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INFORMATION AND INTERACTION IN GROUP RISK TAKING

by

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A DISSERTATION

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ABSTRACT

INTERACTION AND INFORMATION IN GROUP RISK TAKING

by

RICHARD ST. JEAN

The purpose of the present investigation was to examine some of the processes involved in group risk taking. Brown's value hypothesis holds that people value risk individually and that this tendency becomes enhanced when they become aware of the amount of risk that others are willing to take. A second possibility is that people initially value risk but that the change-inducing process involves the production and recognition of substantive arguments relevant to the taking of a risky or conservative position. Thus, an immediate aim of the study was to single out the relative contributions of these two agents, risk-level exchange and the development of relevant arguments, to the production of risk-taking shifts in groups.

A second concern was with the effect of interactional processes on risk-taking behavior. Three major theories of the shift to risk (leadership, responsibility-diffusion, and value theory) have maintained that face-to-face interaction is a necessary antecedent of the shift to risk while one (familiarization) has held that it is not. The present experiment attempted to examine more closely the effects of this factor by presenting the same information in both group and non-group contexts.

With respect to the above aims and on the basis of value theory

considerations the following hypotheses were tested: 1) the shift to risk will be greater in group than in alone conditions; 2) both risk-level information and pro and con information (substantive arguments) are necessary for the occurrence of a full risky shift and, further, when presented alone each would occasion a small risky shift; 3) risk-level information will be as effective in a group as in an alone setting, but pro and con information will be more effective in an interactional setting.

These hypotheses were tested experimentally by means of a 4 x 2 x 2 factorial design including an information factor, a social interaction factor, and a pre-post factor. The four levels of information were full information, pro and con information, risk-level information and no information (control group). Each level of information occurred for both a group condition and an alone condition. Fifteen subjects served in each of the experimental cells formed by the combination of these two factors. The pre- and posttests constituted a repeated-measures factor for each subject.

The results confirmed the hypothesis that social interaction increases the shift to risk. However, the second and third hypotheses were explicitly disconfirmed. Full risky shifts were obtained from pro and con information, but only small insignificant shifts for risk-level information. Further, in the alone condition there was no shift whatsoever for risk-level information, but a small shift for pro and con information.

Discussion of the results focused on the formulation of a relevant-argument hypothesis as a more viable theoretical proposition than Brown's risk-level explanation. This hypothesis holds that substantive arguments relevant to the risky action are the major cause of the shift to risk and, further, that the effect of these arguments are greatly

heightened when developed in a group setting. Implications of this hypothesis and suggestions for future research were considered.in detail.

INTRODUCTION

In recent years there has been a surge of research dealing with the parameters of risk in decision making (e.g. Kogan and Wallach, 1964, 1967b; Edwards and Slovic, 1965; Slovic, 1962; Pruitt, 1962). The parameter of risk is involved whenever there is a desireable goal, a lack of certainty that it can be reached, and possible negative consequences for failure (i.e. a prize, some probability of attaining it, and a stake). The situation may be one in which these components are relatively objective as, for example, the decision to stake a certain sum of money for a prize of known value with a stated probability of success. On the other hand, the components may be relatively subjective, as when one decides to leave a relatively secure but dull job for a position that offers excitement and challenge but no long-term stability. In both cases risk taking is involved when the individual elects to stake something of value on a desireable, but uncertain outcome.

The social psychologist becomes involved when the risky decision making is shared with others. Many important decisions are made in groups rather than by individuals working alone. Our age of participatory democracy demands that all decisions, small or large, be taken out of the hands of the autocratic individual and given to the egalitarian group. In the modern academic world committee meetings have become a way of life. Suppose, for example, the admissions committee of College X is faced with the decision of whether or not to enroll culturally disadvantaged youths at the risk of lowering academic standards. How much risk will they be willing to tolerate? In many problem situations where an element of

danger or risk is involved the final decision will emerge only after many long hours of group discussion. The question to be explored in this paper is the relationship between the experience of group interaction and the riskiness of the final decision.

From a logical standpoint there are three possible answers that might be given to this question. Kogan and Wallach (1967b) give an extensive discussion of these possibilities.

First, the traditional view has been that group decisions will be more conservative than individual decisions. Groups have been thought to exert a conventionalizing or conforming influence upon their constituent members. The participants in the decision-making conference are less likely to suggest novel or risky ideas for fear of group sanction. This claim was set forth by Whyte (1956) in an invective against the process of committee decision making in business settings. In his view, this practice has a suppressing influence on boldness and innovation. Some indirect support has been found for this proposition. Zander and Medow (1963) found that subjects working in teams more often lowered their aspirations following a poor performance than did those working individually. It is possible in this case that shared experiences of failure may have suppressed any risk-taking proclivities and, thus, have led to advocating a more cautious decision. In other words, while this finding offers some support for Whyte's thesis, it might be difficult to generalize it beyond those instances in which a failure of aspiration is involved. In a syllogistic reasoning task Barnlund (1959) found that groups are more careful than individuals in the implications they draw. However, caution in forming conclusions may or may not be related to the propensity to take risks.

