these two aspects, you've left little to choose between. On grounds that my proofreading would be somewhat more gratifying, I guess I'd pick B."

S-7: "Although quality should not be a factor in the evaluation of the content of a manuscript or letter, it often is. I would rather be neat than speedy."

A further study. Some of the subjects' reasons suggested that they might have been denying the stated equality of the alternatives. To insure that the dilemma was clearly understood and to probe more deeply into the resolution of it, a further study was conducted with six more employees, all typists, at the Oregon Research Institute. The typist selection task was posed in the context of a tape recorded interview of the subject by the experimenter.

This format permitted the experimenter to correct any misperceptions that the subject might have and to resist subjects' attempts to redefine the task in ways that denied the equality of the typists.

One subject refused to choose because of the stated equality. She suggested that a coin flip would be an acceptable decision procedure for her. The remaining five all selected B, the typist superior on quality. The following interview is typical of their responses. The subject tried to redefine the problem in a way that reduced the dilemma. Such redefinition was resisted by the experimenter.

E: I'd be interested in your choice and your thoughts about the choice.

S: B isn't really all that slow, I mean do they really offset each other? Is it a reasonable difference in speed?

E: Let me say that again the speed and quality of both are at some acceptable level. But there are differences and the differences count.

S: I would pick B. I would have absolutely no hesitation, because of the aesthetic qualities that he brought to his work and his ability to make a better looking product in an acceptable length of time. I would attribute that to higher intelligence or better qualities that he would bring to his whole job. And typing speed is really just a skill that is not that difficult to achieve.

E: Let's assume that this is a job where these people will be doing **prima**rily typing, OK? And typing is really the job, you know, producing typed products, a limited job.

S: I still probably would pick B because he would bring more imagination to his job. I expect that if things arose I would assume that he would be more skillful at that kind of thing.

E: That's an inference you're drawing from the quality of the work, the fact that the quality of the typing is better. You're broadening B's advantage. Now, taking into account that broadening, you find they are on the balance point. You're just trying to make the choice easier by broadening the advantage of B. Let's just say they're equal. Now . . .

S: I would still choose B, because I would still rate a quality product over the speed of the other one. Maybe there were too many years of having been told at whatever places I've worked that the product that went out, whether it was a financial report or whatever, was what people saw. They didn't see the effort that other people put into it, and that it was really important that it looked fantastic.

E: Well, are you saying that quality is so important that speed cannot offset it?

S: Yes, in my experience.

E: If the difference in quality was there, was modest, but was there, and the differences in speed was considerable, although even the slowest speed was acceptable, could quality be compensated for by speed.

S: Yes, it could be. When you described it at first, it sounded like one's speed was much faster and one's quality was much better.

E: Well, say there's just a noticeable difference in quality, it's slight, but it's there. But on the other hand there's enough speed difference to balance it to make the choice really tough.

S: Still quality is really important. When something has to be gotten out in a hurry, when speed is really important, you can always get more typists. But when you're talking about how nice a product looks, or the effect it's going to have on the people who read it or see it, then there just isn't any . . . I mean they really don't care how fast you get it out, whether you get it out in 10 minutes or close to an hour. They're going to see what it looks like and they're going to see if it looks like high quality, if it looks like a lot of thought went into the preparation.

E: Do you think you'd feel more comfortable in the long run having selected the typist who is superior in quality?

S: Yes.

E: Do you think this might underlie your preference here? That having to live with the choice, you'd think that in the long run you'd feel better about the choice?

S: Yes, I think so.

E: There's less risk involved.

S: Yes.

E: What about flipping a coin?

S: No, I probably wouldn't.

E: Why?

S: It just wouldn't be my way of solving a problem. I can't think of any time I've ever made a decision on that kind of a basis. It wouldn't occur to me, especially if I were dealing with human beings.

Discussion

The results of all four experiments are consistent with the hypothesis that people resolve choices between equally-valued, multi-attribute alternatives by selecting the alternative that is superior on the more important attribute or dimension. Reliance on the more important attribute produces highly consistent and predictable choices in contrast to the random mode of resolution implied by many theories of choice.

The present results verify Tversky's contention that people will follow choice mechanisms that are easy to explain and justify in terms of a priority ordering on the aspects (Tversky, 1972). Reliance on the more important attribute provides such a mechanism.

Techniques for matching or equating stimuli have long played a key role in psychological measurement. For example, judgments equating a gamble with a certain amount of money are used by decision analysts to encode an individual's risk preferences and utilities (Raiffa, 1968). Compensation rates or trade-off functions derived from matching techniques may be unaffected by considerations of justifiability--which are likely to become relevant only within the context of choice. Thus subjective preference functions derived from matching may imply choices different from those an individual would actually make.

In other words, reliance on easily justifiable aspects to the neglect of other important factors could lead one to reject alternatives whose overall utility (assessed outside the choice context) is superior to that of the chosen alternative. This speculation goes beyond the data of the present study by assuming that justifiability will be a potent, stable, and broadly applicable consideration, as opposed to the view that justifiability is simply a temporary and "special state of mind" in Shepard's (1964) sense, called into play only when no other criteria lead to decision.

The expectation that justifiability will be a relevant criterion for choice, even when alternatives are not otherwise well matched, is strengthened by a case study in industry which illustrates "decision making by cliche" (Birkin and Ford, 1973). These investigators examined the after-effects of the "Zero Defects" program, adopted by more than 12,000 firms to attack the problem of defective workmanship by motivating employees to do the job right the first time. The program was sold by getting the firms to accept the following sort of rationale: "Because of the complexity of today's products and because of the drastic consequences of product failure, management should use all means possible to meet customers' specifications. Human error on the job is not inevitable and employees, if properly motivated, could maintain a desire to get a job done right the first time." Once the program was implemented, many firms discovered they could not live with the consequences of making quality a primary goal. As quality rose, productivity declined, production deadlines were missed and amounts of spoiled and scrapped goods increased. A high percentage of firms dropped the program.

