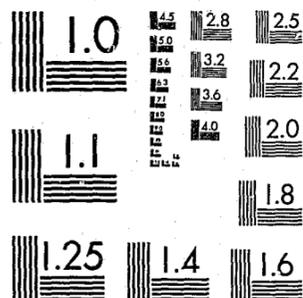


National Criminal Justice Reference Service



This microfiche was produced from documents received for inclusion in the NCJRS data base. Since NCJRS cannot exercise control over the physical condition of the documents submitted, the individual frame quality will vary. The resolution chart on this frame may be used to evaluate the document quality.



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Microfilming procedures used to create this fiche comply with the standards set forth in 41CFR 101-11.504.

Points of view or opinions stated in this document are those of the author(s) and do not represent the official position or policies of the U. S. Department of Justice.

National Institute of Justice
United States Department of Justice
Washington, D. C. 20531

DATE FILMED

7/14/81

Small-Group Decision Making and Complex Information Tasks



A Report to the
Federal Judicial Center

76904

THE FEDERAL JUDICIAL CENTER

Board

The Chief Justice of the United States
Chairman

Judge John C. Godbold
*United States Court of Appeals
for the Fifth Circuit*

Judge William Hughes Mulligan
*United States Court of Appeals
for the Second Circuit*

Judge Aubrey E. Robinson, Jr.
*United States District Court
District of Columbia*

Judge Donald S. Voorhees
*United States District Court
Western District of Washington*

Chief Judge William S. Sessions
*United States District Court
Western District of Texas*

Judge Lloyd D. George
*United States Bankruptcy Court
District of Nevada*

William E. Foley
*Director of the Administrative
Office of the United States Courts*

Director

A. Leo Levin

Deputy Director

Charles W. Nihan

Division Directors

Kenneth C. Crawford
*Continuing Education
and Training*

William B. Eldridge
Research

Jack R. Buchanan
*Innovations
and Systems Development*

Alice L. O'Donnell
*Inter-Judicial Affairs
and Information Services*

Assistant Director

Russell R. Wheeler

1520 H Street, N.W.
Washington, D.C. 20005
Telephone 202/633-6011



U.S. Department of Justice
National Institute of Justice

This document has been reproduced exactly as received from the person or organization originating it. Points of view or opinions stated in this document are those of the authors and do not necessarily represent the official position or policies of the National Institute of Justice.

Permission to reproduce this copyrighted material has been granted by

Public Domain
Federal Judicial Center

to the National Criminal Justice Reference Service (NCJRS).

Further reproduction outside of the NCJRS system requires permission of the copyright owner.

SMALL-GROUP DECISION MAKING AND COMPLEX INFORMATION TASKS

Michael J. Saks
National Center for State Courts
February, 1981

This publication is a product of a study undertaken in furtherance of the Federal Judicial Center's statutory mission to conduct and stimulate research and development on matters of judicial administration. The analyses, conclusions, and points of view are those of the author. This work has been subjected to staff review within the Center, and publication signifies that it is regarded as responsible and valuable. It should be emphasized, however, that on matters of policy the Center speaks only through its Board.

NCJRS

APR 6 1981

ACQUISITIONS

Cite as M. Saks, Small-Group Decision Making and Complex Information Tasks (Federal Judicial Center 1981).

FJC-R-81-1

TABLE OF CONTENTS

FOREWORD v

EXECUTIVE SUMMARY 1

I. THE QUESTION 5

II. LIMITATIONS OF THE ANSWERS 8

III. THE FINDINGS 10

 The American Jury 10

 The Importance of Task 15

 Superior Performance by Groups Compared to Individuals 26

 Inferior Performance by Groups Compared to Individuals 34

 Enhancing Group Effectiveness 36

 The Individuals in the Group 39

 Jury Composition 39

 Individual Cognition 44

APPENDIX 51

 The Literature Review 51

 The Research Tradition 55

 Social Facilitation 58

FOREWORD

This report by Professor Michael Saks was commissioned by the Federal Judicial Center as part of its program of research to support the work of the Judicial Conference Subcommittee on Possible Alternatives to Jury Trials in Protracted Court Cases. Professor Saks is a recognized scholar in social psychology who has published several important works in the psychology of courtroom conduct, jury behavior in particular. His assignment for the Center was to survey the available research literature on small-group decision making in order to provide the subcommittee with the information that might be relevant to their task of considering whether juries are capable of competently deciding complex and/or protracted civil cases.

Professor Saks has completed a thorough review of the relevant sources. His survey reveals no research data directly applicable to the pressing, practical questions the subcommittee faces. It is important that readers of this report not expect a close fit between the results described here from the behavioral sciences and the needs of judges and legislators who are pondering the practical problems of long-term jury service in cases presenting complex facts and difficult legal issues. Empirical research will be useful

v

Preceding page blank

when it has been specifically designed to address these problems. This report by Professor Saks provides a valuable and necessary starting place for thought or proposals about such research designs.

A. Leo Levin

EXECUTIVE SUMMARY

Are juries capable of competently deciding complex and/or protracted civil cases? The Federal Judicial Center asked that the research literature on small-group decision making be reviewed to enlighten the current discussion of this question.

(This report refines the question to a comparison among various possible decision-making entities: individuals versus groups, groups versus other groups, judges versus juries, juries as currently constituted and managed versus redesigned juries) The available literature includes many thousands of studies conducted within the disciplines of psychology, sociology, speech communication, management science, and others. One important limitation of the present review is that it has of necessity relied primarily on secondary sources, mainly textbooks, monographs, and review articles in the field of small-group research. Empirical generalizations and conceptual integrations have been extrapolated to the immediate issue of juries deciding complex or protracted cases. Consequently, the conclusions of this report should be considered as "best available guesses" based on imperfect information. It is absolutely necessary

d that (any seriously considered alternatives ^{should be} ~~be~~ empirically tested.)

b
c
Virtually (no direct tests of the immediate question were found.) We must, therefore, try to draw (lessons) from stable patterns and theoretical principles found in the small-group research literature in order to answer, if only tentatively, the question posed to us. In short, the literature reviewed will answer the question at hand only by analogy.

The findings of the research literature we reviewed may be summarized as follows:

d 1. Whether groups perform better than individuals, and whether one kind of group performs better than another kind of group, depends upon interactions with other variables, the most important being the nature of the task.

c 2. Tasks that are performed better by groups (compared to individuals), by larger groups (compared to smaller groups), and by heterogeneous groups (compared to homogeneous groups) are tasks that: permit a division of labor, are complex, capitalize on unusually knowledgeable or skilled members (disjunctive tasks), or capitalize on the summed contributions of several group members (additive tasks). Other kinds of tasks (unitary, conjunctive) are

performed more poorly by groups and by larger groups; they gain little or no advantage from heterogeneity.

3. The legal fact-finding task, especially in complex cases, seems to be of the type in which, ceteris paribus, large heterogeneous groups perform better than individuals.

4. The reasons for superior performance by groups include: greater probability of including highly able individuals, increased net resources, greater memory and cognitive processing capacity, enhanced error-checking, increased stimulation, and competition among viewpoints.

5. The one major study that directly compares judge to jury decision making is The American Jury by Kalven and Zeisel. A sample of cases in that study were stratified according to complexity ("difficulty") of the cases. The relatively high base rate of judge-jury agreement remained virtually as high for complex cases, suggesting that judges and juries saw complex cases similarly, as they did the other cases.

6. The reasons for superior performance by individuals (compared to groups) include: tasks being unitary or conjunctive; tasks being simple or routine; the individual being more highly skilled than any of the group members; and group process losses exceeding gains associated with expanding group resources.

7. Some kinds of groups perform better than other kinds. (Characteristics associated with superior performance, which might be applied profitably to juries, include: increasing individual skill on tasks through training; enhancing the composition of the group; providing time for individual thinking; increasing group size; coordinating group members; and clarifying objectives, rules, and procedures.)

The report concludes with a discussion of the likely advantages of enhancing group composition; for example, (appropriately composed groups would probably cope better with complex cases than conventional juries or judges.)

I. THE QUESTION

Concern over the role of juries in the trial of complex or protracted civil cases prompted this report. In general, the concern is that juries as currently constituted and managed may not be capable of competent fact-finding in cases whose trials endure for many weeks or months and whose evidence and arguments may include voluminous, esoteric, or highly abstract scientific, technical, or commercial subject matter. As part of a larger research effort addressing this concern, the Federal Judicial Center asked for an examination and summary of the social and behavioral science research literature on small-group decision making involving tasks that approximate those confronted by juries in complex or protracted cases.

