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Longitudinal Patterns of Group Decisions: An Exploratory Analysis

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This article presents an exploratory investigation into longitudinal patterns of influence in group decision-making. In particular, we focus on how the outcomes of past decisions affect group members' relative influence in future joint decisions. Results suggest that past outcomes play an important role in the resolution of disagreements when group member preferences are equally intense. *Losers* in prior decisions are likely to *win* in the future (and vice versa) due to what appears to be promotion of equity in the group.

Empirical studies of small group decision-making and conflict resolution processes are found throughout the behavioral and social sciences (Bacharach & Lawler, 1980; Ford, Moskowitz & Wittink, 1978; Kelley & Thibaut, 1978; Tedeschi, Schlenker & Bonoma, 1973). For the most part these studies have taken a static perspective, studying single decisions at single points in time. Established groups (e.g., families, committees, boards of directors) are likely to make many similar decisions throughout the course of their existence. Therefore, formal research on how the outcomes of past decisions affect future ones is needed to better understand the relevant processes.

This article discusses an exploratory research program designed to examine the roles past decisions or *decision history* and other influence-related factors play in group decision processes. We investigate whether these factors significantly affect the outcomes of group decisions using laboratory experiments in which each group made a series of joint decisions. The article proceeds as follows. We establish a theoretical basis by summarizing relevant past research on the role of decision history and other influence-related resources in group

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processes. Then two studies are described and their results are reported. Finally, conclusions are drawn and suggestions for future research are presented.

Theoretical Background

We subscribe to a standard paradigm that has been followed through group decision research (Bacharach & Lawler, 1980; Blake & Mouton, 1970; Davis, 1973; French & Raven, 1959; Katz & Kahn, 1978). When group members disagree about the action to be taken in a joint decision, the matter is often resolved through the possession and active use of power-related resources (e.g., superior knowledge or the offering of incentives). A motivated group member will attempt to influence the decision outcome in his or her favor by exercising the power which accompanies these resources. The existence of passive power-related resources has also been suggested. Such resources as attractiveness, social status and apparent physical strength (Collins & Guetzkow, 1964; French & Raven, 1959) operate by reducing the motivation of other group members to exercise their own resources. In their classic article, French and Raven proposed what has become the dominant scheme for classifying power-related resources. According to them, power can be derived from an ability to reward (reward power), an ability to punish (coercive power), formal authority (legitimate power), relative expertise (expert power) and the projection of desirable associations (referent power).

Influence-related Factors

Many studies have suggested that the resolution of disagreements in group decision-making is affected by a larger set of factors than the one described by French and Raven (1959). Some of these additional factors (e.g., strength of preference and decision history) can affect a group member's influence either as power sources or as motivation to use power sources. For example, a group member who strongly prefers a particular course of action is likely to be more motivated to use any available power sources. Therefore, we will refer to the entire set of power-related resources and motivators as *influence-related factors*. The influence-related factors of interest in this study are listed next. References are from a wide range of disciplines and offer theoretical and/or empirical support for the importance of each factor in group decision-making.

1. *Abilities to Reward and Punish*: Davis, 1976; French & Raven, 1959; Gold, 1968; Lindskold & Tedeschi, 1971.

2. *Authority*: Burns & Granbois, 1977; Cartwright & Zander, 1968; Olson, 1969; Thomas, 1982; Webster & Wind, 1972.

3. *Expertise*: Bacharach & Lawler, 1980; Bachman, Bowers & Marcus, 1968; Blood & Wolfe, 1960; Marwell & Schmitt, 1967.

4. *Opinion Leadership*: Coleman, Katz & Menzel, 1966; Mantilla, 1971.

5. *Age*: Blau, 1977; Green & Cunningham, 1975; Spiro, 1983; Thal, 1977.

6. *Sex*: Blau, 1977; Greenhalgh, Neslin, & Gilkey, 1984; Lindskold & Tedeschi, 1971; Shaw, 1971; Strodtbeck, James & Hawkins, 1957.

7. *Desire to Avoid Conflict*: Blood & Wolfe, 1960; Park, 1982; Pondy, 1967; Spiro, 1983.

8. *Generalized Self-Confidence*: Aronoff & Messe, 1971; Hovland & Janis, 1959; Lindskold & Tedeschi, 1971b; McMillan, 1973; Shaw, 1961.

9. *General Interest*: Burns & Granbois, 1977; Davis, 1976; Katz & Lazarsfeld, 1955; Kelley, 1966; Pruitt & Lewis, 1975.