A second, and perhaps more compelling view, is that the degree of riskiness characteristic of group decisions somehow represents an

averaging of individual decisions. After reviewing a number of empirical studies Cartwright and Zander (1960) concluded that this is probably the case. Their interpretation is that group members tend to exert direct influence attempts towards those who deviate in any direction. This interpretation receives some support from Schachter's (1951) observation that when deviates are perceived as moving towards the group norm there is a gradual cessation of influence attempts. More direct support comes from a study by Hunt and Rowe (1960) which reports that there was little or no difference in the riskiness of investment decisions made by groups in contrast with those made by individuals. This study has been criticized by Wallach, Kogan and Bem (1962) on the grounds of methodology. They feel that since group interaction was quite brief (15 minutes) and since the groups met within sight of one another the results should be considered inconclusive. However, several recent studies in group risk taking (Teger and Pruitt, 1967; Zajonc, Wolosin, Wolosin and Loh, 1970) have evolved procedures utilizing interaction experiences lasting considerably less than 15 minutes, yet with results replicating studies using longer procedures. Other studies (e.g. Teger, Pruitt, St. Jean and Haaland, 1970) have shown that valid results may be obtained even when groups meet within sight of one another.

A third possibility is that group decisions may often be more risky than the average of individual decisions. Bruner (1962), for example, feels that the process of group interaction in itself encourages greater risk taking. The rationale for this view is that groups usually face the task of finding solutions to problems which individuals have not been able to solve. If this is the case group members would have no reason to fear failure and, thus, should feel free to promote risky or unconventional alternatives. Osborne (1957) has indicated that group

interaction will lead to the proposal of novel and venturesome ideas if the principles of "brainstorming" are followed. In an empirical test of this contention, Taylor, Berry and Block (1958) found that groups following these principles actually produced fewer ideas than individuals working alone. This finding was corroborated by Dunnette, Campbell and Jaastad (1963) in a study using industrial work groups. While these studies are suggestive neither focused on the risk-taking aspects of the decision task. It should be noted that the Synectics approach developed by Gordon (1961) claims to focus creative resources within a group onto a problem situation in such a fashion that imaginative and innovative concepts are developed.

The above studies offer no systematic basis for distinguishing between group and individual risk taking. Some of these have not been directly concerned with the dimension of risk and others have suffered from methodological difficulties. Kogan and Wallach (1967b) have indicated that studies in this area should fulfill at least two requirements. First, subjects should be fully involved with the risk-taking aspects of the problems. In other words, risk taking should be a prominent dimension of the problem situation. Secondly, group conditions should be structured in such a manner that they capture the full essentials of an intensive discussion. When these prescriptions are met the results of such studies are fairly uniform.

The Shift to Risk Phenomenon

The effect called the shift-to-risk-phenomenon was first reported by Stoner (1961) in a master's thesis submitted to the School of Industrial Management at M.I.T. Stoner asked his subjects to resolve a number of "life-dilemma" situations in which the solutions available varied system-

atically in terms of their riskiness. Subjects first made their decisions alone and then were formed into groups where they discussed each problem until a final consensus was established. The basic finding was that group decisions were significantly more risky than the average of individual decisions prior to group discussion.

In this experiment Stoner used the Choice Dilemmas Task, devised by Wallach and Kogan (1959) for use in assessing individual risk taking. This instrument takes the form of a questionnaire containing 12 problem situations. Each situation depicts a dilemma involving a central figure who must choose between two courses of action. One course is consistently more attractive than the other but has a smaller probability of succeeding. To illustrate this point a typical item is reproduced:

> Mr. G., a competent chess player, is participating in a national chess tournament. In an early match he draws the top-favored player in the tournament as his opponent. Mr. G. has been given a relatively low ranking in view of his performance in previous tournaments. During the course of play Mr. G. notes the possibility of a deceptive but risky maneuver which might bring him a quick victory. At the same time, if the attempted maneuver should fail, Mr. G. would be left in an exposed position and defeat would almost certainly follow.
>
> Imagine that you are advising Mr. G. Listed below are several probabilities or odds that Mr. G.'s deceptive play would succeed. Please check the lowest probability that you would consider acceptable for the risky play in question to be attempted.

Odds are listed as 1 in 10, 3 in 10, 5 in 10, 7 in 10, 9 in 10, and 10 in 10.

All subjects are given a standard set of instructions indicating that they are to read each problem and check the lowest probability level deemed acceptable for attempting the risky alternative involved. They are further instructed that in all cases they are to keep in mind that the risky alternative, if successful, would be the more desirable for the central figure involved. A risk score is computed for each subject by summing the probability levels he has chosen for the various problems.