Like any other empirical question, the present one (What is known about small-group decision making on complex tasks?) is far more useful if it includes a comparison. For example, to say that a group of size N solves 63 percent of problems of type X is not informative. The 63 percent figure becomes meaningful only when compared with the values resulting from problem solving by individuals, by groups of varying other sizes, and by groups of differing composition,

operating under different conditions or solving problems of different types. Given the context of the present issue, the ideal comparison would be between individuals comparable to judges--individuals who are highly educated (but not in the substantive field of the facts in dispute), of high status, permitted to use comparatively active information-seeking and decision-making procedures--versus groups comparable to juries--groups composed of diversely educated (but mostly less well-educated), lower-status individuals required to use comparatively passive information-gathering and decision-making procedures. Not surprisingly, the research literature contains virtually no direct comparisons between these two alternative decision-making entities. We can, however, take note of existing comparisons between individuals and small groups, and try to apply what has been learned from these comparisons to the question at hand. Given the absence of studies of individuals, groups, and tasks closely analogous to judges, juries, and complex cases, the best we can do in this review is to extract well-established principles and recurring patterns of findings and apply them with appropriate admonitions to the present question.

Also, we can try to derive lessons on how juries might be modified to improve their ability to decide complex cases

by examining existing comparisons of different kinds of groups and of groups operating in different ways. Thus, we are asking how groups compare with individuals and how one type of group compares with other types of groups performing several kinds of tasks. These comparisons will be made in light of the choices that do or could face the courts in trying complex and protracted cases. Thus, the major questions--What is known about small-group decision making and complex tasks? How well do juries perform in complex cases?--are best framed as several more concrete questions: What is revealed by comparing groups to individuals? On what types of tasks? With what composition? To what other kinds of groups? How might juries and the procedures surrounding them be modified to enhance fact-finding and decision making?

II. LIMITATIONS OF THE ANSWERS

The "answers" given in this report should be considered no more than educated guesses about the performance of small lay groups in handling complex information, and the factors affecting that performance. This is so for two reasons.

First, the existing literature, limited though it may be, is voluminous. We did not have sufficient resources available to read each one of the thousands of empirical studies and theoretical syntheses, and to freshly assess their validity and soundness. By relying largely on secondary sources, textbooks, and review articles, we are basing our judgment on that of the authors of those works.

Second, the existing literature has some inappropriateness. The studies that have been conducted are never completely analogous to the problem of juries deciding complex cases. The subjects in the experiments may be college students or experts, or the task may be too simple or too brief, or some other potentially important difference may exist. This increases our reliance on repeatedly observed phenomena and principles abstracted from the empirical observations. Short of a direct test, it is not possible to know how well the extrapolation from these principles and

empirical generalizations applies to the conditions of interest to us. However strong the findings may be in their own realm, their application to other areas contains some unavoidable uncertainties.

This report presents the best available guess in light of the existing research literature, and we are confident that others would draw the same conclusions from the literature. However, an empirical test of the alternatives is ultimately required to assess whether the intended improvements in decision making do result from the modifications chosen.

III. THE FINDINGS

In this chapter, we present our findings from the research literature, beginning with some of the highly germane findings from The American Jury.¹ In subsequent sections, we review work that shows the importance of task in interaction with other variables in making sense of the performance of small groups and shows the conditions under which group performance is superior or inferior to that of individuals. In the next section, we briefly discuss the comparison of groups with other kinds of groups, suggesting ways that effectiveness can be enhanced by modifying group composition, structure, or procedures. In the final section, we discuss principles of the psychology of individual perception, memory storage and retrieval, and how trial procedures might be altered to facilitate learning by jurors.

The American Jury

The empirical study that comes closest to making the comparison that would be considered ideal for the present report is The American Jury.² In that research, data were

1. H. Kalven & H. Zeisel, The American Jury (1966).

2. Id.

collected on 3,576 jury trials before 555 different judges. The judges were asked to indicate how they would have decided the cases if they had been bench trials. Obviously, such a design is not methodologically perfect: the judge may actually have decided the case differently than he reported, and the kind of case attorneys present to a jury is different from that presented at a bench trial. But given its limitations, it is a unique and informative study.

In the criminal cases studied, it was found that judge and jury agreed on the verdict in about 78 percent of the cases. The American Jury explains the reasons for disagreement and, within the limits of the study, bases those explanations on the empirical evidence gathered. For the majority of cases, the jury understands the evidence well. But what of the arguably complex cases in the sample? First, the trial judges rated 86 percent of the 1,191 cases in this analysis as "easy to understand." Of the remaining "somewhat difficult" and "very difficult" cases, it is reasonable to predict that if the jury has not comprehended the cases (as the judge has), the overall high rate of judge-jury agreement will drop off. The data indicate clearly that this does not happen. Table 1 shows that the clearness or closeness of a case, not its difficulty, accounts for nearly all of the variation in rates of judge-jury disagree-

ment. Juries see the "difficult" cases about the same as the judge does; that is, the rate of disagreement is no higher for "difficult" cases than it is for "easy" cases. Some reasons for this apparently high level of accuracy (at least as accurate as the judge) are suggested. In "difficult" cases, the jury was twice as likely to come back to the judge with questions, although no more than 27 percent of the juries raised questions. Thus, when uncertain about something, the group knew it and sought clarification. Second, the length of deliberation was highly correlated with the length of trial. The more evidence that was presented, the longer the jury took to deliberate over it.

TABLE 1
JUDGE-JURY DISAGREEMENT AS A FUNCTION OF DIFFICULTY
AND CLOSENESS OF CASE

	<u>Clear</u>		<u>Close</u>	
	<u>Easy</u>	<u>Difficult</u>	<u>Easy</u>	<u>Difficult</u>
Disagreement rate	9%	8%	41%	39%
N	618	57	406	110

Source: H. Kalven & H. Zeisel, *The American Jury* 157 (1966).

These data are obviously relevant to our question; the answer they give parallels what would be expected from the

basic research on groups. But some limitations ought to be mentioned. First, these are criminal cases, not civil, which may or may not be a problem. To the degree that trial length is an index of complexity, complex criminal cases occur more often than complex civil cases. It may be that complexity in the criminal sphere informs us about the jury's capacity to perform in the civil sphere. But, perhaps, complex criminal cases are qualitatively different from complex civil cases.

Second, a good measure of "difficulty" was not used and may not exist. How difficult is difficult? This was left to the subjective judgment of the trial judge. This is as much a problem for research as it is for the implementation of any decision to curtail jury trials: Where is the line to be drawn? In advance of trial, by what test is that place to be known? It would have been helpful to have the same analysis for civil trial data, but that was never analyzed and published. If the data were analyzed, different definitions of "complexity" could be applied, and various measures of jury comprehension, including but not limited to agreement with the judge, could be applied.

Finally, even though these data tell us that judge and jury see even difficult or complex cases in essentially the same way, we do not know if their level of correctness,

though shared, is low or high. With civil cases involving technical testimony, it would be possible to measure judge and jury comprehension against some external standard of correctness. The utility of Kalven and Zeisel's findings may depend on the similarity of their judges' "difficult" criminal cases to the "complex" civil cases in which we are interested. We do not know how similar they are; the question is therefore open to speculation. At the least, however, these data tend to disconfirm the hypothesis that the jury operates with a high degree of random error in complex or difficult cases. The high correlation between judge and jury decisions can occur only if they see the cases similarly; any random variation lowers that correlation. Thus, judge and jury either are right together or wrong together, but according to these data their perception and comprehension are similar.

These data are worth special note because they offer the only direct comparison of the question at hand. They also tend to answer our concern about the nature of the jury task and whether it is the sort of task that benefits from group work. It appears that it is. A group of presumably less-skilled and certainly less-experienced individuals can, when combined into a group, perform a legal fact-finding

task at approximately the same level of competence as a judge.

The Importance of Task

The findings of small-group research show that the nature of the task performed is of great importance in understanding group behavior in comparison to the behavior of individuals or other kinds of groups. Many of those who have studied group performance have recognized the importance of understanding the task, but the important conceptualizing about task has not occupied much of the work in the field. There is Zajonc's distinction between learning tasks and performance tasks, and the opposite effects of the presence of other people on them.³ There is Roby and Lanzetta's work on the analysis of the "critical demands" associated with particular kinds of tasks.⁴ And there is Steiner's brief typology.⁵ From our viewpoint, the relative neglect of task analysis in the research literature presents two problems. There has been insufficient study of the

3. See Zajonc, Social Facilitation, 149 *Science* 269 (1965). See also pp. 58-60 infra.

4. See Roby & Lanzetta, Considerations in the Analysis of Group Tasks, 55 *Psychological Bull.* 88 (1958).

5. See I.D. Steiner, Group Process and Productivity (1972).

kinds of complex and protracted decision-making tasks with which we are now concerned. Moreover, we may not be aware of a task difference that renders our generalizations from the literature invalid.

Steiner's work is the most recent and comprehensive attempt to construct a taxonomy of tasks (in terms of the past studies taken into account, not the breadth of the typology). We will examine his taxonomy to see what it might contribute to understanding the task that confronts juries.

According to Steiner's conceptualization, understanding group behavior requires understanding of:

- (1) task demands--the behavior required to accomplish the task; the manner of combining information, objects, and behavior to complete the task successfully
- (2) resources--the knowledge, abilities, tools, skills in possession of the group
- (3) process--the actions actually taken by the group, usually imperfect, a better-or-worse approximation of ideal performance.