10. *Strength of Preference*: Arrow, 1951; Bartos, 1974; Benton, Kelley & Liebling, 1973; Coleman, 1966; Corfman 1987; Keeney & Kirkwood, 1975; Pruitt, 1981.

11. *Decision History*: Coleman, 1957; Deutsch, 1973; March, 1966; White, 1970.

The first eight of these factors relate directly to French and Raven's (1959) bases of social power. Ability to reward, ability to punish and authority are their reward, coercive and legitimate powers, respectively. Opinion leadership and expertise reflect expert power. Age is a characteristic that may lead to referent power. Sex, desire to avoid conflict and self-confidence are additional personal traits that may complement the sources of power and that research has suggested can affect how people react in group situations when preferences differ.

The importance of general interest and strength of preference stem from the notion that the more an individual wants something, the more likely he or she is to get it. This can result from greater motivation to use power-related resources or from a desire on the part of the group to accommodate individual preferences. In the decision analysis literature the latter explanation is reflected in weighted linear utility models (e.g., Keeney & Kirkwood, 1975). In these, the higher an individual's utility for a given alternative is, the higher the group's utility for that alternative will be.

Of particular interest in this study is the effect of past decision outcomes or decision history on the resolution of disagreements in group settings. Research in several areas supports the concept of a history effect. Deutsch (1973), for example, discusses the prior relationship of the parties to one another as one of the factors affecting the course of conflict. Although he concentrates on describing the relationship between prior and current conflicts, the implication is that past conflicts are important for outcomes as well. In a similar vein, structural-change models (Coleman, 1957; White, 1970) propose that changes in perspectives and goals occur as the result of conflict. These changes then affect future conflict.

We suggest that this history effect can take two basic forms: either a turn-taking or equity effect in which losing (having the alternative the member prefers rejected by the group) last time increases a person's chances of winning (having it chosen by the group) this time, or a momentum effect in which the winning member continues to win. Strong pressures will tend to exist for members to conform to whichever of these patterns or norms is established in the group (Asch, 1951; Crutchfield, 1955; Sherif, 1936). In this way the group norm will be self-perpetuating. Therefore, we expect a particular group to exhibit either equity or momentum in a sequence of decisions.

Support for each of these patterns is found in several areas. Equity theory (Adams, 1965; Homans, 1961) is concerned with the way in which individuals attempt to reduce feelings of inequity in social exchange. In a sequence of group decisions, if an individual feels the resolution of past decisions has left one member at a disadvantage, he or she may push for outcomes which restore equity in future decisions. The consequence of this would be observed as turn-taking or equalizing of gains over a group's decision history. This type of behavior is consistent with the tendency of ad hoc groups to employ compromise solutions (Hall & Williams, 1966). The opposite prediction, that an individual will increasingly dominate the sequence, is supported by empirical work demonstrating the stability and reinforcement of leader identity in groups without formal structure (Gray & Mayhew, 1970; Von Broembsen, Mayhew & Gray, 1969). The stability appears to exist even when the subject matter of the discussion changes (Blake, Mouton, & Fruchter, 1954).

March (1966) discusses two model types that incorporate the effect of past conflicts on uses of power. His force-depletion models imply that power is used up, making it unavailable in future conflicts. Thus, a person who has been influential in the past may not have the resources to continue to be influential in the future. Force-conditioning models, on the other hand, imply that being influential increases the probability that an individual will be so in the future: success improves reputation and reputation for success leads to more success.

Hypotheses

With the exceptions of sex, the desire to avoid conflict, and decision history, theory indicates that the more of each of these influence-related factors a group member possesses, the more he or she will be able to influence other members and decision outcomes. The reverse is true of the desire to avoid conflict. The relative importance of these factors and the effect of sex and decision history will depend upon the nature of the group members' interdependencies and the decision task.

The kind of group examined here is institutional and short-term. Institutional groups are typically externally formed and controlled, and exist to perform functions that may be other than those that bind the members to the group (Faris, 1937). Thus, members of institutional groups tend to be united by instrumental bonds (McCall, 1970). These characteristics are typical of many project teams, work groups and committees. Although our investigation of decision history is exploratory, the short-term, task-oriented and relatively impersonal nature of this kind of group lead us to expect a predominantly cooperative conflict resolution pattern (Hall & Williams, 1966). Thus, the effect of decision history should be toward equity. It is not clear what effect, if any, sex will have on influence in groups of this type.

The overall importance of the outcome to the group members will also affect which influence-related factors are more important and how cooperative the group is (Corfman, 1987). High stake decisions are more likely to be met with the use of threats or mandates (coercive or legitimate power) than decisions that matter less to the members. Low stake decisions are more likely to be settled cooperatively, with fairness and equity having a larger impact on the outcome. Due to the experimental setting, the decisions we examine have outcomes that are not of critical importance to the participants. Thus, again, we expect the effect of decision history to be that past losses result in future wins.

