Testing Contrasting Interaction Models for Discriminating between Consensual and Dissentient Decision-Making Groups

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TESTING CONTRASTING INTERACTION MODELS FOR DISCRIMINATING BETWEEN CONSENSUAL AND DISSENTIENT DECISION-MAKING GROUPS

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This study tested three models of group interaction for their ability to discriminate between groups that reach consensus and those that do not. Fifteen mock juries (seven hung and eight conviction) constituted the sample. Model 1, a "functional action model," successfully discriminated between consensus and hung juries based on the relative number of simple disagreements. Model 2, an "interact pattern model," successfully discriminated between consensus and hung juries based on the sequential redundancy of interaction patterns that perpetuate or resolve ambiguity, that digress from the work at hand, and that clarify or resolve conflict. Model 3, Fisher's four phases of development, failed to discriminate between consensus and hung juries.

Researchers studying small group decision making have a clear mandate to investigate relationships between the structure of social interaction and group performance outcomes. A growing body of research evidence demonstrates that both the processual forms and the thematic content of group communication explain a significant proportion of variance in models linking individual and group-level task interaction and group performance outcomes (Fisher, 1970b; Jarboe, 1988, 1996; Mabry & Attridge, 1990; Poole, 1985; Poole &

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Hirokawa, 1986; Shelly, 1997; Wheelan, 1994; Wheelan & Kaeser, 1997; Wheelan & McKeage, 1993). Problematizing the role communication plays in generating group outcomes has been instrumental in motivating research analyzing relationships between predecisional factors and interaction process variables for their ability to predict outcomes (Mabry & Barnes, 1980; McGrath, 1964; Meyers, 1989; Poole, McPhee, & Seibold, 1982).

The conceptual links between communication processes and group decision-making outcomes is still the subject of controversy (Poole & Baldwin, 1996). Very little information is available that explains how, and at what point(s), discordant behaviors affect decision-making performance. Moreover, conceptualizations of group outcomes like consensus and effectiveness vary. The present study sought to extend current understandings of consensus processes in groups by adopting an open systems perspective (Mabry & Barnes, 1980; VanLear, 1996) and assessing the predictive efficiency of distributional, sequential, and phasic models of communication in small groups succeeding or failing in making consensus decisions.

GROUP CONSENSUS AND INTERACTION PROCESSES

Consensus is a disarmingly complex construct. Small group research has conceptualized consensus as an attitudinal and/or behavioral convergence of group members on a common decision or issue. Moreover, researchers have operationalized consensus as either a causal or a criterion variable. Thus, there are two potentially complementary but conceptually distinct approaches to studying small group consensus processes: consensus-as-causality and consensus-as-effect.

Consensus-as-causality occurs when consensus is defined as a decision rule. Task instructions requiring groups to arrive at decisions through unanimity reflect the translation of social values about group functioning into procedures and goals. Like other task requirements, they are normative, influencing group member participation and group perceptions (Poole, 1985; Rawlins, 1984; Wood, 1984).

Consensus, however, is not always the result of group interaction, regardless of its stipulation as a decision rule (Nemeth, 1992). Failure to reach a consensual decision under group decision rules requiring unanimous endorsement of an outcome—a dissentient outcome—is not uncommon. Dissentient outcomes typically are viewed as the result of flaws in decision-making skills or leadership when group consensus is expected by decision rule or taken as an attribute of decision quality (Gouran & Hirokawa, 1996; Hirokawa, 1980, 1984; Rawlins, 1984).

The consensus-as-effect orientation arises from studying how group input and process synergies are interdependently related to decision outcomes. Factors such as attitudinal similarity, persuasive argumentation, or personal attraction stimulate social influence and cathectic processes in an input-process-output logic sequence of cause and effect. Successfully stimulating a trajectory toward the convergence of shared (or unshared) opinions and beliefs among group members often leads to consensual outcomes (DeStephen, 1983b; DeStephen & Hirokawa, 1988; Knutson, 1972; Moscovici, 1985; Wood, 1984).

DEVELOPMENTAL STRUCTURES

Group research has approached the study of consensual outcome groups (COGs) and dissentient outcome groups (DOGs) from a variety of perspectives. Much of the research on communication process structures in group decision making is based on settings where a decision rule of unanimity was stipulated as a task instruction or sought by members as a performance norm. This bias toward data obtained from COGs is understandable because of the social and pedagogical hegemony that consensual group decision making has enjoyed (Wood, 1984).

The normative entraining of decision rules or social expectations can make modeling decision-making processes difficult. Required is a framework that can be applied cross-contextually without losing explanatory efficacy because of conversational topics or procedural constraints. Mabry and Barnes (1980) and more recently VanLear (1996) have discussed open systems theory–based frameworks for conceptualizing and modeling dynamic communication process patterns typical of those found in small groups. Three primary types of process structures explored in this study are distributional, sequential, and phasic models. Research on decision development and, more broadly, the development of groups as social communicative entities has relied on one or more of these three types of process structures for modeling developmental tendencies.