Within this system, tasks may be characterized according to the following typology. The first factor is whether a task is unitary or divisible. A unitary task is one that is so organic, exists so much as an integrated whole, that it cannot profitably be divided into subtasks. A divisible task is one that can be usefully divided among two or more people. This is an important consideration,

because past research shows that groups hold a considerable advantage over individuals in performing tasks where a division of labor is possible.

How should the jury's task of fact-finding be classified? We would argue that it is a mixed task, in that some portions of it are divisible and others are unitary. As a task becomes increasingly complex, the information load is at once more burdensome and has greater potential for division among group members. In a complex case, more so than in a simpler dispute, different portions of the evidence could be more thoroughly scrutinized and digested by some group members than by others. For example, in a given case some members might have more patience for and interest in the engineering testimony, others in the financial analysis, others in other portions. By deferring on the details to the various subgroups, the jury as a whole would be exploiting one of the advantages of a group. Of course, the group does not have to operate that way. The question here is whether it is in the nature of the task to permit profitable division of labor. It appears that jury decision making does permit such a division of labor, and as the evidence grows more complex, the division can be even more profitable. The ultimate finding of liability, however, is a unitary task. The individual facts found must be put

together, according to some calculus⁶, and a dichotomous decision as to liability must be made.

A second factor is whether a task is maximizing or optimizing. A maximizing task calls for producing the most or fastest output; an optimizing task calls for producing an ideal amount or a most correct solution to a problem. Clearly, juries do not produce widgets or computer circuitry. Theirs is an optimizing task: finding a correct solution by applying the law (as understood) to the facts (as understood).

The third factor is the kind of process permitted by the task. Some tasks are disjunctive, meaning that the strongest or best solution offered by a group member may be chosen as the group solution. "Eureka" tasks are of this type; the moment a group member comes up with the correct solution, its correctness is obvious to all and that solution is adopted by the group. A second kind of process is found in conjunctive tasks. In these tasks, some rule or inherent constraint specifies the product that would be the group product, typically a "weak link." For example, a mountain climbing team can reach the summit no faster than

6. See Pennington & Hastie, Juror Decision-Making Models: The Generalization Gap, Psychological Bull. (Mar. 1981)(in press); Penrod & Hastie, Models of Jury Decision Making: A Critical Review, 86 Psychological Bull. 462 (1979).

the slowest of its members. The third kind of process is additive; the accomplishments of each group member are summed together to yield a group product. The annual income of a small firm is the sum of the business brought in by its members; naming as many unique parts of the human anatomy as they can is the combined product of each individual's knowledge. The fourth and final process is discretionary, in which the nature of the task is such that the group performing it can adopt without constraint any one of the three other processes or any other formula for combining individual judgments into a group decision. Jury decision making appears to be a discretionary task. The result proposed by the member with the most comprehensive and accurate theory of the case could be adopted by the other members as the group decision (disjunctive). In a situation in which a unanimous decision must be made, an individual (or under a quorum decision rule, a faction) can, arguably, constitute a weak link and the whole group can go no further than the most resistant individual (conjunctive). And in the early stages of decision making, when the jury is going over the facts and trying to agree on a shared image of what happened, the nonoverlapping recall of group members produces a shared picture (additive). Therefore, the jury's task is

mixed (partly unitary, partly divisible), optimizing, and discretionary.

The proper identification of tasks is important because Steiner has shown and subsequent research has generally confirmed that the productivity of groups compared to individuals or other kinds of groups depends upon the type of task being performed. The typology provided by Steiner allows us to predict the effects that various changes in group structure or composition will have, given the task to be performed. Steiner's principle is that groups perform better than individuals and larger groups perform better than smaller groups, potentially, because they bring greater resources to carrying out the task demands. But potential productivity (measured by computing productivity for "synthetic" groups)⁷ almost always exceeds the actual productivity of interacting groups, because of "process losses." This concept is given by a simple formula:

$$\text{actual productivity} = \text{potential productivity} - \text{process losses}$$

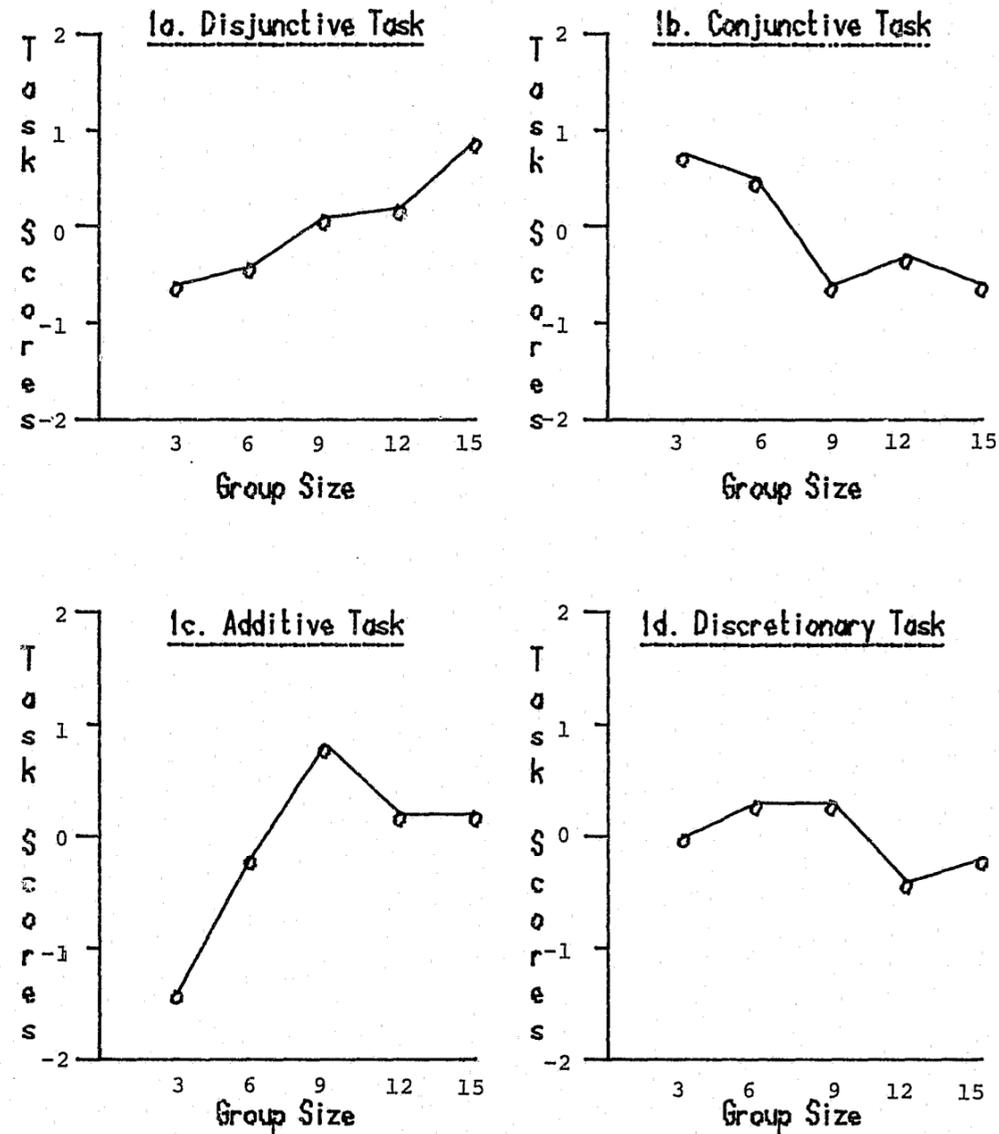
For example, more members mean more resources, but there are

7. "Synthetic" groups are those in which the products of noninteracting individuals are combined in some artificial fashion (for example, by selecting the best performance or the average performance as the "group" product).

costs attached to organizing those additional members. More participants means more productivity, but only until the process losses exceed the marginal gain resulting from the additional members. Steiner suggests that these process losses are due to organizational and motivational deficits associated with group activity.

The type of task is the most important single factor in determining the process, and in determining whether increased size (from one to several or eight to nine) results in process losses that are modest in relation to resources gained, or whether the process losses grow faster than the resources gained. For disjunctive tasks and additive tasks, groups do better than individuals and larger groups do better than smaller groups, up to some point beyond which the process losses grow faster than the resources gained. For conjunctive tasks, increased size immediately degrades the group's performance. Figure 1 presents data from an experiment testing Steiner's model. The empirical relationships closely approximate his predictions. Thus, as with Zajonc's distinction between performance tasks and learning tasks, this task-based distinction helps make sense out of a mixture of findings that would otherwise seem contradictory. Steiner's scheme enables us to predict that, to the degree that jury decision making is divisible and the decision

Figure 1
Graphs of Group Size and Standardized
Performance Scores for Each Task

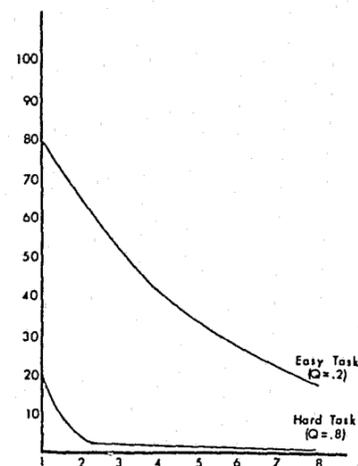


Source: N. L. Badore, Group Size and Task Effects on Group Problem-Solving (1979)(unpublished doctoral dissertation, Boston College).