The variables so far discussed are listed in Table 1 (next page) with the direction of their hypothesized effects on an individual's ability to influence group outcomes.

Study 1

The effects of these influence-related factors were explored through a laboratory experiment which employed ad hoc dyads, each making a series of 12 binary choices. Half of the choice were between two stock market investments and half were between two pieces of music. Data were collected in three phases: (a) a pre-experimental questionnaire (used for selection of decision stimuli, group formation, and collection of information on power-related resources), (b) the experiment itself in which each two-person group made a selection from each of twelve stimulus pairs, and (c) a post-experimental questionnaire (used to collect additional information on power-related resources and perceptions of group processes). These phases will be described in more detail.

Subjects

Subjects for the experiment were student volunteers at a leading graduate school of business. They were told before they volunteered that they could expect to receive about five dollars in compensation, although their performance

Table 1
Hypotheses

INDEPENDENT VARIABLE	HYPOTHESIZED EFFECT ON INFLUENCE
Strength of Preference	+
Decision History (won in the past)	-
Ability to Reward	+
Ability to Punish	+
Formal Authority	+
Expertise	+
Opinion Leadership	+
Interest	+
Generalized Self-confidence	+
Desire to Avoid Conflict	-
Age	+
Sex	Exploratory

in the experiment would determine the exact amount. The groups were clearly instrumental in that their dependence upon each other was for completion of the task and receipt of the payoff. They were also short-term (the duration of a one hour task) and the members did not choose each other for the task. Thus, in important respects the dyads resembled compressed-time versions of many instrumental groups found in the work place.

The subjects did not have legitimate authority or the means to reward or coerce. Thus, the design controls for formal authority, the ability to reward and the ability to punish. These variables are not examined further. (The experimenter followed the interaction between group members and noted the use of specific power sources during the decision-making sessions. These reports contain no evidence of the use of reward, coercive or legitimate power.)

Stimuli

The study dealt with two different kinds of decisions: choice of a musical selection which was played to the subjects immediately following the decision, and choice of a stock whose market performance over the next three months determined a monetary payoff. The music decisions were indeterminate tasks, made using subjective criteria. The stock decisions were made using more objective criteria and were determinate tasks. Although the correct solution

could not be determined immediately, ultimately one stock in each decision pair performed better than the other.

Pre-experimental Questionnaire

An eight page questionnaire was attached to the participation solicitation distributed to the students. Eighty-six of these were returned in usable form. This questionnaire provided demographic, personality, and other background data. (See the Appendix for selected scales and sources.) In addition, we collected judgments on music and stocks which we used to form the experimental groups and select the stimuli. Subjects rated a list of 23 pieces of music on preference and familiarity and another list of 38 stocks on expected price increases and confidence in their judgments. All ratings were on 5-point scales.

Stimulus Selection

We wanted to select music and stock pairs that would tend to cause disagreement in the experiment. Therefore, we examined correlations of music and stock preferences for the 70 respondents who returned the pre-experimental questionnaire by the due date. The six most negatively correlated pairs of each type (music and stocks) were chosen. Although there was considerable homogeneity of preference, in all but two cases the correlations were significantly less than zero ($p < .10$). In only one case, Wagner's "Tristan and Isolde", were fewer than 73% of the subjects familiar with the piece of music. However, discussions with subjects afterward indicated that although they were not familiar with that particular work, they were generally familiar with Wagner's musical style.

Group Formation

In a fashion similar to the one described previously for creating stimulus pairs, subjects were matched for experimental groups based on correlations of subjects across music and stock preferences. Dyads were designed to include individuals who were negatively correlated in their preferences for the items examined in the pre-experimental questionnaire — that is, each member tended not the prefer the items the other member preferred. Thirty-eight such groups ultimately completed the experiment.

The Experimental Session

At the beginning of the session each group member was handed a folder containing a form on which to rate individually the alternatives in each stock or

music pair as it was presented. The subjects' ratings were constant sum allocations of 100 points between the two alternatives to reflect their relative preferences. The instructions encouraged subjects to use a ratio scale in making their point allocations. Subjects were instructed not to look at each others' rating forms or to discuss their point allocations at any time during the session.

Twelve stimulus pairs were presented to the subjects on cards. The six music cards gave the title, composer or performer, and the genre (classical, rock, jazz, etc.) of each piece. The six stock cards provided the company name, dividend, price/earnings ratio, volume, current price, and yearly high-low of each alternative. Every group was presented with the same set of twelve pairs. The presentation order was varied across groups in order to eliminate any spurious effects of order on how group history affected the outcomes.