Another implication of the present results bears mentioning. Imagine the

situation in which a foreign government must decide between two possible alliances--one of which offers superior trade opportunities and the other of which offers a better position with respect to national defense. Further suppose that delay or other signs of indecisiveness imply that the choice is a difficult one with both options rather equally valued. Further assume that, other things being equal, national defense is viewed as a more important attribute than trade. The MID hypothesis suggests that one could predict, with probability equal to .7, or perhaps .8, that the decision will eventually be resolved in favor of the alternative offering superior defense advantages. Or consider voters who are undecided between Candidate A, who has a slightly better position on a major issue, and Candidate B, who has a much superior stand on a less important issue. The present data imply that these voters would not distribute their choices equally among the two candidates but would, instead, vote more often for Candidate A.

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Footnotes

This study was supported by the Advanced Research Projects Agency of the Department of Defense (ARPA Order No. 2449) and was monitored by ONR under Contract No. N00014-73-C-0438 (NR 197-026).

The author is indebted to H. William Morrison for his help in designing and executing Experiment 1 and Russel Geiseman and Timothy Earle for their assistance in the conduct of Experiments 2 and 3. The critical comments of Robyn Dawes, Baruch Fischhoff, Paul Hoffman, Sarah Lichtenstein, and Amos Tversky are also greatly appreciated.

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[1] *Paradise*, Canto IV, line 1.

Table 1

Critical Pairs Seen by Subjects in Each Group

Pair 1. Players		Dimension		Pair 2. Teams		Dimension	
						% won vs.	
		HR	BA			First Place	Last Place
Group 1	player BA	___	.287	Group 1	team LP	38	69
	player HR	26	.273		team FP	___	55
Group 2	player BA	20	.287	Group 2	team LP	___	69
	player HR	___	.273		team FP	47	55
Group 3	player BA	20	____	Group 3	team LP	38	69
	player HR	26	.273		team FP	47	___
Group 4	player BA	20	.287	Group 4	team LP	38	___
	player HR	26	____		team FP	47	55

Table 2

Choices Among Equally-Valued Players and Teams

	Observed Frequency	Expected Frequency	χ^2
Players			
BA ranked higher twice	22	10.25	
Split ranking	13	20.5	18.0*
HR ranked higher twice	6	10.25	
Teams			
FP ranked higher twice	26	10.25	
Split ranking	10	20.5	31.1*
LP ranked higher twice	5	10.25	

*$p < .001$

Table 3

Stimulus Pairs Used in Experiment 2

Pair	Alternatives	Dimensions	Alternative A	Alternative B	Equate with Respect to:
1	Baseball Players	Home Runs Batting Average	20 .286	26 .274	Value to Team
2	Applicants to College	English Effectiveness Motivation to Achieve	67th %tile 36th %tile	51st %tile 70th %tile	Potential Success in College
3	Gift Packages	Cash Coupon Book Worth	$10 $32	$20 $18	Value to You
4	Secretarial Applicants	Typing Speed Typing Accuracy	54 words/min 68th %tile	82 words/min 53rd %tile	Typing Ability
5	Athletes	Chin-ups done Sit-ups done	9 58	14 39	Physical Fitness
6	Routes to Work	Distance Time	8 miles 35 minutes	18 miles 21 minutes	Attractiveness to You
7	Auto Tires	Cost/tire Tread Life	$23 16,000 Miles	$46 28,000 Miles	Attractiveness to You
8	T.V. Commercials	Number per Hour Time Taken per Hour	8 4 minutes	4 7 minutes	Degree of Annoyance
9	Readers	Speed Comprehension	425 words/min 55%	300 words/min 80%	Reading Ability
10	Baseball Teams	% Games won vs: First Place Team Last Place Team	38% 69%	47% 55%	Position in League Standings

Table 4

Choices and Ratings for Equally-Valued Alternatives

in Experiment 2

Pair	Stimuli	Mean Importance of MID[a]	% Choices (C_1) of Alternative Better on MID[a]
1	Baseball Players	63	77
2	Applicants to College	61	81
3	Gift Packages	73	88
4	Secretarial Applicants	60	79
5	Athletes	58	64
6	Routes to Work	68	79
7	Auto Tires	58	79
8	T.V. Commercials	68	68
9	Readers	65	77
10	Baseball Teams	71	85
		Mean	78

[a]Dimension rated as more important by the subject.

Table 5

Proportion of Choices in Which the Alternative Offering More Money and Fewer Cigarettes Was Preferred

	Reference Point					
S	$2.40 & 0 packs	$4.00 & 0 packs	$.00 & 9 packs	$.00 & 19 packs	Total	Dominant Dimension
1	5/6	6/6	3/5	5/6	19/23*	money
2	6/6	6/6	5/5	5/6	22/23*	money
3	2/3	4/6	6/6	3/3	15/18*	money
4	5/6	6/6	5/6	6/6	22/24*	money
5	4/6	3/6	5/6	6/6	18/24*	money
6	4/6	4/6	4/6	4/6	16/24	money
7	0/6	0/2	4/6	0/6	4/20*	cigarettes
8	3/6	2/6	4/6	3/6	12/24	none
9	3/6	2/6	4/6	4/6	13/24	none

*Significant at $p < .01$; 1-tailed binomial test.