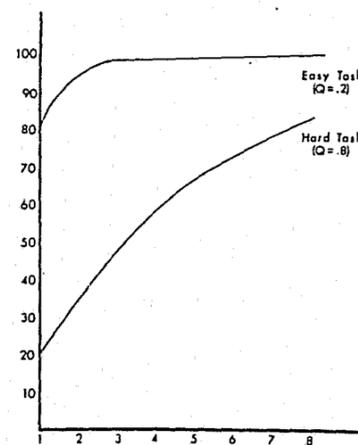
maker employs disjunctive or additive processes, a group will do better than an individual and larger groups will do better than smaller ones.

Steiner also considers the effect of tasks that are relatively easy or hard. These may be analogous to Zajonc's performance and learning tasks, but they call for a higher or lower level of knowledge or skill for successful accomplishment. Figure 2 presents the curves suggested by Steiner. A clear difference results as a function of task difficulty, but whereas increasing group size greatly facilitates the accomplishment of hard tasks when the task is disjunctive, increasing size interferes with completion of conjunctive tasks. Although it makes a considerable difference, then, whether the jury treats its discretionary task as conjunctive or disjunctive, the safer choice, as we can see from the curves, is a larger group for a difficult task. If the task is treated as disjunctive, this results in a benefit. If conjunctive, the group performance is likely to be so poor anyway that increasing the size of the group will make little difference. (The comparisons here as elsewhere in the research literature are between smaller (as small as one) and larger groups composed of individuals drawn from the same population, which is not the situation in judge versus jury comparisons.)

FIGURE 2
COMPARISON OF PREDICTED GROUP PERFORMANCE
IN DISJUNCTIVE AND CONJUNCTIVE TASKS
AS A FUNCTION OF GROUP SIZE



Relationships between group size (abscissa) and the percentage of groups in which the least competent member can perform a conjunctive task (ordinate).



Relationship between group size (abscissa) and the percentage of groups containing at least one person who can perform a disjunctive task (ordinate).

Source: I.D. Steiner, *Group Process and Productivity* (1972).

A final set of lessons from Steiner's work that is relevant to the present question has to do with the relationship of group composition to productivity, and how this effect is moderated as a function of type of task. The advantage of larger groups for disjunctive tasks is the increased probability of finding at least one member who is competent to perform a given aspect of the task. Increased heterogeneity leads to a greater likelihood of persons with such ability being in the group. For conjunctive tasks, the opposite relationship holds. In this weak-link situation, the probability of having a least-able member increases as the probability of successful task completion decreases.

The implication of these relationships to the present question cannot be made with confidence for the reasons given earlier, and because the nature of the jury decision-making task has not been studied with an eye toward ascertaining whether the task tends toward conjunctivity or disjunctivity, or additivity; or, if it is largely discretionary, how juries in fact typically treat the task. The difference, as we have seen, is considerable. If the jury decision-making task is discretionary, it may be possible through instruction or brief training to have juries treat their task as disjunctive so that through modifications such as size (a group rather than an individual) and heteroge-

neous composition, the likelihood of superior decision making could be enhanced.

Superior Performance by Groups Compared to Individuals

Most studies show groups to perform better, that is, to produce superior products or to make more accurate decisions and judgments.⁸ If we examine the reasons why this occurs, we will understand the conditions under which groups are to be preferred and the limits of their superiority.

The single most powerful reason for enhanced task performance by groups is mere statistical pooling: by increasing the size of a sample, random error is reduced and the probability of obtaining at least one person with the know-

8. See, e.g., J.H. Davis, Group Performance (1969); Faust, Group versus Individual Problem Solving, 59 J. of Abnormal and Social Psych. 68 (1959); Fox & Lorge, The Relative Quality of Decisions Written by Individuals and by Groups as the Available Time for Problem Solving Is Increased, 57 J. of Social Psych. 227 (1962); Laughlin, McGlynn, Anderson, & Jacobson, Concept Attainment by Individuals versus Cooperative Pairs as a Function of Memory, Sex, and Concept Rule, 8 J. of Personality and Social Psych. 410 (1968); Lorge & Solomon, Group and Individual Behavior in Free-Recall Verbal Learning, in Mathematical Methods in Small Group Processes (J.H. Criswell, H. Solomon, & P. Suppes eds. 1962); Luchins & Luchins, Einstellung Effect and Group Problem Solving, 77 J. of Social Psych. 78 (1969); Restle, Speed and Accuracy of Cognitive Achievement in Small Groups, in Mathematical Methods in Small Group Processes (J.H. Criswell, H. Solomon, & P. Suppes eds. 1962); Restle & Davis, Success and Speed of Problem Solving by Individuals and Groups, 69 Psychological Rev. 520 (1962); Taylor & Faust, Twenty Questions: Efficiency in Problem Solving as a Function of Size of Group, 44 J. of Experimental Psych. 360 (1952).

ledge and skills needed to complete the task is increased. The first aspect is illustrated by studies in which people are asked to estimate the temperature of a room, the number of objects in a stimulus array, the weight of objects, etc. Group estimates come significantly closer to the actual amounts than estimates by individuals.⁹ This is the clearest and simplest illustration of the statistical pooling effect: average the estimates of individuals, and the result comes progressively closer to the actual value as group size increases and random error is thereby reduced. The effect also works for more complicated tasks. For example, groups of highly educated persons were asked to predict future political, economic, and technological events. The predictions were compared to the actual outcomes and, as expected, the group predictions tended to be more accurate than indi-

9. See, e.g., Farnsworth & Williams, The Accuracy of the Median and Mean of a Group of Judgments, 2 J. of Social Psych. 237 (1936); Gordon, Group Judgments in the Field of Lifted Weights, 7 J. of Experimental Psych. 398 (1924); Preston, Note on the Reliability and the Validity of the Group Judgment, 22 J. of Experimental Psych. 463 (1938); Sattler, Effect of Group Variability on Pooled Group Decisions, 18 Psychological Rep. 676 (1966); Stroop, Is the Judgment of the Group Better than that of the Average Member of the Group? 15 J. of Experimental Psych. 550 (1932); Travers, A Study in Judging the Opinions of Groups, 47 Archives of Psych., No. 266 (1941); Travers, A Study of the Ability to Judge Group Knowledge, 56 Am. J. of Psych. 54 (1943); Travers, The General Ability to Judge Group-Knowledge, 56 Am. J. of Psych. 95 (1943).

vidual predictions.¹⁰ Nonexperts as well make more correct judgments (for example, about economic facts or current events) when they decide as a group.¹¹ This is a strictly statistical, nonsocial phenomenon, predictable from sampling theory.¹²

Regarding juries, Saks found some evidence of such reduced variability with increases in group size.¹³ Another aspect of pooling is that as the size of the group increases, the probability of obtaining one or more highly able members increases. This effect was noted as early as 1932¹⁴ and is most often given as the Lorge-Solomon Model A, which posits that the group performance is equal to that of the group's most able member.¹⁵ The final "statistical" effect is that, due to their number, groups have the potential to bring more resources to a problem and have

10. Kaplan, Skogstead, & Girshick, The Prediction of Social and Technological Events, 14 *Pub. Opinion Q.* 93 (1950).

11. Jenness, The Role of Discussion in Changing Opinion Regarding a Matter of Fact, 27 *J. of Abnormal and Social Psych.* 279 (1932).

12. W.L. Hays, Statistics for the Social Sciences (2d ed. 1973).

13. M.J. Saks, Jury Verdicts (1977).

14. Stroop, supra note 9.

15. Lorge & Solomon, Group and Individual Performance in Problem Solving Related to Previous Exposure to Problem, Level of Aspiration, and Group Size, 5 *Behavioral Science* 28 (1960).

more memory storage and processing capacity than any one member of that group. These effects of statistical pooling are obvious and common-sensical, yet they are powerful sources of a group's heightened ability in comparison to individuals.¹⁶

There are also nonstatistical, social and psychological, effects. A typical experiment is to present a story to individuals and groups or allow them to observe a series of events, and ask them to report as accurately as possible what they have read or observed.¹⁷ The result is that groups generate less detailed information than individuals, but a greater proportion of the group's output is accurate.¹⁸ The reason for this seems to be that in groups people are more inhibited about presenting information they are not confident about, or that the group's enhanced error-checking capability suppresses conclusions that are doubted by a few people so that they are never offered as a group

16. See, A.P. Hare, Handbook of Small Group Research (1976).

17. See, e.g., Dashiell, Experimental Studies of the Influence of Social Situations on the Behavior of Individual Human Adults, in A Handbook of Social Psychology (C. Murchison ed. 1935); Yuker, Group Atmosphere and Memory, 51 *J. of Abnormal and Social Psych.* 17 (1955).