After the subjects individually rated the two stimuli in each pair they were given five minutes to reach agreement on which piece of music to listen to or which stock to invest in. Following each music decision, subjects listened to a tape of their joint selection for approximately three minutes. The subjects were informed that at the conclusion of the experiment, the experimenters would randomly choose a stock pair on which to base their payment. The performance over the next three months of the stock the group chose from that pair, relative to the performance of the other stock, determined the group's monetary payoff. The music tapes and the future monetary payoff appeared to have been incentive enough to encourage subjects to think carefully about their preferences and argue for their first choices. Each group made all twelve decisions.

When all stimulus pairs had been presented, the subjects completed a second questionnaire. This provided information on their impressions of each other and the task: how much they liked each other, whether they would like to work with each other in the future, and whether they were aware of decision processes operating during the experiment.

Analysis and Results

Variables

The objective of our analysis was to determine the relative effects that the influence-related factors described earlier had on the outcomes of the decisions. We performed a discriminant analysis with the identity of the winner (the member whose preferred alternative was chosen by the group) as the dependent variable. In order to operationalize this, we arbitrarily labeled the individuals in each dyad as member one and member two. Then we created the binary variable Who Wins, which took on the value 1 if member one won and 0 if member two won.

The subjects' constant sum point allocations to the alternatives in each pair were used as the preference measures, $V_i(A)$ and $V_i(B)$. V_i^* is the point allocation to member i's preferred alternative. By taking the difference between V_1^* and V_2^* we have a measure of the members' relative intensity of preference for the alternatives they preferred (Intensity). The interpersonal comparison of utility implied with this measure appears to be justified by the group members' behavior. In their joint decision making discussions, subjects seemed to accept each other's expressions of preference intensity and the experimenter observed that the subjects' conclusions on whose preferences were stronger were consistent with the initial point allocations.

The outcome of the last disagreement, History, was coded in two ways. The first version assigned a member 1 if he won and 0 if he lost. A relative measure was formed by taking the difference of the outcomes for the two members. Consequently, this variable is +1 if member one won in the preceding disagreement, -1 if he lost, and 0 if the decision was the group's first disagreement. The second version of History is continuous and captures how much the members won or lost in the last disagreement. The relative measure was formed by subtracting the number of points the group allocated to member 2's preferred alternative from the number allocated to the alternative member 1 preferred. Again, if it was the first time the group had disagreed the value was set at 0. The continuous proved more useful than the binary version in subsequent analysis. Therefore, we report results only for that variable.

Data for the 10 power-related resources were self-ratings from the questionnaires. The non-demographic traits were measured using the items in the Appendix. These were averaged to create two-item indices and a relative score was generated for each trait by subtracting member 2's score on the index from member 1's score.

Disagreements

Despite our attempt to construct groups whose members differed in their preferences for stocks and music, in general the groups agreed in their choices. Of the 38 groups who participated, 34 had at least two disagreements and were retained for analysis. On average there were only 4.4 disagreements per group (149 of the 408 decisions made). As a result, it was not possible to test for the effects of decision outcomes further back in the groups' histories than the preceding decision.

Four possible explanations for this general lack of disagreement are apparent. First, there was a lag of three weeks between administration of the pre-experimental questionnaire and the last experimental session. Therefore, preferences which were not strongly held may have changed. Second, the

pre-experimental questionnaire asked subjects how much they liked or disliked each musical selection. By contrast, subjects in the experiment rated the selections according to which they preferred to listen to at that particular time. Conceivably, a subject might generally have preferred one alternative, yet be more inclined to listen to something different at the time we ran the experiment. Third, the subject matching method used was to correlate subjects on their preferences for all of the questionnaire items. This means that some subjects who were negatively correlated may not have disagreed on the particular items we chose for the experiment. Finally, the lack of disagreement may simply be due to the homogeneity of the population from which we drew our sample.

Model Estimation

In past studies, the number of decisions observed for each group has often been too small to estimate reliably the effect of past decision outcomes on the relative influence of group members (Davis, 1973; Kerr, Stasser & Davis, 1979; March, 1966). We compensate for the relatively small number of observations (decisions) made by each group by pooling observations across groups and decisions. We assume that a set of exogenous factors (our influence-related factors) systematically dictates decision outcomes and that variation in outcomes across groups and decisions can be attributed to variations in these factors (Blalock 1982; Steckel, Lehmann & Corfman, 1988). We then use discriminant analysis to examine the relative importance of the exogenous factors.