A comparison is then made between risk scores in individual and group conditions.

Using the same methodology Wallach, Kogan and Bem (1962) replicated Stoner's original finding. They reasoned that since Stoner's subjects were male graduate students in industrial management the shift to risk might be accounted for by the mutually-shared role expectations of this group. That is, the presence of peers may have served to remind each subject that a business executive is expected to take risks in his decision making. To control for this possible effect the experimenters used groups composed of either all male or all female undergraduates enrolled in a liberal-arts curriculum. Previously unacquainted subjects were used in order to insure that the outcome could not be attributed to fortuitous associations between in-group status and risk-taking dispositions. The results of this study were essentially the same as Stoner's. Group decisions exhibited a shift toward greater risk taking when compared with prediscussion individual decisions. This held for both sexes. An interesting fact is that private decisions made after group discussion exhibited the same increase in riskiness as appeared in group decisions. Evidently, the shift to risk is a matter of private as well as public acceptance. In addition, this increase in riskiness was maintained even after a period of two to six weeks had elapsed subsequent to group discussion.

An important question concerning this shift is whether or not it can be generalized from the original experimental paradigm. It should be noted that the phenomenon has been obtained principally through the use of the hypothetical questions (Wallach and Kogan, 1959). Is this effect restricted to hypothetical problems or will it also be found in actual risk-taking situations where the welfare of the group participants is involved? Four studies have addressed themselves to this question.

The first study (Wallach, Kogan and Bem, 1964) involved a system of risks associated with possible monetary gains and losses contingent upon the subject's performance on a set of problem-solving items. Subjects were asked to decide upon the difficulty level of the problem they would attempt to solve. The payoff scale was proportionate to the stated difficulty level; harder items paid greater dividends. The major finding was that when groups discussed to consensus the difficulty levels to be chosen the resulting decisions favored higher difficulty levels (and, thus, a greater degree of risk) than did the average of individual decisions.

A second experiment (Bem, Wallach and Kogan, 1965) involved the threat of aversive consequences for the failure of risky decisions. These consequences consisted of painful side effects resulting from exposure to various unpleasant odors. Odors which had a greater likelihood of producing the side effects paid proportionately higher premiums provided, of course, that the subject did not actually get the effects. Thus, the consequences of failure involved both unpleasant physiological stimulation and the foregoing of potential monetary gains. When groups discussed the probability levels involved they reached decisions that were significantly more risky than the average of individual decisions.

A study by Pruitt and Teger (1969) has extended the generality of the risky shift to gambling decisions. Subjects first filled out a questionnaire indicating either for a fixed stake what probability of winning they would like to have or for a fixed probability of winning the amount of money they would like to risk. All bets were of zero expected value; over a long series subjects should break even. There was actual risk involved since one bet was chosen at random by the experimenter and played off on the roulette wheel. Bets were first decided upon individually and then were discussed by groups. The results indicated that a

significantly greater degree of risk was decided upon following group discussion than prior to it.

The shift effect has also been found among groups with previous professional experience in decision-making tasks. Siegel and Zajonc (1967) administered a set of hypothetical items to a number of 3-man groups, each composed of a psychiatrist, a psychologist and a social worker. These groups discussed 12 items--6 drawn from the Choice Dilemmas Task (1959) and 6 "clinical choice dilemmas" devised by the authors to reflect the type of mental-health problems these groups had previously worked with. The basic finding was that a large and significant shift to risk occurred on both sets of items. This shift was just as great for the clinical items as for the items drawn from the Wallach and Kogan list. Thus, the risky shift was demonstrated for established groups working on familiar problems.

Taken together, these four studies provide strong support for the idea that groups will shift to risk in actual as well as in hypothetical situations. The question is what mechanisms operate in the context of group discussion that do not operate in individual decision making.

Explanations of the Shift to Risk

A number of explanations have been put forth in an attempt to explain the consistency of the group shift to risk. In recent years a large body of research has been devoted to the testing of these hypotheses.

Risk Taking as a Function of Leadership Influence

A plausible explanation for this phenomenon might be that those individuals who are high risk takers in the beginning exert more influence in group discussion than those who are initially moderate or low.

Evidence to support this view was found by Wallach, Kogan and Bem (1962). Following discussion, group members were asked to rate each other in terms of interpersonal influence. The result was that those individuals who exhibited the greatest degree of risk on the pretest measures were perceived by other group members to be more influential in the discussion. In a later study (Wallach and Kogan, 1965), it was found that even when groups are not required to reach a consensus in the discussion the relationship between initial risk and perceived influence still persists. In addition, Rim (1963, 1964a, 1964b, 1966) has reported that high risk takers rate high on measures of extraversion, need for achievement, tolerance of ambiguity, radicalism, and interpersonal values of leadership and recognition. Thus, the suggestion is that high risk takers are characterized by a particular constellation of personality traits which may predispose them to leadership.