18. See review in H.H. Kelley & J.W. Thibaut, Group Problem Solving, in 4 Handbook of Social Psychology (G. Lindzey & E. Aronson eds. 1968).

product. This finding--that groups remember better than individuals and do so by generating more accurate (if not more voluminous) information--occurs reliably.¹⁹ It is frequently noted in the literature that the advantage of groups over individuals is clear when a task is divisible.²⁰ Also, as tasks grow in their technical aspects or complexity, the capability of groups increases in comparison with individuals.²¹ This is most likely due both to the tendency of such tasks to lend themselves to a division of labor and to the availability of greater resources within groups and greater error-checking ability (both "statistical" and social).²²

The statistical pooling effect implies that one of the

19. See, e.g., A.P. Hare, supra note 16, at 329; Dashiell, supra note 17.

20. See A.P. Hare, supra note 16, at 318; I.D. Steiner, supra note 5.

21. Frank & Anderson, Effects of Task and Group Size upon Group Productivity and Member Satisfaction, 34 Sociometry 135 (1971); Goldman, Group Performance Related to Size and Initial Ability of Group Members, 28 Psychological Rep. 551 (1971).

22. Dashiell, supra note 18; Shaw, A Comparison of Individuals and Small Groups in the Rational Solution of Complex Problems, 44 Am. J. of Psych. 491 (1932); South, Some Psychological Aspects of Committee Work, 11 J. of Applied Psych. 348 (1927); Ziller, Group Size: A Determinate of the Quality and Stability of Group Decisions, 20 Sociometry 165 (1957).

major advantages of a group is merely its ability to capture one or two highly skilled individuals, that the group performs no better than its most able member (and probably performs less ably due to the process losses involved in identifying that member and coordinating the group). And, indeed, for many kinds of tasks this is just what happens.²³ There are some circumstances, however, in which the group performs better than the best of its constituent members. In these circumstances, more than mere pooling is working to the group's advantage; social processes are operating to make the group more effective than the sum of its parts, that is, more effective than synthetic groups made up of "members'" individual performances. For example, one study presented groups and individuals with complex syllogisms containing conclusions that were consistent with the presumptions and prejudices of most people.²⁴ The task was to

23. See, e.g., Lorge, Fox, Davitz, & Brenner, A Survey of Studies Contrasting the Quality of Group Performance and Individual Performance, 1920-1957, 55 Psychological Bull. 337 (1958); Marquart, Group Problem Solving, 41 J. of Social Psych. 103 (1955); Schoner, Rose, & Hoyt, Quality of Decisions: Individuals versus Real and Synthetic Groups, 59 J. of Applied Psych. 424 (1974); Steiner & Rajaratnam, A Model for the Comparison of Individual and Group Performance Scores, 6 Behavioral Science 142 (1961).

24. Barnlund, A Comparative Study of Individual, Majority, and Group Judgment, 58 J. of Abnormal and Social Psych. 55 (1959).

assess the internal validity of each syllogism and state whether the conclusion followed from the given premises. In this task, groups were correct more often than individuals, more often than synthetic groups, and more often than their most capable member.²⁵ More than mere statistical pooling is going on in such situations; some social process must facilitate such performance. Some of the group processes that permit this to happen appear to be: enhanced motivation, increased caution and deliberateness, heightened critical resources, and competition among private prejudices.²⁶

Another process that occurs in group decision making is the "risk shift" phenomenon. When a tendency toward one direction or another exists, the group accentuates that tendency. This phenomenon was originally called the "risky shift" because the early studies employed tasks that showed

25. See also W. M. Timmons, *Decisions and Attitudes as Outcomes of the Discussion of a Social Problem* (1939) (Columbia University Teachers College, Contributions to Education No. 777); Thorndike, *On What Type of Tasks Will A Group Do Well?* 33 *J. of Abnormal and Social Psych.* 409 (1938); Timmons, *Can the Product Superiority of Discussors Be Attributed to Averaging or Majority Influences?* 15 *J. of Social Psych.* 23 (1942); Wagner & Alper, *The Effect of an Audience on Behavior in a Choice Situation*, 47 *J. of Abnormal and Social Psych.* 222 (1952).

26. B.E. Collins & H. Guetzkow, *A Social Psychology of Group Processes for Decision-Making* (1964).

greater risk-taking by groups than by individuals. Eventually, researchers realized that shifts occurred in a conservative direction as well, when the task (or the task's subject matter) leaned initially in a conservative (or low-risk) direction. The risk shift or group polarization phenomenon indicates that if the initial average opinions of a group lean away from the neutral, the group's collective opinion will lean even further in the initial direction after discussion.²⁷

Finally, it should be noted that even in the numerous circumstances in which group performance is superior to individual performance (for example, in productivity or accuracy) this performance is purchased at a substantial cost in efficiency. That is, the productivity per person per unit of time is much lower in groups than in the average efforts of individuals working alone.

Inferior Performance by Groups Compared to Individuals

There are some kinds of tasks and some circumstances in which groups perform less well than the average constituent individual. As we discussed in presenting Steiner's typology, groups do not perform as well as individuals at con-

27. Myers & Lamm, *The Group Polarization Phenomenon*, 83 *Psychological Bull.* 602 (1976).

junctive tasks. Although there are some conditions under which groups perform better than their best member, that is not usually the case. For most tasks, the most able individual can do better than the group.²⁸ In the context of the present question, it may be that if the judge is more able at the task than any member of the jury, the jury will not achieve the same level of performance as the judge.²⁹ Moreover, group superiority fades if the task does not lend itself to division of labor, if organizational problems overwhelm the group, or if low standards of performance are set.³⁰ Our informal analysis of the jury task suggests, however, that large parts of the task are divisible and that process losses do not exceed the gain in resources and other benefits. There is some reason to believe that as tasks become increasingly complex, group performance falls off,³¹ but the data needed to assess this possibly crucial point are inadequate.

In a sense, juries are discussion groups, although the discussion is a means and not an end in itself, as it is for

28. A.P. Hare, supra note 16.

29. Id.; Marston, Studies in Testimony, 15 J. of Crim. Law and Criminology 5 (1924).

30. A.P. Hare, supra note 16; I.D. Steiner, supra note 5.

31. H.H. Kelley & J.W. Thibaut, supra note 18.

some groups. At least one study has found that untrained, that is, new, discussion groups lose approximately 80 percent of the ideas contributed to it by its members.³² Valuable contributions were not retained by the group. This represents considerable information loss due to group process; the resources were present, but could not be harnessed. As a result, in these discussion groups, 75 percent of individual decisions were superior to the group decisions. Because synthetic groups often do better than interacting groups,³³ it may be more effective to have individuals make decisions that are then combined artificially into a group decision.

Enhancing Group Effectiveness

In the research literature, groups are not compared only to individuals. In search of the factors that would improve group productivity and decision making, groups are compared to other kinds of groups. One response to the

32. Lorge, Tuckman, Aikman, Spiegel, & Moss, Problem Solving by Teams and by Individuals in a Field Setting, 46 J. of Educational Psych. 160 (1955).

33. See, e.g., Faust, supra note 8; Taylor, Berry, & Block, Does Group Participation When Using Brainstorming Facilitate or Inhibit Creative Thinking? 3 Ad. Sciences Q. 23 (1958); Watson, Do Groups Think More Efficiently Than Individuals? 23 J. of Abnormal and Social Psych. 238 (1928).

present issue might be to modify the decision-making group rather than dispense with it; to take advantage of the benefits of group process by designing improvements in the jury's composition, structure, or process. In this section, we discuss several variables encountered in reviewing the research on group behavior that could be employed to modify certain features of the jury to make it more effective.

The following list is not exhaustive or definitive, but only suggestive of a strategy by which the knowledge contained in the small-group research literature could be put to work to answer the present question.

Increase individual task-skill through training. The jury task in all cases, especially complex cases, requires two levels of member skill. One is substantive understanding of the subject matter in dispute. The second is skill in group discussion and decision making. It has been found that virtually any training or practice at a task significantly increases a group's ability to perform the task effectively. Jurors could be given instructions, training, or "dry runs" on group deliberation. Mere exposure to a task at time-1 improves performance on the task at time-2. Jurors who have previously served on cases could be pre-

ferred for membership on juries that are to hear complex cases.³⁴

Improve the composition of the group. With regard to knowledge of the substantive matter before the jury, the small-group literature makes clear that high levels of individual skill lead to high levels of group performance. The obvious implication is that on cases thought to demand high levels of group skill, more knowledgeable or skilled jurors be assembled.