Table 2 presents the linear discriminant function for the dependent variable, Who Wins. This function correctly reclassified 113 of the 149 disagreements, a rate of about 75 percent. The probabilities that independent variables had effects significantly different from zero, which are also reported in Table 2, are from the mathematically equivalent process of performing a least squares regression of Who Wins on the independent variables. (Maddala, 1983, discusses this equivalence. He also demonstrates that the t-statistics associated with the regression coefficients have t-distributions despite the dichotomous nature of the dependent variable.)

The most important variables in the linear discriminant function appear to be Intensity, Opinion Leadership and Internal Control. Signs were as hypothesized. Thus, members who had more intense preferences, who enjoyed discussing and were consulted by others on the decision subject, and who had a greater feeling of control over their lives were more likely to have the alternatives they preferred chosen by the group.

History is conspicuous by its absence, especially given its significant, although low, correlation with the dependent variable ($r = -.16, p < .05$). This suggests the possibility of multicollinearity and, indeed, History is significantly

Table 2
Study 1: Results of Model Estimation

Dependent Variable: Who Wins	
Independent Variables	Linear Discriminant Function Coefficients
Preference Intensity	.94***
Decision History	-.28
Expertise	-.18
Opinion Leadership	.66**
Interest	-.33
Self-confidence	-.33
Conflict Avoidance	-.20
Internal Control	.47*
Sociability	-.11
Attractiveness	.11
Age	.11
Sex	.34
Outcomes correctly reclassified:	75%

***$p < .001$. **$p < .05$. *$p < .10$.

correlated with Intensity ($r = -.23, p < .01$). The negative sign of the correlation suggests that losing in one decision made a subject likely to give a broader spread in points to the two alternatives in the next decision. This leads us to speculate that History did not affect future outcomes directly, but that the increased spread in individual point allocations after losing accounted for the greater probability of winning in the next decision. We cannot be sure whether past decision outcomes actually changed the intensity of future preferences or whether they simply affected motivation to win. How individuals allocate points between two alternatives may be a function not only of their true preferences, but also of how determined they are to have their way. In order to see whether subsequent disagreements were different in nature from the first due to the absence of a history effect, the first disagreement in each group was dropped and the analysis performed with the other 115 disagreements. There was no apparent difference in the results.

Differences in the decision process due to the determinate versus indeterminate natures of the two task types were investigated by splitting the sample into the 74 music and 75 stock disagreements. The analysis was then performed on each subsample. This method did not result in the explanation of significantly more variance in the dependent variable. Although the relative importance of the influence-related factors was not different for these types of stimuli, the length of the process clearly was. As hypothesized, the stock disagreements took longer than the music disagreements – 127 versus 53 seconds on average.

Summary

This study suggests that groups tended to resolve conflicts in favor of the member whose preferences were most intense and that members had a systematic tendency to favor their preferred choices more strongly if they were dissatisfied in the last disagreement. This stronger preference then led to an enhanced chance of winning in the subsequent disagreement. In addition, members who were opinion leaders and who had higher levels of internal control tended to be more influential.

Although the results of this study are suggestive, two weaknesses are apparent. First, the methods used to create stimulus pairs and match subjects for the experiment produced an inadequate number of disagreements to investigate decision histories longer than one period. Further, the large number of agreements the groups had between their disagreements may have diluted the effects of decision history. Although this may be a more realistic situation than one in which every decision is a disagreement, the laboratory experiment was designed to detect effects in the purest case. Second, the power-related resource indices were created based on theory, but in some cases were highly correlated, resulting in instability of discriminant analysis parameter estimates. In Study 2, which is described in the following section, a more effective method of stimulus selection is used and indices are created with greater concern for their convergent and discriminant validity.

Study 2

Method

The data for this study were collected in four phases: (a) a pre-experimental questionnaire completed before the experiment and brought to the session (used to assess expertise), (b) a second pre-experimental questionnaire completed on site (used to select decision stimuli), (c) the experiment itself in which each

two-person group made a selection from each of twelve stimulus pairs, and (d) a post-experimental questionnaire (used to collect additional information on power-related resources). These phases will be described in more detail.

Stimuli

For this experiment we attempted to choose stimuli about which subjects had more intense preferences. A pretest using a convenience sample of 43 students indicated that eating dinner at a restaurant was a leisure-time activity about which they felt they were more *picky* than average. Therefore, we designed this experiment to involve the selection of a restaurant at which to have dinner. The 20 restaurants for the study were selected at random from those in a published guidebook and were in the moderate price range for the area ($50 for two excluding alcohol, tax and tip).