There remains a plausible alternative explanation for this evidence. It is possible that the perceived influence of high risk takers was an outgrowth of the group shift to risk rather than being a cause of it. It seems natural that those who were originally closest to the final group product should be perceived as having exerted the greatest influence. It is likely that this could occur even without the consensus requirement since Wallach, Kogan and Burt (1965) have reported that group members recognize that the shift is taking place.

Evidence for this second point of view comes from two studies (Nordhøy, 1962; Rabow, Fowler, Bradford, Hofeller and Shibuya, 1966). In both studies items were created for which the result was a shift to greater conservatism following group discussion. This shift was accompanied by the finding that those who were initially lowest on risk taking were perceived as having exerted the greatest influence. Is it

possible that high risk takers are persuasive in some situations but not in others? The more parsimonious view holds that perceived influence is a result of the group moving in a particular direction. However, Kogan and Wallach (1967b) feel that the evidence on this point remains ambiguous since "there may be something special about the kinds of items in question that cause the high risk taker to change his mind (p. 257)."

At any rate, it would appear that recently a number of decisive blows have been struck against the leadership hypothesis. Teger and Pruitt (1967), for example, managed to obtain a risky shift in a condition where the subjects did not engage in discussion but simply revealed to one another information about their initial choices. No verbal communication was involved since information was exchanged simply by displaying cards inscribed with probability values. In this situation high risk takers had no opportunity to be persuasive yet a risky shift was still obtained. Although it may be argued that some influence still took place it would hardly be fair to attribute this influence to the personality of the high risk taker. The findings seem to support some sort of cultural value mechanism (discussed later) rather than a leadership explanation.

In a recent study Wallach, Kogan and Burt (1968) attempted to determine if the shift to risk could be attributed to greater persuasiveness on the part of risk takers than on the part of conservatives. On the basis of responses to the Choice Dilemmas Task discussion groups were formed such that the variability of risk-taking dispositions within each group was extremely high. Each group then discussed risk-neutral material and each of the members was rated in terms of perceived influence. Use of risk-neutral materials prevented the possible contaminating influence of a shift to risk making the high risk taker appear more persuasive. Results indicated that for males there was no relation between riskiness

and perceived influence. For female groups there was a slight positive relationship between riskiness and perceived influence. The authors conclude that, in general, the risky shift cannot be attributed to greater persuasiveness on the part of risk takers.

Just the opposite approach was taken in a very recent study by Hoyt and Stoner (1968). Subjects were assigned to discussion groups on the basis of risk-taking homogeneity rather than heterogeneity. It was assumed that this procedure would neutralize any leadership effects of high risk takers and, according to the leadership hypothesis, prevent a risky shift from occurring. Despite this procedure substantial risky shifts were produced in the following discussions. This evidence combined with that of the two previously reported studies indicates that the leadership hypothesis does not provide a very adequate explanation of the shift to risk.'

Diffusion of Responsibility

By far, the greatest amount of empirical research in this field has been accomplished through the efforts of Wallach, Kogan, and their collaborators. They have proposed that "...individuals, when constituted as a group, experience a diffusion of responsibility as a product of the knowledge that one is deciding upon an action jointly with others rather than deciding by oneself (Wallach, Kogan and Bem, 1964, p. 263)." They further report that responsibility diffusion is mediated by the formation of affective bonds which enables the individual group member to feel less than proportionately to blame when he considers the possibility of failure. Rettig (1966) offers the similar explanation that the process of communication set in motion by group discussion may result in a lowered expectancy of being censured and a greater feeling of security. His study, however,

is concerned with predicted ethical risk taking in which the social desirability of the risky action is low.

Kogan and Wallach feel that the notion of responsibility diffusion has received strong support in several studies. In one, (Wallach, Kogan and Burt, 1967) groups were composed homogeneously of either field-dependent or field-independent members. It was found that longer discussions of field-dependent groups resulted in a stronger risky shift whereas longer discussions among the field-independents weakened the shift. The authors reasoned that longer discussions enhanced the affective bonds among the field-dependents. Among the field-independents longer discussions were characterized by a more intellectual or cognitive style of discussion which, they assume, is not conducive to the formation of emotional ties. In addition, they found significant positive correlations between the amount of risky shift exhibited by a field-dependent member and the degree of risky shift he attributed to the group of which he was a member. It is held that this process of projecting one's own behavior onto the group can be seen as a means for minimizing personal responsibility. No such relationship was found for the field-independents who, presumably, are not prone to minimizing personal responsibility.