Provide time for individual thinking. Where a task calls for individual thinking, the group product is better when time is set aside for individual thought, rather than when constant communication and interaction is required.³⁵

34. See, e.g., Faucheux & Moscovici, Studies on Group Creativity: III. Noise and Complexity in the Inferential Process, 21 *Human Relations* 29 (1968); Goldberg & Maccoby, Children's Acquisition of Skill in Performing a Group Task Under Two Conditions of Group Formation, 2 *J. of Personality and Social Psych.* 898 (1965); Hall, Group Performance Under Feedback That Confounds Responses of Group Members, 20 *Sociometry* 207 (1957); Leathers, Quality of Group Communication as a Determinate of Group Product, 39 *Speech Monographs* 166 (1972); Loree & Koch, Use of Verbal Reinforcement in Developing Group Discussion Skills, 51 *J. of Educ. Psych.* 164 (1960); Maier, An Experimental Test of the Effect of Training on Discussion Leadership, 6 *Human Relations* 161 (1953); Maier, Effects of Training on Decision-Making, 30 *Psychological Rep.* 159 (1972); Meier & Hoffman, Quality of First and Second Solutions in Group Problem Solving, 44 *J. of Applied Psych.* 278 (1960); Pryer & Bass, Some Effects of Feedback on Behavior in Groups, 22 *Sociometry* 56 (1959).

35. See Gustafson, Shukla, Delbecq, & Walster, A Compar-

Increase group size. For certain kinds of tasks, of which jury decision making appears to be one, larger groups (within limits) perform better than smaller groups; the discussion of Steiner's model makes this evident.³⁶

Note that these are but a few suggestions gleaned in passing from the small-group research literature; others may be found.³⁷ The solution of complex problems is likely to be facilitated by effective coordination of efforts, effective leadership, clear objectives, clear rules and procedures, more communication, more information, and more time.³⁸ If the strategy of jury enhancement is adopted, a more thorough search of the literature would be desirable.

tive Study of Differences in Subjective Likelihood Estimates Made by Individuals, Interacting Groups, Delphi Groups, and Nominal Groups, 9 Organizational Behavior and Human Performance 280 (1973); Vroom, Grant, & Cotton, The Consequences of Social Interaction in Group Problem Solving, 4 Organizational Behavior and Human Performance 77 (1969).

36. See also review in M.J. Saks, supra note 13; see studies cited in Ballew v. Georgia, 98 S. Ct. 1029 (1978).

37. Novel solutions are possible; for an example, see M.J. Saks, supra note 13.

38. See A.P. Hare, supra note 16, at 341-43; Lambert, The Process of Influence and Productivity in Small Work Groups, 16 Bulletin du C.E.R.P. 377 (1967); Sorenson, Task Demands, Group Interaction and Group Performance, 34 Sociometry 483 (1971).

The Individuals in the Group

Jury Composition

Despite widespread interest by lawyers and others about who sits on a jury and the possible impact of members' individual characteristics, including possible prejudices, the available data all point to one conclusion: the individual differences among jurors, including personality and attitudes, account for no more than about 10 percent of the variance in group decisions; the evidence presented accounts for about three to seven times as much variance.³⁹ Why? At least two-thirds of cases are clear, not close;⁴⁰ without the ambiguity of a close case, a juror would have to exhibit blatant personal prejudices to sway the group decision. Most cases are "easy," not "difficult."⁴¹ Excluding jurors who have personal ties to principals in the case removes the most powerful basis for prejudicial decisions (interpersonal influence and expectation of future interaction, not attitu-

39. See Saks, The Limits of Scientific Jury Selection: Ethical and Empirical, 17 Jurimetrics J. 3 (1976); S. Penrod, Evaluation of Social Scientific and Traditional Attorney Methods of Jury Selection (1979) (unpublished doctoral dissertation, Harvard Univ.).

40. Lempert, Uncovering "Nondiscernible" Differences: Empirical Research and the Jury Size Cases, 73 Mich. L. Rev. 643 (1975).

41. H. Kalven & H. Zeisel, supra note 1.

dinal abstractions). The jury task is more or less successfully defined as reaching a decision based upon evidence, so that being "right" means responding to the testimony, rather than one's biases.⁴²

These generalizations describe the overall functioning of the jury system, at least so far as the available data are accurate. In particular cases, or particular kinds of cases, these generalizations may fail. For example, in "close" cases, individual juror differences almost certainly take on greater importance.⁴³ And in those cases involving complex evidence, juror differences may have a considerable effect.

When the level of knowledge or skill required is low, as in most cases, the requisite skills are widely found in the population and appear on most, if not all, juries. Collins and Guetzkow report that for routine tasks, group heterogeneity, or grouping itself, offers little benefit over homogeneous groups or over individuals.⁴⁴ As the task becomes more complex, the group's ability to perform the task is enhanced by heterogeneity, increased group size, and

42. See M.J. Saks & R. Hastie, *Social Psychology in Court* (1978).

43. M.J. Saks, *supra* note 39.

44. B.E. Collins & H. Guetzkow, *supra* note 26.

the presence of unusually knowledgeable or skilled members.⁴⁵ But the benefit of heterogeneity is not without its costs. Shaw has found that even as task-relevant skills may complement each other, interpersonal conflicts are more likely to arise in heterogeneous groups.⁴⁶ This is one of the process losses Steiner postulates. The possibility is real, however, that unlike simpler cases, complex cases put a premium on individual knowledge and skill that is equal to the task.

With regard to knowledge of the substantive matter before the jury, the small-group literature makes clear that high levels of individual skill lead to high levels of group performance. The literature presents some case studies that suggest that, for complex cases, the juries that are chosen are composed of apparently less-able individuals than a jury in a typical civil case in the same jurisdiction.⁴⁷ Meeting

45. I.D. Steiner, *supra* note 5; Hoffman, Homogeneity of Member Personality and Its Effect on Group Problem-Solving, 58 *J. of Abnormal and Social Psych.* 27 (1959); Pelz, Some Social Factors Related to Performance in a Research Organization, 1 *Ad. Science Q.* 310 (1956).

46. Shaw, A Note Concerning Homogeneity of Membership and Group Problem Solving, 60 *J. of Abnormal and Social Psych.* 448 (1960).

47. Note, The Right to an Incompetent Jury: Protracted Commercial Litigation and the Seventh Amendment, 10 *Conn. L. Rev.* 775 (1978).

the decision-making demands of complex evidence may derive unusual benefit from heterogeneous groups containing highly capable individuals, especially if they already have expertise in the subject matter of the dispute. A group with heterogeneous skills and knowledge could exploit the positive features of group performance and do better than any single individual could. Such a heterogeneous group could include typical jurors as well as people more knowledgeable in particular areas. Some studies have found that group members who are particularly expert in certain areas germane to the group's work tend to adapt to the role of a resource person to the group⁴⁸ and are accepted with skepticism by the group (that is, their views are not adopted without challenge). Such groups would almost certainly perform better than individual judges, who lack expertise in the technical area at issue or who, at best, can be highly knowledgeable in a limited number of areas. The growing literature questioning judicial capacity in complex cases suggests that the alternative of exchanging conventional juries for "supergroups," composed of highly skilled indi-

48. Shaw, Some Effects of Varying Amounts of Information Exclusively Possessed by a Group Member Upon His Behavior in the Group, 68 J. of General Psych. 71 (1963); Shaw & Penrod, Does More Information Available to a Group Improve Group Performance? 25 Sociometry 377 (1963).

viduals, would be more beneficial than exchanging juries for judges.⁴⁹ A similar proposal is that of the "science court",⁵⁰ in which controversial technical issues would be resolved through an adversary presentation to a panel of judges expert in a field related to, but without a vested interest in, the subject of dispute.⁵¹ Another suggestion is that of presenting complex cases before panels of three or more judges, to take advantage of small-group processes by combining several judges into a single decision-making entity. A suggestion related to the possibility of enhancing the composition of juries is that of instituting peremptory inclusions along with, or instead of, peremptory challenges, so that persons with knowledge (or prejudices) favorable to one party or the other could be represented on the jury.⁵²

These suggestions are not without complications, both

49. D.L. Horowitz, The Courts and Social Policy (1977); Bazelon, Coping with Technology through the Legal Process, 62 Cornell L. Rev. 817 (1977); Horowitz, Overcoming Barriers to the Use of Applied Social Research in the Courts, in The Use, Nonuse, Misuse of Applied Social Research in the Courts 149 (M.J. Saks & C.H. Baron eds. 1980).

50. Kantrowitz, A Proposal for an Institution for Scientific Judgment, 156 Science 763 (1967).

51. Graham & Dillon, Creative Supergroups: Group Performance as a Function of Individual Performance on Brainstorming Tasks, 93 J. of Social Psych. 101 (1974).