Subjects

Subjects for the experiment were student volunteers at the same graduate school of business. They received seven dollars each for participating and the chance to win dinner for two at one of the restaurants they chose.

The Experimental Session

The experiment was very similar to the one conducted for Study 1. Differences are highlighted here.

Subjects brought to the session completed pre-experimental questionnaires in which they provided information on their knowledge of and experience with each of the 20 restaurants in the study. This was used for a variable that measured expertise on specific restaurants (vs. general expertise). At the beginning of the session each group member was handed the second pre-experimental questionnaire, the first two pages of which asked them to choose one from each of 50 different pairs of restaurants. When both group members had completed this task the experimenter used these rating sheets to select for the experiment 12 stimulus pairs on which the members disagreed. Again, the experimenter presented the stimulus pairs one at a time. The subjects first individually rated each stimulus in the pair and then reached a joint decision about where they preferred to have dinner. Each group made all twelve decisions. When all stimulus pairs had been presented, the subjects completed the set of questions which provided information on their power-related resources and on the realism of the task. (See Appendix.)

Analysis and Results

Variables

The dependent variable and the preferences measures were created as for Study 1. The outcome of the last disagreement, History, varied on an additional dimension, producing four rather than two versions of the variable. As before, the first variation determined whether a binary or a continuous measure was used. The second variation determined whether only the preceding joint decision was used or whether a cumulative history (over all preceding decisions) was used. Relative measures were formed by taking the difference of the outcomes for the two members. No apparent difference in predictive ability was found among the four versions; results for the binary cumulative version (which measures the proportion of times subject 1 won over all preceding decisions) are reported here.

The fifteen items indicated in the Appendix were analyzed for use in the power-related resource indices. To help create indices with discriminant validity, the items were factor analyzed. The five factors with eigenvalues greater than one were retained. All factor loadings greater than .5 are discussed here. The opinion leadership, expertise and one of the interest items loaded on the first factor. As this is an intuitively reasonable result, these items were combined to form one Expertise/Interest index. The confidence items loaded on the second factor. An internal control and a conflict avoidance item loaded on the third factor. The latter item was, "a good argument can be a lot of fun," which might reasonably be interpreted as relating to internal control. Thus, the two items were used for the Internal Control index. The other two conflict avoidance items loaded on factor four. Factor five contained an internal control item (becoming a success is a matter of hard work . . .) and an interest item (how many times . . . do you eat dinner at a restaurant?). This may be because hard working, successful people have less time to cook and more money to spend on restaurants. Because the correlation between these items was not significant and we have no theory concerning hard work, these items were not considered further. Each index was created by taking the mean of the appropriate variables. The four resulting indices and their Cronbach alphas are: Expertise/Interest (α = .86), Confidence (α = .73), Internal Control (α = .50) and Conflict (α = .50). (These coefficients are considered in the acceptable range for exploratory research, Nunnally, 1967, p. 226). Relative measures were created by subtracting member 2's score on each index from member 1's score.

Recognizing that self-reported general expertise in restaurant dining might be different from expertise specific to the restaurants in the study, a Specific Expertise variable was formed using the data from the pre-experimental

questionnaire. This had two forms: a) the subject's mean expertise for the two items in the pair, and b) the subject's expertise for the restaurant about which he or she was most expert. Again, a relative measure was formed. Neither version appeared to have superior predictive ability. Results for the form using the mean are reported here.

Disagreements

Three classes of preference patterns can be identified: a) disagreements, b) agreements, and c) situations in which one of the members was indifferent. Of the 384 decisions made by the 32 groups (12 decisions each), 210 were disagreements, 101 were agreements, and in 73 at least one of the members was indifferent. The average number of disagreements per group was 6.6, which was sufficient for our analysis of decision history. (All first decisions were dropped to eliminate effects of learning.) Given the method by which decision pairs were selected for each group, it is at first surprising that only slightly more than half of the decisions were disagreements. The cases of indifference were probably due to the fact that the questionnaire forced choices between restaurants in potential decision pairs, even though subjects may have been truly indifferent in some cases. Therefore, some decision pairs that looked like they would result in disagreement were really situations in which one of the members had no preference. The agreements may be explained similarly. Preferences that are not strongly held are not likely to be stable. An indication that preferences were generally not extremely intense is that the average number of points allocated to the preferred alternatives was 68.3 points (although the allocations did range up to 100 points).