Kogan and Wallach (1967a) found that groups composed homogeneously of high test-anxious subjects exhibited a stronger shift to risk than randomly composed groups. The interpretation is that high-anxious individuals are more than normally concerned about negative outcomes and, thus, have more responsibility to diffuse. This idea was also supported through a study performed by Wallach, Kogan and Bem (1964). One of the manipulations involved setting up a condition in which one subject was induced to feel responsible for the wins and losses of others in the group as well as his own. When these "responsible" subjects arrived at a decision

after discussion with other group members they manifested a strong shift to risk. The authors interpret this to be a consequence of the fact that the individuals involved felt a greater than usual amount of responsibility and, thus, had more responsibility to diffuse.

It is interesting to note that Marquis (1962) obtained the same results in a similar study, yet drew opposite conclusions. Marquis reasoned that since one member is deemed to be responsible he should not have the same freedom as other group members to experience a diffusion of responsibility.. Since a shift to risk was obtained anyway Marquis concluded that responsibility diffusion could not account for the results.

It would seem that the above evidence is rather equivocal with respect to the theory. On the basis of their results, Rabow et. al. (1966) conclude that diffusion of responsibility, although not ruled out, is insufficient to account for all the data. The Rabow study utilized items for which there was a shift to greater conservatism rather than risk. These items were constructed on the basis of a norm-conflict prescription in which the cautious alternative is supported by societal norms whereas the more desirable and risky alternative does not receive normative support. To illustrate this point a typical item is reproduced:

> A very small community has sponsored the medical education of a young doctor in order to replace the older and only doctor of that community. The young doctor must decide whether or not to follow up a research idea which may produce an important medical advance, a decision that will prevent him from returning to the small community (p. 20).

In this case each subject is asked to decide what the odds should be of the research being a success before he would advise the doctor to follow up his idea.

Responsibility diffusion was formulated to account for shifts to risk, not shifts to conservatism. It cannot be invoked to account for both because then it would be no explanation at all. However, Kogan and

Wallach (1967b) have attacked the Rabow study on the grounds that the risky alternative does not appear to be of much greater desirability than the cautious alternative. This criticism, though, can also be applied to an item used by Wallach, Kogan and Bem (1962) for which risky shifts have been observed:

> A college senior with considerable musical talent must choose between the secure course of going on to medical school and becoming a physician, or the risky course of embarking on the career of a concert pianist (p. 77).

It would not appear from the item itself that becoming a concert pianist is more desirable than going to medical school. Yet, it must be remembered that the instructions urge the subject to always keep in mind that the risky alternative is more desirable to the central figure involved. Since Rabow et. al. used the same instructions this criticism of Kogan and Wallach must be considered untenable.

Before leaving this issue it is necessary to consider one more test of the responsibility-diffusion hypothesis. Pruitt and Teger (1967) report a study in which they used an actual gambling situation in order to insure that there would be a concrete outcome to give some substance to feelings of responsibility. Subjects first answered items about the amount of money they would be willing to risk and what odds they would be willing to take. Next, they met in small groups to discuss some non-risk items. It was assumed that group interaction would allow the affective bonds to develop which are supposed to mediate diffusion of responsibility. Following group discussion, subjects were told to make new decisions on the gambling items with the instruction that their decisions would be averaged with those of other group members. This would produce a final group decision which was to be played off for money.

The authors reasoned that this procedure should promote diffusion of responsibility since all of the group members were participating in

the final group decision. Instead of producing shifts to risk, this procedure resulted in nonsignificant shifts toward conservatism. This finding would seem to imply that responsibility-diffusion, if it does occur, is not sufficient to produce the shift toward risk. In a personal statement to Pruitt and Teger (cited in Pruitt and Teger, 1967), Kogan commented that responsibility-diffusion would occur only if information is available about the level of risk that other group members are taking. However, as Pruitt and Teger point out, if this is the case then the responsibility-diffusion hypothesis needs to be restated. As it stands now it does not provide a very adequate explanation.

Risk Taking through Familiarization

Recently, Bateson (1966) has proposed a familiarization hypothesis which maintains that a more thorough consideration and understanding of the risk-taking problems on the part of the subjects involved may in itself lead to greater riskiness on the posttest measure. He has supported this contention through utilization of a procedure in which subjects, after completing the pretest, are instructed to familiarize themselves with the Choice Dilemma items by writing out pros and cons for each action. A significant shift to risk was observed on the posttest measures. This shift was of approximately the same magnitude as that obtained in the group discussion procedure. In interpreting these results Bateson argues that group discussion may result in a greater familiarization with the relevant facts of the problem and that greater familiarization in itself leads to a greater willingness to advocate risky solutions. A study by Flanders and Thistlethwaite (1967) augments this argument. They found that familiarization produced as great a shift as did discussion and, more importantly, that familiarization followed by discussion did not produce

any greater magnitude in the shift to risk. They concluded that the shift to risk results from a pseudo-rather than a true-group factor.