DISTRIBUTIONAL STRUCTURE

The distributional structure evident in group communication is a function of how group interaction is arrayed across a finite set of message types (or categories). Bales (1950, 1953) was one of the first group theorists to incorporate distributional message structures as a key concept in the explanation of group stability and change. According to Bales (1953), group activities (like decision making) produce asymmetric frequency distributions of messages. Thus, for example, he found that members of problem-solving groups gave information five times as often as they asked for it and showed agreement twice as often as disagreement. As groups temporally moved toward a decision, however, rates for suggestion giving, agreement, and disagreement increased, information giving decreased, and opinion giving remained relatively stable (Bales, 1955). Bales and Strodtbeck's (1951) three-phase model of orientation, evaluation, and control is predicated on changes in asymmetric message arrays thought to characterize each discrete phase.

Hoffman and his associates (Hoffman, 1961, 1979; Hoffman & Kleinman, 1994; Hoffman & Maier, 1964, 1967) rely on the probity of distributional process structures in explicating their group valence model (GVM) of decision making. They reason that group discussion facilitates an exchange of deliberative arguments and sentiments about decision alternatives. The decision alternative accumulating the largest critical mass of positive support for adoption (beyond a minimum threshold), probabilistically, is the alternative most likely to be endorsed as a group decision. Hoffman and his colleagues provide compelling evidence that the GVM is a better predictor of decision outcomes than competing models for moderately simple multiple-option decision-making tasks (see Hoffman & Kleinman, 1994).

SEQUENTIAL STRUCTURE

Understanding developmental patterns in small groups clearly must be linked to identifying asymmetrical distributions of actions or cognitions. Asymmetry in communication structure also can be evident in the ordering of enacted messages. Contiguous proximity of behavior creates sequential structuring of communication process (Mabry & Barnes, 1980). The basic unit of sequential process communication structure is the interact (Fisher & Hawes, 1971; Hawes, 1973). Interacts are formed by empirically framing contiguously adjacent messages as action-reaction (antecedent-consequent) units beginning at Time_{t+0} of group interaction.

Sequential structure is achieved when a significant probabilistic pattern emerges (an asymmetry), denoting that certain action-reaction message unit combinations are more prevalent than others (Shelly, 1997; VanLear, 1996). Thus, for example, a relatively higher amount of units containing the ordered message pair "question-answer" versus, say, "answer-question" would reflect the sequential structuring of those message choices. Just as the asymmetrical distribution of agreement with a decision option in Hoffman's group valence model constitutes a theoretically interesting structural pattern, so can nonrandom patterns of interacts observed in consensus and dissensus groups provide insight into communication process differences characterizing their divergent outcomes.

Saine and Bock (1973) assessed interaction structures in consensus and dissensus outcome groups. Six groups were instructed to discuss seven policy questions and arrive at a consensual answer to each question. Groups were divided into high and low consensus conditions based on the number of decisions they made.

Distributional structure (act-level) analyses indicated that high consensus groups had more “expressions of unity” than low consensus groups. Conversely, low consensus groups produced more “personal involvement” statements and “phatic messages” (nontopical and emotionally neutral chitchat) than high consensus groups.

Sequential structure analyses revealed that high consensus groups were characterized by greater amounts of unity/unity interacts. Low consensus groups had more interacts containing personal involvement and phatic statements as the consequent (reaction) categories. Saine and Bock (1973) concluded that high consensus groups manifested significantly higher frequencies of “stabilizing” sequences (act strings facilitating decisional agreement) than did low consensus groups.

DeStephen (1983a, 1983b) examined interaction patterns from the first and last meetings of high and low consensus groups not operating under consensus decision rules. Attitudinal consensus levels were determined according to group mean scores on scales measuring member agreement with group decisions and satisfaction with participation. DeStephen’s data required analysis using complex double-interacts: sequential units composed of three-message, instead of two-message, act chains. In high consensus groups, first versus final meeting periods were differentiated by double-interact units more likely to reduce ambiguity and lead to closure. Conversely, in low consensus groups, first versus final meetings were differentiated by double-interact sequences more likely to produce additional discussion. Thus, consensus and dissensus groups were distinguished by level of ordinal message complexity and evidenced clear differences in sequential structure pattern consequences at different time points.

PHASIC STRUCTURES

Systematic changes in the distribution of message acts, or interacts, typically are referred to as phases. Phases denote the ordered structure or cyclicity of the communication process (VanLear, 1996). Empirically, phasic structures are process metastructures discerned by extrapolating recurring patterns of distributional (e.g., Bales & Strodtbeck, 1951) or sequential (e.g., Fisher, 1970a; Mabry, 1975b) behavioral structures. Studies of group development are predicated on at least one of three underlying sets of assumptions about the functional purposes phasic structures emulate: sociality, goal attainment, or procedural regulation.

One of the first systematic attempts to assess phase cycles in small groups was Bales and Strodtbeck's (1951) three-phase model of orientation, evaluation, and control, predicated on Bales's (1950) theory of small groups as equilibrated social systems. While ostensibly an assessment of phasic structure in problem-solving interaction, Seeger's (1983) reanalysis of the data showed it a better indicator of group formation. Clearly, Bales's work aimed at explaining how groups function as social collectivities. His goal was to model how group participation led to role structures that generate or maintain a group's dynamic coherence as a social system. This effort was seminal, stimulating a variety of theoretical approaches to group development (e.g., Bennis & Shepard, 1956; LaCoursiere, 1980; Mabry, 1975a, 1975b; Mabry & Barnes, 1980; Tuckman, 1965; Wheelan, 1994).