52. This suggestion has been made by Professor Richard O. Lempert of the University of Michigan Law School.

legal and psychological (for example, people trained in certain fields share certain political and social biases). The main point is that a group composed of highly skilled individuals would probably perform better at fact-finding than any existing judicial decision-making entity.

Individual Cognition

In this final section, we draw several well-established principles from research on individual information processing in an attempt to cast light upon the individual task facing a juror (or judge) in trying to learn new, unfamiliar, technical information. The implications of this brief review are that competent decision making by a jury in a complex case will be enhanced either by placing persons on the jury who have backgrounds in the field in question, or by modifying the conditions under which jurors are called upon to learn new information so that learning is more feasible. We will not attempt a comprehensive analysis; only several major, illustrative points will be made.⁵³

Human memory involves two distinct subsystems: Short-Term Memory (STM) and Long-Term Memory (LTM). In order to apprehend any information, it must first enter STM. But STM

53. See generally P.H. Lindsay & D.A. Norman, *Human Information Processing* (1977).

is a temporary, work-space memory; information is lost within seconds unless it is rehearsed (actively repeated) or transferred to LTM, which is where memory storage occurs. When people remember a telephone number just long enough to make the call or forget the names of people to whom they were introduced less than a minute before, they have simply held the information in STM and then let it go. People often believe they have learned something merely because they hear, comprehend, and even repeat it. But unless the information gets into LTM, there is no possibility of using the information later. This is analogous to a computer, which has a central processing work-space with a brief life (during the run of a program), and longer-term storage on tapes or disks for information that is to be saved for later use. Thus, the first challenge in learning new information is getting it into the LTM subsystem.

The second, and greater, challenge is to retrieve information that has been stored in LTM when it is needed. Retrieval depends upon the adequacy of the organization of information within LTM. If new information is integrated with existing and accessible information, in cognitive structures that lead efficiently to the new information, the new information can be retrieved. This is analogous to a library, which has a great deal of information on its

shelves, but the retrievability of that information is dependent upon the adequacy of the library's catalogs and indexes. This is evident in everyday life when we know that we know something, but we cannot "dig it out" of memory; or we read a news story related to our field of expertise and it "sticks," but a news story about an unrelated discipline is relatively quickly lost. More controlled demonstrations have been performed in psychology experiments. For example, in one study, subjects in two conditions were read identical paragraphs, which they were later asked to recall. The paragraph carried one title for one condition and another title for the other. Certain information contained in the paragraph was recalled far more often under one title than under the other. The reason is that a given title evoked a context into which the information easily fit and from which it was easily retrieved; the other title provided a context that more readily held other information in the paragraph.⁵⁴

An enormous amount of the early learning in a new field involves terminology and definitions, after which one develops a deeper structure of understanding, meaning, and organization. Pieces of information begin to congeal, or

54. Bransford & Johnson, Considerations of Some Problems of Comprehension, in Visual Information Processing (W. G. Chase ed. 1973).

"chunk," so that any one of them serves as a stimulus to recall several others. Then many chunks are linked semantically to others. Semantic networks are powerful aspects of the memory system. For example, to a knowledgeable lawyer the term "antitrust" will call to mind a whole body of concepts, cases, doctrines, statutes, anecdotes, and individuals. To a nonexpert, the term calls to mind few and vague notions. A new bit of information related to antitrust has more meaning and more nuance to an antitrust lawyer, and because of its connections with existing knowledge will be more easily stored in LTM and more easily retrieved. Similarly, a financial analyst, physician, or economist has a network of information that allows relatively easy analysis and assimilation of information in one of those areas.

In addition to integrative processes, it is known that storage and retrieval are facilitated by the "depth of processing" to which new information is subjected; that is, various "levels" of a piece of information can be noticed. Consider a new study a social psychologist reads about. He can note many things about the study: its title, its authors, its date; the subject population, the procedures employed; the area of research it explores; the hypotheses it purports to test and what was found; and how these hypotheses fit in with other research on the same questions.

Each succeeding level is a "deeper" processing of the information. The deeper the processing, the more likely the retrieval. In a sense, memory is a form of problem solving. Even information thought to be forgotten can be found if enough "paths" can be travelled, any one of which might lead to the information. The more connections there are to existing memory, the more rapid and certain the retrieval. Experience with an area of knowledge changes the nature of a person's problem solving in that area. Many problems are too complex even for experts, so they learn to use special analytic and synthetic tools: statistics, formulas, algorithms, etc.

Human Information Processing, a textbook on memory processes, summarizes what a person has to do to store new information in LTM and have a good chance of retrieving it later:

1. Work. Memory seldom comes easily. It requires attention to the material, effort, and skill.
2. Understand. Know what you are trying to do. Try to paraphrase the material. Know how it is related to other things.
3. Organize. Divide the material into small pieces. Fit each piece sensibly with the others. Try to combine it with what you already know. Things in isolation are hard to remember. Look for structure in the material itself. Use mnemonic aids where possible.

55. P.H. Lindsay & D.A. Norman, supra note 53, at 365.

In light of these few concepts of information processing--STM and LTM, integrative processes, depth of processing, and these three "rules" for learning that follow from them, what chance does a jury have to learn new information? Evidence comes in a continuous (if not always steady and stimulating) stream. STM is bombarded; most of a juror's attention is taken up with "mere" perception and comprehension of the immediate message. Little opportunity exists for trying to place the information into LTM. Jurors are probably surprised at how little they recall after a day of even conscientious and attentive consideration of testimony. If a trial is a learning experience, where lawyers and witnesses are the teachers, the jurors have little or no opportunity to understand (in the sense of integrating or deeply processing) or to organize the information. They cannot ask how one thing relates to another, cannot pause to learn the terminology thoroughly before moving on to more conceptual learning, cannot review the material periodically after presentation to test their recall and understanding. By contrast, a judge can, if he wishes to, prepare for a case by reading up on the subject matter in dispute, asking questions, reviewing, and so forth, thereby enhancing the opportunity to work actively on the material, understand, and organize it.

The demands of learning a large body of new information are formidable. The circumstances in which a conventional lay juror is placed do not promote that learning. Numerous improvements might be possible. The two that come most immediately to mind are to restructure the jury's learning situation so that more can be learned from the testimony, and to include on the jury persons who already possess basic knowledge of the subject matter of the dispute.

APPENDIX

The Literature Review

The literature reviewed for this report consisted of research and theoretical studies conducted on the subjects of small-group productivity, problem solving, decision making, and judgment by psychologists, sociologists, communication researchers, and organizational scientists. Standard reviews, bibliographies, and texts⁵⁶ were examined; these secondary sources, which proved to be most helpful, were relied upon heavily.

We were most interested in studies of small groups making judgments or choosing among alternatives (decision making) when the task was protracted or involved complex

56. I. Altman, C. Pendleton, & A. Terauds, Annotations of Small Group Research Studies (1960); B.E. Collins & H. Guetzkow, supra note 26; J.H. Davis, supra note 8; Group Dynamics: Research and Theory (D. Cartwright & A. Zander eds., 3d ed., 1968); Handbook of Industrial and Organizational Psychology (M.D. Dunnette ed. 1976); A.P. Hare, supra note 16; J.E. McGrath & I. Altman, Small Group Research (1966); W.E. Scott & L.L. Cummings, Readings in Organizational Behavior and Human Performance (1973); I.D. Steiner, supra note 5; H.H. Kelley & J.W. Thibaut, supra note 18; Shiflett, Toward a General Model of Small Group Productivity, 86 Psychological Bull. 67 (1979); Zander, Psychology of Group Processes, 30 Ann. Rev. of Psych. 417 (1979); Zander, Study of Group Behavior During Four Decades, 15 J. of Applied Behavior 272 (1979).

information. In pursuit of such studies, we examined Psychological Abstracts and Sociological Abstracts, and used the computer bibliographic search facilities of the Federal Judicial Center's computer (using Lockheed's DIALOG system).⁵⁷ Hare's review cited 6,037 references;⁵⁸ McGrath and Altman's cited 2,699.⁵⁹ The computer search also looked at Management Contents. In total, the computer search covered about 500,000 items from 1967 to the present.⁶⁰

None of these contained the key words "task complexity" or "task difficulty." While Psychological Abstracts, for example, contained hundreds of small-group entries and decision entries, and thousands of task entries, only seven articles encompassed all three. While this may reflect a shortcoming of computerized search systems, it also reflects a shortage of direct attention to complex tasks in the small-group decision-making literature.