Model Estimation

Table 3 presents the linear discriminant function for the dependent variable, Who Wins. This function correctly reclassified 73 percent of the decision outcomes. The most important variables in the linear discriminant function were Intensity, History and Expertise/Interest. Signs were as hypothesized. Thus, members who had more intense preferences, who had lost in the past and who were more expert were more likely to have the alternatives they preferred chosen by the group.

These results are similar to those of Study 1 in which Intensity and Opinion Leadership (here included in Expertise/Interest) were the most important factors and History, although not significant, appeared to operate through the Intensity variable. In Study 1, History did not affect future outcomes directly, but an increased spread in individual point allocations after losing accounted for the

Table 3
Study 2: Results of Model Estimation

Dependent Variable: Who Wins	
Independent Variables	Linear Discriminant Function Coefficients
Preference Intensity	.49***
Decision History	-.27***
Specific Expertise	-.06
Expertise/Interest	.23**
Self-confidence	.05
Conflict Avoidance	-.12
Internal Control	-.01*
Age	-.11
Sex	.13
Outcomes correctly reclassified:	73%

***$p < .001$. **$p < .05$. *$p < .01$.

greater probability of winning in the next decision. In Study 2, there was no correlation between History and Intensity. Therefore, the implications are slightly different. Here it appears that losing in the past either increased a member's motivation and efforts to win (without affecting his or her point allocations) or a group norm of equity or fairness was operating.

To further investigate the relationship between History and Intensity, the sample was split according to whether the group members' preferences were equally intense or one had stronger preferences than the other and the model was estimated on each subsample. (Results appear in Table 4.) A Chow test indicated that significantly more variance was explained when the sample was split ($p < .05$). In the analysis using the sample in which one member's preferences were more intense than the other, the discriminant function correctly reclassified 87 percent of the outcomes and had three significant parameter estimates with signs as hypothesized: Intensity, History and Confidence. The sign of Confidence indicates that the member who was more self-confident had a greater chance of winning. The discriminant function for which preferences were equally intense correctly reclassified 73 percent of the outcomes and had four significant

Table 4
Study 2: Results of Model Estimation Sample Split on Preference Intensity

Dependent Variable: Who Wins

	Linear Discriminant Function Coefficients	
Independent Variables	Equal Intensity[a]	Unequal Intensity[b]
Preference Intensity	.21**	.75***
Decision History	-.36***	-.22*
Specific Expertise	-.15	-.06
Expertise/Interest	.29**	.12
Self-confidence	-.07	.27**
Conflict Avoidance	-.13	.06
Internal Control	-.04	-.12
Age	-.10	.05
Sex	.21*	-.01
Outcomes correctly reclassified:	73%	87%

[a] $n = 89$. [b] $n = 44$.
*** $p < .001$. ** $p < .05$. * $p < .10$.

parameter estimates: Intensity, History, Expertise/Interest and Sex. This implies that being expert and being male also increase a member's chances of winning.

When examined together these results suggest an interesting and logical process. When one member had stronger preferences, Intensity was by far the most important factor. Its coefficient was much larger than the others in this analysis ($\beta = .75, p < .001$) and much larger than the coefficient of Intensity in the equal preference analysis ($\beta = .21, p < .05$). History had a relatively small effect ($\beta = -.22, p < .10$). When preferences were close to equally intense, preference Intensity was not as useful for resolving disagreements and Intensity was less important than History ($\beta = -.36, p < .001$). This implies that decision history was used to break ties in preference. Expertise and sex also came into play when preference intensity could not be used to resolve differences. Confidence was important only when preference intensities were unequal, perhaps because confidence makes members more assertive in their expressions of preference.

Table 5
Study 2: Results of Model Estimation Sample Split on Group Gender Composition

Dependent Variable: Who Wins

	Linear Discriminant Function Coefficients	
Independent Variables	Mixed[a]	Matched[b]
Preference Intensity	.45**	.46***
Decision History	-.26**	-.42***
Specific Expertise	-.23*	.04
Expertise/Interest	.29*	.17*
Self-confidence	.36	-.16
Conflict Avoidance	-.06	-.19
Internal Control	.08	-.14
Age	-.19	-.37***
Outcomes correctly reclassified:	79%	79%

[a]n=61. [b]n=83
***$p < .001$. **$p < .05$. *$p < .10$.