Revealing social processes that transform sets of individuals into interdependent groups is a necessary but rather general objective in studying phasic structures. From a systems perspective, groups are goal-directed entities, and their communication process structures both define and constrain purposive activities (Mabry & Barnes, 1980; Poole, 1985; VanLear, 1996).

Among the earliest studies to examine relationships between group objectives and communication process structures was Scheidel and Crowell's (1964) assessment of idea development in group discussions. Rejecting prescriptive linear models of reasoning to group conclusions and Bales's (1950) general phase model and observation methods, Scheidel and Crowell (1964) mapped the distributional and sequential structure present in problem-solving discussions. They concluded that discussion processes resemble a spiraling model of decision development. Ideas regarding the task anchor deliberation through a sequential chaining of reasons for retaining or modifying the idea. Ultimately, deliberation evolves to a point where the group accepts the idea or rejects it, and re-anchors itself with another ideational input.

Goal-directed phasic models reflect either uniphasic or multiphasic assumptions about developmental process structures. Bales and Strodtbeck's (1951) three-phase model exemplifies a generalized uniphasic model of development. Similarly, Fisher's (1970a) four-phase model describes a uniphasic approach to modeling goal-directed group development: (a) an initial period of group member orientation (to the setting and task), (b) a subsequent conflict period involving the critical testing of ideas and clique formation supporting decision proposals, (c) a transitional period in which conflict declines as members coalesce in support of reasons for one solution or decision point, and finally (d) a period in which a decision clearly emerges for group endorsement and related discussion (e.g., pre-implementation planning).

Studies of longitudinal interaction patterns have revealed significant amounts of between-group heterogeneity, leading small group researchers to propose multiphasic development models (Hirokawa, 1983; Poole, 1981, 1983a, 1983b; Poole & Doelger, 1986; Poole & Holmes, 1995; Poole & Roth, 1989a, 1989b). Hirokawa (1983) studied relationships between developmental structure and performance effectiveness, failing to find a statistically reliable uniphasic pattern in either high- or low-quality performance groups. Poole's extensive research on "multiple sequence" phasic models (see Poole & Baldwin, 1996, for an extended review) concludes that phase structures, predicated on distributional or sequential process structures, are contingent outcomes both of objective and subjective group task variables, and of group structure variables such as power, cohesiveness, and group size.

Phasic structures also can emerge as groups follow rationalized procedural routines for organizing group deliberation (Jarboe, 1996). Systematic investigation of relationships between procedural formats and phasic patterns is sparse. Hirokawa (1983) failed to find a single unitary pattern in high- or low-quality performance groups, but his data revealed that effective groups systematically analyzed problems before attempting to solve them. Comparing four common formats used in group decision making (reflective thinking, ideal solution, single question, and free discussion), Hirokawa (1985) also failed to find significant effects of discussion formats on decision quality. He did, however, find that the number of requisite analytic functions performed by the group was positively related to decision quality.

HYPOTHESES AND MODELS TESTED

This study used data from simulated jury deliberation groups, employing a unanimity decision rule that either arrived at a verdict of "guilty" (consensus) or ended in a "hung" verdict (dissensus). Nagao, Vollrath, and Davis (1978) have observed that juries constitute a unique type of group decision-making context requiring group-level outcomes as a direct obligation of their responsibility for upholding societal values regarding representative fairness.

The literature suggests at least three different models of social interaction that may discriminate between groups that do or do not reach consensus. Model 1, the simplest, conforms to a distributional logic and is labeled the *functional action* model. This model holds that group consensus is facilitated by the enactment of certain kinds of behaviors by group members and inhibited by the enactment of other kinds of behaviors. The timing or the sequence of these behaviors is not considered crucial to Model 1. This model, therefore, holds that

> *Hypothesis 1:* The relative frequency of the kinds of communication behaviors enacted by group members will discriminate between consensual and dissentient group outcomes.

Whereas many categories for behaviors exist that could provide evidence of this model, as a hedge against error, this study will focus on a relatively small set of categories for which clear a priori directional hypotheses can be presented.

> *Hypothesis 1a:* Groups that reach consensus will have relatively more "simple agreement" and relatively less "simple disagreement" than groups that fail to reach consensus.

Hypothesis 1b: Groups that reach consensus will have relatively more statements arguing in favor of decision proposals and relatively fewer statements arguing against decision proposals than groups that fail to reach consensus.

Hypothesis 1c: Groups that reach consensus will have fewer nontask and ambiguous statements than groups that fail to reach consensus.

A second model of group interaction that can discriminate between COGs and DOGs is the *interact pattern* model (Fisher & Hawes, 1971). Unlike Model 1, which holds that the relative frequency of certain behaviors facilitates or inhibits consensus, irrespective of the timing of such behaviors, the interact pattern model asserts that specific patterns of interaction between participants facilitates or impedes consensus.

In this model, behaviors take their functional importance from the interaction context. Thus, it makes a difference what kinds of behaviors actors are responding to and what kinds of behaviors they tend to elicit. Certain behaviors may tend to elicit other kinds of behaviors as responses. These interact structures create redundant action/response patterns. It is these interaction patterns that discriminate between groups that reach consensus and those that do not.