In a recent paper, however, Kogan and Wallach (1967c) have challenged the results of the familiarization studies. They set up two conditions, one of which was a typical group discussion while the other was a type of familiarization condition in which subjects listened to tape recordings of the group discussions. Risky shifts were manifested in both conditions, but the risky shifts under the discussion condition were significantly larger than under the familiarization-by-listening condition. They argued that the same information was available to groups in both conditions and that if familiarization alone were sufficient to account for the risky shift it should be of the same magnitude in both conditions. These results appear to contradict those reported by Flanders and Thistlethwaite.

A detailed investigation of the above studies reveals subtle differences in procedure. In their familiarization instructions Flanders and Thistlethwaite created in their subjects the explicit expectation that they were to prepare for a group discussion although, in actuality, no discussion was to follow. Part of their instructions read: "We want each of you to be prepared to discuss the choices to be made so that you will not have to spend group discussion time restudying the problem (p. 93)." Kogan and Wallach, however, did not lead their subjects to believe that they would engage in a group discussion or in any way make their decisions public. In a recent study at the University of New Hampshire (cited in Teger, Pruitt, St. Jean and Haaland, 1970) this parameter was investigated. Two familiarization conditions were used. In one, subjects wrote out pros and cons for the Choice Dilemmas Task while under the impression that they were to make new choices which would be revealed in subsequent group

discussion. The subjects made posttest choices, but no discussion followed. In the other familiarization condition subjects also wrote out pros and cons but while under the impression that their subsequent choices would remain private. In addition, a traditional group-discussion procedure was run for purposes of comparison. Significant shifts to risk were found after group discussion but, surprisingly, neither familiarization condition produced significant shifts in either direction.

A number of other attempts have been made to replicate the familiarization studies (Teger, Pruitt, St. Jean and Haaland, 1970). Several familiarization procedures have been used including exact replications of both Bateson's and Flanders's and Thistlethwaite's procedures. In none of these studies has a significant shift to risk been observed. It now seems likely that the shift observed in the Kogan and Wallach familiarization condition was an outgrowth of subjects' vicarious experiencing of group interaction. Bateson's shift may have been due to the fact that his study was run in England and English students may be prone to studying a problem carefully before making a decision. Thus, on the pretest subjects may have been hesitant to accept a great deal of risk since they had not had time to study the problems carefully. However, unless we assume a Type I error it is extremely difficult to account for the results of Flanders and Thistlethwaite.

The comprehension hypothesis has still another shortcoming. It explains only shifts to risk, not shifts to conservatism. In order to explain both types of shifts it would have to be combined with some other explanation such as value theory discussed next.

Risk Taking as a Function of Value Orientation

In an attempt to explain both shifts to risk and shifts to

conservatism Brown (1965) has proposed a "value" hypothesis. He feels that the content of the traditional risk-taking items has been such that the risky alternatives involved are more apt to be supported by cultural or societal values than are the conservative ones. Thus, subjects perceive most of the Choice Dilemma items as warranting a risky approach. It will be noted that American culture supports the taking of risks in many concrete situations--in quiz shows, in sports, on the battlefield, etc. Madaras and Bem (1968) have shown that risk-acceptors, in general, are seen as having more socially-desirable characteristics than risk-rejectors. However, in some situations the approved approach is a conservative one. Therefore, Brown asserts that people value both risk and caution according to the circumstances and a risk-taking item may engage either the value on risk or the value on caution. Whichever value is engaged will influence the flow of information in such a manner that group members will bring forth more statements supporting the value than opposing it. Thus, it might be supposed that if more information is brought out supporting a risk approach the group would shift in that direction.

Some support for this notion has been obtained by Nordhøy (1962) who analyzed the verbal content of group discussions of the Choice Dilemma items. For 10 of the 12 items there were a greater number of statements supporting risk than caution. These were the same items for which there were shifts to risk. For the other two items there were a greater number of statements supporting the conservative alternatives. These items showed nonsignificant shifts toward conservatism. However, Wallach and Kogan (1967b) have argued that this finding does not necessarily support the value position. They claim that if groups are going to shift to risk anyway a natural outgrowth of this process would be the production of a greater number of statements justifying a risky approach. In this

instance, therefore, it is difficult to ascertain which is the cause and which the effect.

Hinds (1962) has reported results which have more significance for value theory. In conjunction with the administration of the Choice Dilemma items he asked his subjects to indicate what alternatives would be chosen by most other people. Subjects consistently guessed that others would be more conservative. Brown interprets this to mean that each person taking the test conceives himself to be at least as risky as the average of his peers. Thus, the process of group discussion serves to inform each subject of how other group members have actually chosen. The shift to risk occurs since those who find themselves to be below the average will revise their decisions in an upward direction. On the norm-conflict items devised by Rabow et. al. (1966) the theory is that subjects originally define the items as warranting a cautious approach and assume that they are being at least as cautious as others. When group discussion informs them that others are being even more conservative they recast their decisions into a more conservative framework. This theory, then, rests on the dual assumptions that people like to be in tune with the cultural values as they see them and, furthermore, when they find they are not they suffer a type of cognitive dissonance which results in decision change.