To determine whether there was any difference in the decision processes of single sex groups versus groups with one male and one female, the model was estimated separately on these subsamples. A Chow test indicated that significantly more variance was explained when the sample was split ($p < .05$). (See Table 5.) For both the mixed and matched gender groups 79 percent of the outcomes were correctly reclassified. Intensity, History and Expertise/Interest were important for both groups. For the matched groups Age and Conflict were also important. Age had a strong effect indicating that younger members tended to win. This may be due to the differences between older and younger M.B.A. students. The younger students may have been competitive whereas the older students may have decided that this experiment was not worth as much exertion. That Age was not significant in the mixed sex analysis suggests that younger subjects felt more comfortable being competitive when they were dealing with someone of the same sex. The sign of Conflict implies that members who wished to avoid conflict were less likely to win. For the mixed sex groups the effects of Specific

Expertise and Confidence were significant and both improved a member's chances of winning. When we took a closer look by splitting the matched sample into all male and all female groups the amount of variance explained was not significantly greater.

Summary

This study found that groups tended to resolve conflicts in favor of the member whose preferences were most intense. When this was not possible because preferences were equally intense, groups favored the members who had won less in the past. In addition, general expertise, confidence and sex affected who was more influential. One reason for the relatively minor influence of other power-related resources in this study may be the ad hoc, short-term nature of the groups. Members may not have been able to ascertain some of the relevant personal traits (such as specific expertise and age) early enough in the time the groups spent together for these resources to have had a strong effect on overall relative influence. Consequently, studies of longer-term groups may wish to include these variables even though they were not significant here.

Regardless of the groups' gender composition, preference intensity, decision history and expertise were important factors in making decisions. The greatest difference between mixed and matched gender groups was in the effect of age. When genders were matched, younger members had the advantage, perhaps because they felt more comfortable competing with members of the same sex. Specific expertise, self-confidence and desire to avoid conflict played roles as well.

Conclusions

The findings indicate that in studying a particular group choice, it is important to note not only what a group member prefers, but how strongly he or she prefers it. In addition, it is important to understand the history of the group's choices in addition to knowing the members' more stable traits and preferences. This study strongly suggests that the longitudinal study of group decision-making is an important and interesting focus for research.

The conclusions drawn here are obviously tentative. The studies were conducted with small samples of highly educated subjects, all groups had two members, and only one type of decision was examined closely. Clearly, studies of existing groups, of groups with different numbers of members, and of other types of decisions with larger numbers of alternatives are needed before generalizations can be drawn. It should also be noted that this study investigated

the resolution of disagreements rather than major conflicts. Although this approach is also appropriate to the study of conflict resolution, the results may be different.

Several questions remain. In what kinds of groups will momentum or dominance operate rather than equity? How dependent is the nature of the effect of history on the length of the decision sequence or how clearly defined winning and losing are? To what extent do the results apply to sequences of dissimilar decisions? These questions provide useful directions for further investigation into the effect of decision history.

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Appendix

Power-related Resources: Questionnaire Items

EXPERTISE

I know a great deal about music. (Study 1)
I know a great deal about restaurants in New York. (Study 2)
I am good at selecting stocks for investment. (Study 1)
I am good at selecting restaurants to eat in. (Study 2)

OPINION LEADERSHIP (Adapted from King & Summers, 1969.)

My friends ask me about music (for information on the stock market). (Study 1)
My friends ask me for restaurant recommendations. (Study 2)
I like to talk about music (stocks) with my friends. (Study 1)
I like to talk about restaurants with my friends. (Study 2)

INTEREST

I follow the stock market closely. (Study 1)
I follow the New York restaurant scene. (Study 2)
How much time do you spend per week listening to or playing music? (Study 1)
How many times during an average month do you eat dinner at a restaurant? (Study 2)

SELF-CONFIDENCE (Day & Hamblin, 1964)

I seldom fear my actions will cause others to have a low opinion of me. (Studies 1 and 2)
In group discussions, I usually feel my opinions are inferior. (Studies 1 and 2)
When in a group, I rarely express an opinion for fear of being thought ridiculous. (Studies 1 and 2)

CONFLICT AVOIDANCE

I would rather make a slightly poorer choice than argue for a long time. (Studies 1 and 2)
A good argument can be a lot of fun. (Studies 1 and 2)
I feel uncomfortable telling someone else he or she is wrong. (Study 2)

INTERNAL CONTROL (Villani & Wind, 1975)

Many times I feel that I have little influence over the things that happen to me. (Studies 1 and 2)
Becoming a success is a matter of hard work, luck has nothing to do with it. (Studies 1 and 2)
Getting a good job depends on being in the right place at the right time. (Study 2)

SOCIABILITY

When I am in a small group, I sit back and let others do most of the talking. (Villani & Wind, 1975, Study 1)
I enjoy working in groups. (Study 1)

ATTRACTIVENESS (Adapted from Moreno, 1934.)

I like the person with whom I participated in this experiment. (Study 1)
I would like to work with the other participant in the future. (Study 1)