Saine and Bock's (1973) "stabilizing" and "destabilizing" sequences are examples of interact pattern model structures. The second model therefore hypothesizes:

Hypothesis 2: The type and sequential redundancy of interaction patterns occurring between group members discriminate between consensual and dissentient group outcomes.

Again, a large number of interaction patterns exist that might discriminate between group outcomes. As a guard against error inflation, this study restricts its attention to a relatively small set of interaction pattern types.

Hypothesis 2a: Interaction patterns that agree with or reinforce arguments favorable to decision proposals will exhibit greater sequential redundancy in groups that reach consensus than in groups that do not, whereas interaction patterns that indicate substantive disagreement with decision proposals or that reinforce arguments against decision proposals will exhibit greater sequential redundancy in groups that fail to reach consensus than in groups that reach consensus.

Hypothesis 2b: Interaction patterns that perpetuate ambiguity will exhibit greater sequential redundancy in groups that fail to reach consensus than in those that reach consensus, whereas interaction patterns that clarify or resolve ambiguity will exhibit greater sequential redundancy in groups that reach consensus than in those that fail to reach consensus.

Hypothesis 2c: Interaction patterns that waste time or digress from the task will exhibit greater sequential redundancy in groups that fail to reach consensus than in groups that achieve consensus.

Hypothesis 2d: Interaction patterns that clarify or resolve conflict will exhibit greater sequential redundancy in groups that reach consensus than in groups that fail to reach consensus.

The third model is a *sequential phasic* model. This model argues that not only do behaviors have to be timed regarding immediately preceding behaviors, but both behaviors and interaction patterns need to be timed to occur at a particular stage in the development of a decision. Thus, a consensus decision develops through a series of phases that are normatively established, sequentially ordered, and functionally efficient. Development is a natural process through which groups efficiently arrive at consensus (Fisher, 1980). Departures from this normative sequence mitigate against the development of consensus.

The current study takes as its baseline model Fisher's (1970a) four-phase unitary sequence model. This model was selected because it (a) was empirically generated from actual consensus groups, (b) contains the functional elements of interaction traditionally thought to be important for consensus, (c) poses a normative sequence for those functions that is consistent with the bulk of the literature on unitary phasic models, and (d) has been one of the most popular of the uniphasic models from a pedagogical perspective (Poole & Baldwin, 1996). Fisher never empirically contrasted developmental sequences in consensus versus dissensus groups. DeStephen's (1983a, 1983b) research, based on Fisher's category system, showed that a group's development affects the consensus potential of an outcome, but she did not test models spanning the entire developmental history of a group's decision.

Hirokawa (1983), while failing to provide evidence that a single phasic sequence discriminated between "effective" and "ineffective" groups, did find evidence that effective groups were more likely to analyze and understand a discussion problem before attempting to solve it. Although Poole has suggested that group development is more heterogeneous than previously hypothesized, he has not focused on comparisons between consensus and dissensus groups. The current study tests the ability of Fisher's (1970a) model of group development to discriminate between consensual and dissentient group decisions.

Hypothesis 3: Groups that reach consensus will follow a four-phase pattern of orientation, conflict, emergence, and reinforcement, whereas groups that fail to reach consensus will follow different developmental sequence(s).

METHOD

SUBJECTS AND GROUPS

The data for this study were obtained from a more extensive investigation of social influence processes and relevant collateral variables characteristic of jury group decision making. University students volunteered as participants in exchange for nominal amounts of extra credit. A total of 15 groups involved 132 volunteer subjects. All groups were heterogeneous by gender and ethnicity. The average age of participants was slightly under 23 years.

Groups were selected from a pool of available jury panels for which written transcripts of videotape-recorded deliberations had been generated. Because the study sought to compare COG and DOG communication processes, eight juries known to have unanimously voted to convict a hypothetical defendant and seven juries known to have reached a deadlocked, or hung, decision were selected for analysis. The COGs represented a random subset of available transcripts, whereas the DOGs constituted all available hung jury transcripts. The COG sets of jury panels contained four 6-person and four 12-person panels. The DOG juries consisted of four 6-person and three 12-person panels. The average deliberation time for COGs was 34 minutes (range = 14 to 59 minutes), and the corresponding time for DOGs was 60 minutes, the maximum amount of time allotted for deliberation.

JURY MATERIALS AND PROCEDURES

Jury panels were called on to make a unanimous decision about the guilt or innocence of a defendant in a hypothetical criminal case (case materials are available from the second author). The case involves a dispute between the defendant and victim while both parties, portrayed as acquainted males, are in a tavern. The dispute escalates, and the two men fight. The physically larger defendant pulls a knife and twice stabs the karate-trained victim. The victim sustains non-life-threatening injuries and misses a number of months of work. The defendant is remorseful and voluntarily pays the victim's medical bills. The case is prototypical of aggravated assault cases where the pivotal issue determining guilt or innocence is the extent to which a defendant exercised a reasonable right to self-protection or an unnecessary amount of force not required by the circumstances.

The case was presented to jurors as a synopsis of the transcript from the court proceedings of a hypothetical trial that went to jury deliberation. Written materials involving the case include a one-page summary, the judge's opening remarks to the court (about ½ page), and two-page presentations of case relevancies from both the prosecution and defense perspectives. The case is weighted in its presentation of information to predispose conviction, and about two thirds of the juries exposed to the case have voted to convict the defendant.