It should be noted that by this theory the actual flow of arguments, the substantive aspect of the interaction, is not important in the production of the shift: "The content of the discussion, the arguments pro and con, are of no importance by this theory. It is the information about other people's answers that makes individuals move toward greater risk after group discussion (Brown, p. 702)." The fact that more risky than cautious information is produced in group discussion may be seen as a

justification for the already shifting decision.

A partial test of this theory was conducted by Wallach and Kogan (1965). They established a condition in which subjects were required to reach a consensus on each of the Choice Dilemma items without engaging in discussion. The procedure called for the experimenter to post each subject's decision on the blackboard for all to refer to. Several rounds of choices were made in this fashion until consensus was achieved. Since each subject received information about the degree of risk taken by other group members Brown's theory would predict that those whose choices were less risky than the average would choose for greater risk on the next ballot. However, the final decisions represented an averaging effect rather than an overall shift.

Teger and Pruitt (1967) have criticized this study on the grounds that the consensus-without-discussion requirement may have left the subjects with the impression that an averaging strategy was the only one available. Accordingly, the study was replicated without a consensus requirement and the posttest measures indicated a small but significant shift to risk. A larger shift to risk resulted from a comparison discussion condition. This finding can be considered to be compatible with the value theory. While the posting of decisions provides some information about the views of others this opportunity should be greatly enhanced by the verbal exchange within group discussion.

Pruitt and Teger (1967) cite other evidence which they feel to be in line with the value theory. If each risk-taking item is originally defined as warranting either a risky or a conservative approach these values should be reflected by the initial choices on the pretest. In addition, there should be a positive correlation between initial risk and risky shift. Essentially, this is what Pruitt and Teger have found.

Items for which choices are originally risky reflect a shift to even greater risk after discussion. Likewise, originally conservative choices become even more conservative. This is consistent with Brown's prediction that a risk-taking item will engage one of the two values and, through group discussion, exhibit shifts in the value-specified direction.

These authors have further reasoned that the difference between initial risk and the risk others are assumed to be taking (Hind's procedure) should, if the theory is right, yield a prediction of the size of the risky shift. The rationale is that "the farther ahead of the pack one initially thinks he is, the more catching up he has to do when he finds that he is performing in an average fashion (Pruitt and Teger, 1967; p. 16)." That is, there should be a positive correlation between risky shift and the amount of risk subjects assume others to be taking minus their own initial risk. Since small nonsignificant correlations were found this prediction was not borne out.

However, the relevance of this finding for value theory can be called into question. Brown's prediction was that those who find themselves to be below average will revise their decisions toward greater risk. They want to be at least as risky as others. Thus, it would not matter how far ahead of the pack one assumes oneself to be. The only measure of relevance is whether or not one is actually below the mean of the other members' decisions. The shift to risk is based on a few individuals revising their decisions, not the whole group. One could predict, though, that degree of risky shift would bear some relation to how far below the mean a group member finds himself to be.

This idea receives support from a very recent study by Vidmar (1969). On the basis of initial reactions to the risk items he determined each member's relative initial risk position in the group. Following the

posttest choices it was found that magnitude of initial risky shift was inversely related to the member's relative initial position. Thus, those who were farthest below the mean shifted most. In addition, he compared homogeneous groups consisting of either high, medium or low risk takers with heterogeneous groups composed of two high, one medium, and two low risk members. All composition conditions exhibited shifts toward risk but groups in the heterogeneous condition showed significantly greater shifts than groups in the other conditions. Thus, as Brown predicts, it appears that heterogeneity of risk preferences is an important factor in the shift to risk.

It is interesting to note that Wallach appears to have abandoned the responsibility-diffusion hypothesis and embraced the value position. He and his colleague report a study (Wallach and Wing, 1968) which represents a more extensive version of Hinds' (1962) report. Six of the twelve Choice Dilemma items were administered to almost 500 pre-college subjects. They responded with both their own risk preferences and those that they felt the majority of their peers would make. On all six items subjects guessed that the majority of their peers would make more conservative choices than they themselves. This is in line with value theory which suggests that on risk-oriented items (as these were) subjects would feel themselves to be as risky or riskier than the majority of their fellows. Wallach and Wing now feel that this "...interpretation may well account for the lion's share of the group-induced risky-shift effect (p. 105)."