This highlights the inappropriateness of existing research to the immediate question. The research that is

57. Thanks are due to Marsha Carey of the Federal Judicial Center for carrying out the computer searches.

58. A.P. Hare, supra note 16.

59. J.E. McGrath & I. Altman, supra note 56.

60. Psychological Abstracts had 305,000 items; Sociological Abstracts had 96,750; and Management Contents had 86,000.

more internally valid (that is, that permits tight inferences to be drawn and engenders confidence in the study's conclusions) usually involves short-term group tasks, taking a few hours at most, which are relatively simple problems or judgments. Indeed, a simple mock criminal trial constitutes a relatively lengthy task in the small-group research tradition. In many ways, however, these studies are appropriate analogues to juries. The subjects participating in the groups are usually nonspecialists in the subject matter of the problem to be solved or the decision to be made; have no past history of interaction and no established, organized patterns; are strangers to one another; work together in face-to-face interaction and have no prospect of working together in the future. Those studies that involve more lengthy and complex problems almost always occur in circumstances dissimilar to that of juries. These involve situations such as experts in a particular field meeting to deal with specialized problems or members of existing organizations with established roles and hierarchies making decisions or solving problems. Thus, virtually every study that has elements analogous to the problem at hand also has inappropriate elements. One should keep in mind, however, that these differences are significant only if they interact with the functional relationship of interest. Differences

that produce only main-effect, overall, elevations in scores are of no consequence to the ability to generalize from one level of a variable (for example, simulation setting) to another (for example, field setting).

Most of these studies report empirical findings. For example, individuals might be asked to solve mathematics problems and their productivity and accuracy would be compared with that of groups composed of similar individuals. The empirical finding in such instances would be that the group solved more problems accurately but that their efficiency (problems solved per person per unit of time) was lower than for individuals. The researchers might also compare the performance of these entities to that of "synthetic" or "staticized" groups, in which the performance of individuals is combined statistically into a "group" product. For example, individual performances might be randomly formed into "groups" of four, and by some rule (for example, best performance or average performance) a "group" product would be generated. This synthetic group product could be compared to the performance of individuals and real groups. A typical finding would be that the synthetic groups did best, real groups did second best, and individuals did least well.

In addition, standard and well-established findings on

individual information processing (perception, cognition, memory, judgment, decision making, and problem solving) have been drawn upon. This is relevant because a group can deal with new, complex information only through the acquisition of such information by individual members. For this part of the report, we have relied only upon standard tests.⁶¹ Again, no researcher has yet sat subjects down in front of a complex and protracted trial and studied their ability to store, retrieve, and apply the information presented as evidence. But they have conducted studies of what are arguably analogous tasks, and have devised principles that can be applied with some confidence to the present question.

The Research Tradition

The systematic study of small-group behavior, which began in the late 1800s,⁶² has been dominated by several major concerns throughout its history. One has been an effort to understand what the differences are between individual behavior and behavior within a group, as a lone behaver in the presence of others (audience effects), as per-

61. B.F. Anderson, *Cognitive Psychology* (1975); P.H. Lindsay & D.A. Norman, *supra* note 53; G.R. Loftus & E.F. Loftus, *Human Memory: The Processing of Information* (1975).

62. Triplett, *The Dynamogenic Factors in Pacemaking and Competition*, 9 *Am. J. of Psych.* 507 (1897).

sons performing independent tasks in the presence of or in competition with each other (coaction effects), or as joint efforts of two or more people working on a single task (true group effects). A second major concern has been to explain the patterns of difference observed between individuals and groups and between different kinds of groups. A third concern has been the practical application of the findings of such research. Interest in application has come mostly from industry and the military, for the purpose of forming work groups that are optimally composed and organized for the tasks they are to perform. The goal of applied research was to learn how to organize people in order to bring about greater productivity, better decisions, and more accuracy. For this reason, in addition to the ubiquitous college student, subjects of experiments in this field typically include workers and military personnel.⁶³

In the course of this research, four kinds of decision-making entities have been compared: individuals; interacting groups; synthetic groups, in which the products of

63. See, e.g., Hemphill & Sechrest, A Comparison of Three Criteria of Aircrew Effectiveness in Combat Over Korea, 36 J. of Applied Psych. 323 (1952); Homans, The Western Electric Researches, in Human Factors in Management (S.D. Hoslett ed. 1946); Jackson, The Effect of Changing the Leadership of Small Work Groups, 6 Human Relations 25 (1953).

noninteracting individuals are combined in some artificial fashion; and groups of people interacting with each other only through controlled information flow and feedback (for example, Delphi groups). Different entities are compared to each other or to a known performance standard. For example, suppose one wanted to know which entity produced the best judgment of the temperature of a room. One could see which came closest to the actual temperature--individuals, small groups, pooled individual judgments, or controlled, indirectly interacting groups. The results of these kinds of comparisons are the basis of the findings presented below.

In regard to the question at hand, we would want to compare the jury's performance in deciding complex cases to that of judges. Instead of comparing final verdicts, it might make more sense to measure judges' and juries' comprehension of the facts and arguments put forward by the parties. Then one would be able to determine if they differed in their fact-finding abilities. Further, one might want to have a standard of accuracy against which both were tested. That is, even if the judge gave more correct answers than the jury, both might still be deemed inadequate to the task if they both gave more wrong answers than correct answers. Thus, an absolute as well as a relative standard of comparison might be desirable and possible.

So far we have discussed only two kinds of variables, the primary independent variable of the type of decision-making entity and the dependent variable of performance. These are not the only variables involved in these studies; to consider these exclusively results in little unraveling of the mystery of how the primary independent variable affects the dependent variables. A profusion of other variables has been included in the study of group behavior, and these interact with the type of decision-making entity or intervene between the independent and dependent variables in ways that are important to the question of juries and complex cases. These other variables include the nature of the task, the characteristics of group members, the size of the group, and communication patterns within the group. Many other variables that have been used in group research are either irrelevant to the present question or are of too little importance to be addressed in this review. Such variables include: interpersonal choice among group members, personality and attitudinal characteristics of group members, group cohesiveness, social status in group, and leadership.

Social Facilitation

An important question in group research has been how individual performance is affected by working alone, in the

presence of others, or in competition with others. This is not full-fledged "group" performance, but it is analogous to the situation facing jurors during a trial. They must comprehend the evidence as individuals, but in the presence of other jurors with whom they expect to discuss later what they learned individually. The heart of the question for researchers was whether the presence of other people facilitated or inhibited the performance of individuals. After many years of research, a wealth of seemingly contradictory findings had piled up: people make fewer errors in an eye-hand coordination task when in the presence of an audience; learning of nonsense syllables is inhibited by an audience; word association is facilitated; maze learning is inhibited; solving multiplication problems is facilitated; a vigilance task is facilitated.⁶⁴ What does this mean? Obviously, the researchers did not know "the answer." Zajonc has demonstrated convincingly that the shortcoming had been theoretical: once a third variable was taken into account, the apparent chaos disappeared and the puzzle pieces fell into place.⁶⁵ He suggested that the effect of performing a task in the presence of others was to raise the general level of

64. See review in Zajonc, supra note 3.

65. Id.

arousal of the behavior. Increased arousal increases the probability that responses high in a person's response hierarchy (that is, well-learned responses) will be emitted. If we divide the tasks mentioned above into "performance" tasks (already well-learned responses that are simply being carried out) and "learning" tasks (where some new response has to be acquired), we find that social settings facilitate the former and inhibit the latter. The already well-learned responses of performance tasks are emitted at a higher rate; for the learning tasks, like solving difficult problems, it is the errors that are emitted at a higher rate.

Several lessons can be drawn from these findings. First, one would expect jurors (and judges) to have a more difficult time learning the evidence in a tension-charged courtroom than they would alone in a quiet place. Jurors trying to sort out the information and solve problems as a group ought to do less well than a judge alone. Second, this is a tenuous extrapolation. For example, in any trial, but particularly a protracted one, it may well be that people become accustomed to--indeed, may become bored with--the setting, and the social facilitation effect simply may not apply. Third, "contradictory" findings may be a clue that something useful is about to be learned, not that the situation is chaotic and hopeless.

THE FEDERAL JUDICIAL CENTER

The Federal Judicial Center is the research, development, and training arm of the federal judicial system. It was established by Congress in 1967 (28 U.S.C. §§ 620-629), on the recommendation of the Judicial Conference of the United States.

By statute, the Chief Justice of the United States is chairman of the Center's Board, which also includes the Director of the Administrative Office of the United States Courts and six judges elected by the Judicial Conference.

The Center's **Continuing Education and Training Division** conducts seminars, workshops, and short courses for all third-branch personnel. These programs range from orientation seminars for judges to on-site management training for supporting personnel.

The **Research Division** undertakes empirical and exploratory research on federal judicial processes, court management, and sentencing and its consequences, usually at the request of the Judicial Conference and its committees, the courts themselves, or other groups in the federal court system.

The **Innovations and Systems Development Division** designs and helps the courts implement new technologies, generally under the mantle of Courtran II—a multipurpose, computerized court and case management system developed by the division.

The **Inter-Judicial Affairs and Information Services Division** maintains liaison with state and foreign judges and judicial organizations. The Center's library, which specializes in judicial administration, is located within this division.

The Center's main facility is the historic Dolley Madison House, located on Lafayette Square in Washington, D.C.

Copies of Center publications can be obtained from the Center's Information Services office, 1520 H Street, N.W., Washington, D.C. 20005; the telephone number is 202/633-6365.