The procedures for impaneling juries and conducting deliberations involved a series of steps taking place over a period of weeks. All subjects selected as jurors participated in a pretest session where they reviewed the transcript and responded to a questionnaire about their attitudes and perceptions toward the defendant and case. These responses were used to compose jury panels containing various majority and minority member compositions based on predeliberative dispositions to convict or acquit the defendant. Actual jury deliberations were conducted within a few weeks after subjects had completed the pretest. Based on when they were available, subjects were scheduled to report to laboratories and convene as jury deliberation panels to decide on the disposition of the case. Each group had up to 60 minutes to arrive at a verdict. Juries voting to convict the defendant also were charged with the responsibility of deciding on a penalty sentence. The separate sentencing deliberations were not included in these analyses. After 55 minutes, if a jury was still deliberating, a research assistant (the bailiff) informed them that they had 5 more minutes to finish. Juries that failed to reach a verdict in 60 minutes were deemed to be “hung” juries. Copies of the transcript were present during discussion. Subjects were not aware of the specific issues in the study during their participation, according to debriefings conducted by assistants.

Deliberations were videotape-recorded in laboratories equipped with visible cameras and microphones. Each videotape was reviewed by an assistant who prepared written transcripts of the deliberations. Unfortunately, some questionnaire data was not available for all juries used in this study, making it impossible to employ both attitudinal and behavioral measures of consensus and dissensus.

CATEGORY SYSTEM

The category system used in this study is a system developed by Fisher (1970a, 1980), with a few minor modifications. It includes the following:

1. *Interpretation:* Reflects a simple value judgment without evidence, reasons, or explanation.

   f: Favorable toward the decision proposal.
   u: Unfavorable toward the decision proposal.
   amb: Ambiguous toward the decision proposal (bivalued or neutral).

2. *Substantiation:* Judgments that include evidence or reasons as support.

   f: Favorable toward the decision proposal.
   u: Unfavorable toward the decision proposal.
   amb: Ambiguous toward the decision proposal (bivalued or neutral).

3. *Clarification:* Acts that render ideas more understandable.
4. *Modification:* Direct amendment of the decision proposal.
5. *Agreement:* Simple agreement with immediately preceding act.
6. *Disagreement:* Expresses nonsupport for immediately preceding act.
7. *Procedural:* Discussion of procedures and rules.
8. *Nontask:* Comments not relevant to the task.
9. *Residual:* Incomplete or inaudible.

This system was used because it was employed in Fisher's original study, has a long research tradition, and taps many of the functions thought to be relevant to consensus.

Modifications to Fisher's system for this study include (a) combining Fisher's two ambiguity subcategories (ambiguous bivalued and ambiguous neutral) for both interpretation and substantiation and (b) separating procedural and nontask categories from a true residual category. In addition, jury deliberations are unique in that they have two main possible decision proposals (guilt or innocence), with minor room for deviation. Thus, to argue for one decision proposal often is to argue against another. To eliminate potential ambiguities and confusion in coding and interpretation, a decision proposal was considered the position first advanced (whether guilt or innocence) or, in the case of compromises, the decision proposal currently on the floor. A few cases of modified decision proposals occurred, usually when proposals to exchange a light sentence for a conviction were made. This occurred often enough to affect the coding of favorable and unfavorable arguments but not often enough to include the modification category in sequential analyses. Therefore, an argument favorable to a decision proposal could be an argument for innocence, guilt, or some compromise. These changes appeared consistent with Fisher's intent.

CODING

The groups generated more than 6,000 acts. Seven coders were trained on Fisher's system in a series of six 1-hour training sessions. Coders were checked for reliability before, during, and after coding using a revision of Cohen's (1960) kappa suggested by Brennan and Prediger (1981). We established .75 as the required level of reliability.

Approximately 20% of the data were checked for reliability. Estimates for all data used in this report reached this level. Data also were checked for systematic category-by-category unreliability (Hewes, 1985), and those results also showed the data adequate for analysis. The criteria led to the retraining of several coders and the elimination of one coder's data (which was recoded by another reliable coder).

DATA ANALYSES

Researchers often treat the act or interact as the unit of analysis in interaction analyses. Because acts are neither independently sampled nor statistically independent, this usually is inappropriate (Hamilton & Hunter, 1985; Morley, 1986). This study treats the group as the primary unit of analysis for all hypothesis testing.

MODEL 1 ANALYSIS

The functional action model suggests that the relative frequency of certain types of behaviors discriminates between COGs and DOGs. Fisher's system identifies 12 categories of behavioral functions; however, testing all 12 would require a large number of tests for one model on 15 groups, and not all permit easy and unequivocal a priori hypotheses.[1] To reduce the probability of error and still permit the best test of the model, therefore, four composite variables were tested:

1. The ratio of all statements favoring a decision proposal to the number of all statements against a decision proposal (interpretive and substantive),
2. The ratio of simple agreement relative to simple disagreement,
3. The relative proportion of ambiguous statements, and
4. The frequency of nontask statements.

These proportions were subjected to arcsine transformations and then submitted to a multiple discriminant analysis using a MANOVA approach.

MODEL 2 ANALYSIS

The interact pattern model and Hypothesis 2 hold that the redundancy of certain sequential interaction patterns discriminates between consensual and dissentient group outcomes. Proportions of interacts or transition probabilities (conditional proportions) are confounded with the distribution of act types and, therefore, confounded with Model 1. If there is a large proportion of a certain kind of act in a jury, then there will be a higher proportion of interacts in which that category is the antecedent and/or consequent act, and transition probabilities from any state to that act also likely will be higher. Using the proportions of interacts or transition probabilities as the measures of sequential interaction patterns therefore would confound the effects of Model 1 with those of Model 2 rather than treating them as operationally and statistically independent. Furthermore, the interact pattern model holds that it is the tendency of particular types of behavior to elicit certain types of responses that forms redundant patterns which function to facilitate or impede consensus. This suggests the use of a measure of the relationship between the antecedent and consequent behaviors rather than simple interact frequencies or proportions.

To measure the redundancy of these patterns, unconfounded by the distribution of acts at zero order, a procedure similar to that advocated by Morley (1986) was employed. A first-order sequential contingency matrix (much like a Markov contingency matrix) was constructed for each jury. The expected frequency of each interact (based on the marginal distribution of acts) can be compared to the observed frequency of that interact (much like in a simple chi-square test), and an "adjusted standardized residual" (Norusis, 1988) can be extracted, which is distributed as a standard normal z score. This z score is similar to those employed in lag sequential analysis and is interpreted as whether that particular interaction pattern is occurring above or below chance. These z scores, however, are highly sensitive to the number of acts, and because the hung juries usually generated more acts, their z scores would be systematically larger. Fortunately, because they are z scores, they have the usual relationship to the product moment correlation (Rosenthal, 1984), such that by dividing them by the square root of the number of acts involved, one obtains an effect size estimate (the correlation between that antecedent and that consequent act) unconfounded by the number of acts or the zero-order distribution of acts (Morley, 1986).

In a 12×12 contingency matrix, there are 144 possible interacts. Not only are there not enough degrees of freedom to test all interacts, but testing a large number also would obviously increase the probability of chance findings. Likewise, the estimates of sequential structure used here require a reasonably large amount of data to be reliable. To reduce the size of the matrix, and therefore the number of interacts, the following steps were taken: (a) the modification category was eliminated, (b) the interpretation ambiguous and substantiation ambiguous categories were combined into a single ambiguous category, and (c) the interpretation unfavorable and substantiation unfavorable categories were combined into a single category for unfavorable arguments. This left a 9×9 matrix with 81 interacts, which was still too large.

Forty-four of the remaining 81 interacts were eliminated because their average expected frequency was too low to provide reliable estimates (average expected frequency less than five). Of the remaining 37 interacts, only those for which clear, a priori, directional hypotheses could be advanced were considered. This led to the elimination of 22 more interacts. In considering the rationales underlying the hypotheses for the 15 remaining interacts, a good deal of conceptual redundancy was apparent. The coefficients for the conceptually related interacts therefore were aggregated by averaging, provided that they were empirically related and, therefore, produced a reliable composite measure.

This procedure culminated in four composite measures:

1. Agreement reinforcing or against a decision proposal,
2. Interacts that resolve or perpetuate[2] ambiguity,
3. Interacts that clarify disagreements or conflicts, and
4. "Unproductive" interacts that waste time or evidence digression from productive work.

Table 1 presents all the potential interacts and shows those that were eliminated and those that were combined into the composite measures. The aggregated contingency coefficients for the five composite variables were submitted to a multiple discriminant analysis to test the second set of hypotheses.

MODEL 3 ANALYSIS

The phasic model tested in this study is Fisher's (1970a) four-phase model: orientation, conflict, emergence, and reinforcement. This model is based on act and interact variations across time. First, the deliberations for each jury were divided into the four phases. A group of coders was trained to identify Fisher's four phases from his description (Fisher, 1980). The coders were told to identify those four phases, if at all possible (if they existed), by identifying the three breakpoints that most clearly separate the four phases. They were also told that, if and only if those four phases did not exist in a given transcript, that they were to identify the three most important breakpoints in the deliberation that would divide the transcripts into the four most meaningful phases.[3]

Fisher (1970a) presented several clusters of acts and interacts that have predictable trends if his model holds: (a) reinforced

TABLE 1: Interacts and Model 2 Composite Variables

	Consequent Act								
Antecedent Act	*1favorable*	*Unfavorable*	*2favorable*	*Clarification*	*Ambiguous*	*Agree*	*Disagree*	*Procedural*	*Residual*
1favorable	1	ef<	ef<	nh	nh	ef<	ef<	ef<	ef<
Unfavorable	ef<	ef<	ef<	4	4[a]	1[a]	ef<	ef<	ef<
2favorable	ef<	ef<	ef<	nh	nh	ef<	ef<	ef<	ef<
Clarification	nh	nh	nh	3	2[a]	nh	ef<	nh	nh
Ambiguous	nh	nh	nh	2	2[a]	nh	ef<	nh	2[a]
Agree	ef<	ef<	ef<	nh	nh	nh	ef<	ef<	nh
Disagree	ef<	ef<	ef<	4	ef<	ef<	ef<	ef<	ef<
Procedural	ef<	ef<	ef<	nh	nh	ef<	ef<	3	nh
Residual	ef<	ef<	ef<	nh	nh	nh	ef<	nh	3

NOTE: Within the body of the table, 1 = decision proposal support and nonsupport; 2 = resolution and perpetuation of ambiguity; 3 = unproductive digression; 4 = clarification of conflict; ef< = expected frequency too low; nh = no hypothesis.
a. Scoring reversed by multiplying by –1.

TABLE 2: Composite Variables and Predicted Trends for Fisher's (1970a, 1980) Phasic Model

Composite Variable	*Hypothesis*[a]
Reinforced agreement: 1favorable/1favorable; 1favorable/2favorable; 1favorable/agree; 2favorable/1favorable; 2favorable/2favorable; agree/1favorable; agree/2favorable	+ linear
Reinforced disagreement: unfavorable/unfavorable; unfavorable/agree; agree/unfavorable	– linear and quadratic
Reinforced ambiguity: ambiguous/ambiguous; ambiguous/agree; agree/ambiguous	– linear
Overt conflict: 1unfavorable/1favorable; 2favorable/1unfavorable; 1unfavorable/2favorable	quadratic
Ambiguous conflict: 1favorable/ambiguous; ambiguous/1favorable; ambiguous/2favorable; 2favorable/ambiguous	+ linear and quadratic
Clarification	– linear
% clarification; agree/clarify	quadratic
% favorable acts	+ linear
% unfavorable act	quadratic

a. Hypotheses refer to the trends predicted for consensus groups. Hung juries are predicted to have different trends from those above.

agreement, (b) reinforced disagreement, (c) reinforced ambiguous disagreement, (d) overt conflict, (e) ambiguous conflict, (f) statements favoring decisions, and (g) statements unfavorable toward decisions. These seven composite measures were created by taking the relative proportion of the acts or interacts that compose them. Table 2 presents these composite measures and their predicted trends in Fisher's model.

The third set of hypotheses was tested by a repeated measures regression approach. First, the main effects for between cases and for time (as represented by orthogonal polynomials up to third order) were tested on the interaction measures. Next, Hypothesis 3 was tested by the verdict-by-time interaction effects on the above interaction measures. Significant verdict-by-time effects would indicate that the juries that failed to reach consensus went through a different developmental sequence than those that reached a verdict. The trends for COGs should be those predicted by Fisher's model.

RESULTS

MODEL 1

The multivariate effect for the act-level variables was significant, $F(4, 10) = 3.615$, $p = .045$, supporting Hypothesis 1. Examination of the individual univariate effects failed to show that ambiguous statements, the ratio of favorable/unfavorable statements, or nontask statements discriminate between consensus and hung juries. The ratio of simple agreement to simple disagreement, however, did significantly discriminate between consensus and hung juries, $F(1, 10) = 13.316$, $p = .003$, $R = .71$, supporting Hypothesis 1a. Consensus juries had a higher simple agreement to disagreement ratio than hung juries. A post hoc analysis revealed that this effect was accounted for primarily by the tendency of hung juries to use more simple disagreements than consensus juries, such that simple disagreements alone successfully classified 14 of the 15 groups in a discriminant analysis.

MODEL 2

The four composite interaction variables had a significant multivariate effect in their ability to discriminate between consensus and hung juries, $F(4, 10) = 4.118$, $\chi^2(4) = 10.709$, $p < .05$, canonical $R = .79$. Three of the four variables—ambiguity resolution/perpetuation, $F(1, 10) = 5.422$, $p = .037$; unproductive interaction patterns, $F(1, 10) = 19.671$, $p < .001$; and clarification of conflict, $F(1, 10) = 6.373$, $p = .025$—significantly discriminated between consensus and hung juries. All, however, were part of a single significant discriminant function that correctly classified 13 of the 15 juries. Hypotheses 2b, 2c and 2d were, therefore, supported.

MODEL 3

These data fail to support Hypothesis 3. There were two significant convex quadratic main effects for time, multivariate $F(14, 72) = 2.047$, $p < .05$; reinforced ambiguity, $F(2, 43) = 7.536$, $p = .002$,

$R^2 = .04$; and unfavorable statements, $F(2, 43) = 3.353$, $p = .044$, $R^2 = .05$, both consistent with Fisher's (1970a) model. None of the verdict-by-time interaction effects was significant, however, and they only explained an average of 1% of the variance. This indicates that whereas there is some evidence of phasic progression in the data, the nature of those phases does not discriminate between consensus and hung juries.

DISCUSSION

Two of the three models tested in this study showed some ability to discriminate between consensus and hung, or dissensus, juries. The functional action model was supported by the fact that consensus juries had higher ratios of simple agreements relative to simple disagreements than did hung juries. Of the 149 cases of simple disagreement across the 15 juries, only 15 occurred in consensus juries.

There might, of course, be a tendency to view this finding as uninformative. Groups known to have reached consensus could be expected to evidence more agreement than disagreement. Such a conclusion begs a more important point addressed in the hypotheses: Why were consensus and dissensus groups differentiated at the level of distributional structure patterns only on the basis of the relative proportions of simple agreement or disagreement enacted in their deliberations? Why were they not differentiated on the basis of relative amounts of favorable or unfavorable interpretations or substantiations?

Theoretically efficacious explanations for dissensus outcomes include group members clashing over the reasons they favor one decision alternative over another (Hypothesis 1b) or groups getting distracted and not paying enough attention to task issues (Hypothesis 1c). Distributional structure analyses verified that only relative agreement-to-disagreement empirically differentiated consensus and dissensus groups (Hypothesis 1a).

The interact pattern model did the best job of any of the three models of discriminating between consensus and hung juries.

Three of the five interaction variables contributed to the discrimination between jury outcomes, though they formed a single discriminant function. Fisher's (1970a) phasic model failed to discriminate between jury outcomes.

The results of this study present a fairly clear picture of the difference between groups that reach consensus and those that do not. Whereas hung juries engaged in significantly more simple disagreement (e.g., "No, you're wrong."), consensus juries engaged in substantive conflict and the critical testing of ideas. In fact, interaction patterns representing substantive disagreement were more pronounced in consensus juries. This suggests that simple contentiousness, without reasoning or evidence, is not facilitative of a consensual decision. On the other hand, the consensus juries in this study did not display the "false consensus" of "groupthink" (Janis, 1972) but deliberated and fought their way to consensus.

Although hung juries were not distinguished by more substantive conflict, certain interaction patterns characterized groups that failed to reach consensus in the allotted time. An examination of the results regarding the composite interaction variables, as well as a post hoc examination of the specific interacts that composed them, reveals that hung juries engaged in several kinds of unproductive interaction patterns that both wasted time and impeded consensus.

The post hoc analysis showed that hung juries are distinguished by several forms of symmetrical interaction patterns that evidence digressions and nonproductive forms of conflict. Most pronounced is the tendency for nontask statements to elicit further irrelevant nontask comments, thus generating digressions away from the issue at hand. Participants in hung juries also tended to follow procedural statements with other procedural comments and to follow clarifying statements with further counterclarification. It is not that consensus juries refrain from clarifying or procedural statements—they do not. Rather, hung juries seem to get caught up in digressions or conflict over procedures and points of clarification. Such digressions and nonsubstantive forms of conflict waste time and do not move the group toward consensus.

Equally debilitating is the tendency for hung juries to perpetuate ambiguity. Once again, it is not simply that hung juries engaged in more ambiguous behavior—they did not. Rather, the interaction patterns of consensus juries served to resolve ambiguity and conflict through clarification, whereas those of hung juries perpetuated ambiguity. The post hoc examination of the interacts composing the composite variables shows that hung juries respond to simple disagreement with ambiguity, and respond to ambiguity with simple agreement, further ambiguity, or nontask behavior. On the other hand, consensus juries tended to engage in interaction patterns that resolved ambiguity. Simple disagreements and ambiguity elicited clarification in juries that reached a verdict.

It may be tempting to pronounce the phasic model dead and begin the postmortem. We believe that such a conclusion is premature. First, the phasic model may yet prove its ability to discriminate between consensual and dissentient group outcomes with other kinds of decision-making groups operating under different constraints. Second, consensus is not the only pragmatic outcome for decision-making groups. Decisions made by small groups or committees often have to be accepted and implemented by a larger group (e.g., an organization or society). The way in which decisions are made, including the developmental sequence, may well affect general acceptance and implementation of the decision. Finally, it may well be that there are multiple paths to consensus and multiple paths to failure, but the paths to consensus are different from the paths to deadlock. Such a multiple sequence model would not necessarily have been detectable by the procedures employed in this study.

There are certain more general limitations to this study that should be considered when interpreting its findings and conclusions. First, mock juries differ from many other decision-making groups. Even though the participants in these deliberations appeared to get quite involved, a hypothetical exercise probably is somewhat different from an actual trial. Also, the restricted nature of the verdict (acquit, convict, or hang) is quite different from the types of decisions that many groups face—situations in which many decision alternatives must be considered, debated, negotiated, and evaluated. In such situations, it may well be that a particular phasic progression, or that a different set of interaction patterns, expedites consensus. Likewise, the fact that the case was biased toward conviction might have influenced the nature of the interaction.

Obviously, these results should be replicated on other types of groups before the model can be accepted as definitive. A different category system could lead to different conclusions. Fisher's (1970a) system was used because it is the basis of a popular phasic model, it has an established research tradition, and it taps functions that should distinguish between consensus and dissensus. Even though interaction analyses typically employ small sample sizes, replication of these findings in other groups, possibly with different measures, will increase the power and generality of the findings.

NOTES

1. Whereas we could speculate about other effects, the aim here is to limit the number of tests while retaining those variables most likely to support the hypothesis.

2. To permit opposites to be aggregated into the same composite variable, the scoring was reversed when interacts conflicting with decision proposals were combined with those supporting proposals, and for interacts perpetuating ambiguity when combined with interacts resolving ambiguity, by multiplying them by –1 (thus turning positive *r* values negative and negative *r* values positive).

3. This method of identifying phases was used to avoid the use of arbitrary divisions, but to keep phases long enough that estimates of interaction structure would be reliable. Proportions of acts and interacts were used to test the phasic model because (a) it is not as important to keep acts and interaction structure separate as both contribute to phasic progression, and (b) many phases did not have enough acts to permit reliable estimation of sequential redundancy using the methods employed in testing the interact model.

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