The value explanation has been supported and extended by another similar study (Levinger and Schneider, 1969). The subjects involved responded to the Choice Dilemma items in three ways: (1) their own preference, (2) how they felt their peers would choose, and (3) the choice they felt was most admirable. The authors felt that if risk is a positive

value the choice selected as most admirable would represent a riskier position than the initial choice. Although one is left with the question of why the subjects would not originally choose the most admirable position the results were in line with the hypothesis as stated. In general, subjects assumed peers to be more conservative and they most admired choices which were riskier than their own. These results did not hold for those items in which previous research had indicated inconsistent shifts or shifts in the cautious direction. The authors suggest that during discussion the group members discover that the decisions of others are more risky than previously they believed and, thus, feel more freedom to move toward the positively-valued positions.

Perhaps the most compelling evidence for value theory comes from the same researcher who first reported the occurrence of the shift to risk phenomenon. Stoner (1968) presented his subjects with a 12-item questionnaire. Six were assumed to be risk-shifting items, and the others were felt to be caution-shifting. Subjects also completed a "value ranking instrument" which required them to rank 18 phrases in the order of their perceived importance. The phrases were written to describe values which were implicit in each of the alternative outcomes in the 12 dilemma items. On the basis of subjects' rankings the 12 dilemma items were divided into 2 groups: those for which the risky alternatives were ranked higher in importance than the cautious alternatives and those for which the opposite was true. If risk-taking items do engage widely held values and if the importance of relative values can be specified in this manner then this procedure should afford us a means of predicting which way any item will shift through group discussions. Stoner found that items classified in this way as being risk-oriented elicited relatively risky initial decisions and, after group discussion, evoked

strong shifts to risk. Items for which the cautious alternatives were ranked of greater importance had relatively conservative initial decisions. Four of the six items classified in this way shifted in the conservative direction although only two of the shifts were significant. Thus, we have a means for predicting the direction of the shift in advance and, although the predictions were far from perfect, Stoner has shown that value theory need not be an *ex post facto* explanation.

Statement of the Problem

At present, value theory is the only major explanation of the shift to risk phenomenon that has not suffered significant empirical damage. The problem is that there are two possible versions of this theory and previous tests of the value formulation have done nothing to separate them.

Brown's position (1965, pp. 698-702) is that any risk-taking item may elicit either the value on risk or the value on caution. People like to feel that they are acting in accord with the value specified and they respond originally in either a risky or conservative fashion. They assume that they are at least as risky or conservative as others. When some of them find that they are not they shift to a more extreme position on the value. According to Brown's position, then, the only information of relevance is the actual risk preferences of others. As mentioned, some support for this position has been given by Teger and Pruitt (1967) who have reported that when group members do nothing but exchange risk-level information there is a small but significant shift to risk.

The verbal interplay and the arguments pro and con should be of no importance (Brown, 1965). Yet, Nordhøy's (1962) study indicates that risk-oriented items are accompanied by discussions in which there are a

greater number of statements supporting risk than caution. Wallach and Kogan (1967b) have argued that if groups are going to shift to risk anyway a natural outgrowth of this process would be the production of a greater number of statements justifying a risky approach. But there is a second possibility. The flow of substantive arguments, the pros and cons involved, may themselves play a causal role in the shift to risk.

It should be noted that a test of this second possibility also constitutes a crucial test of Brown's position. Brown would be forced to predict that no shift to risk would occur in a discussion of the risk-taking items in which the giving of specific risk-level information was not allowed. This proposition can be tested by means of an experimental design which compares the potency of various levels of information in the production of the shift to risk. Full information (the usual group discussion) is compared with two levels of partial information (a discussion which permits risk-level information only and one which permits pro and con information only). There is also a control group which represents the extreme of no information.

The hypothesis presented here is that both risk-level information and pro and con information are necessary for the production of a full risky shift. Teger and Pruitt (1967) found that groups will shift to risk when presented with risk-level information but that this shift is significantly smaller than that reported for the groups who used the traditional discussion method. Thus, it is expected that either risk-level information or pro and con information by itself will be sufficient for the production of a small risky shift. Yet for the full risky shift it may be necessary for these two elements to be combined as they are in the typical group discussion procedure.

Following the demise of the familiarization hypothesis it appeared that the shift to risk must be a true-group phenomenon. That is, the shift will only take place through the interaction (face-to-face exchange of behavior) of several individuals. Pushed to its logical extreme, however, Brown's value position must consider the shift to risk to be a pseudo-group effect. By this theory the only relevant variable is the acquisition of information concerning the risk levels of others. If this information is made available to subjects subsequent to the completion of the pretest they should choose greater risk on the posttest even in the absence of a group condition.

It is possible, however, that the flow of substantive arguments (pros and cons) are also basic elements of the shift to risk. This would seem to support the contention that the shift to risk is really a true-group effect. Yet, might not this information alone produce the shift to risk when presented in an individual rather than a group context? A written transcript of a group discussion would provide the full informational requirements but without the interactional components. If a shift to risk were to appear in this condition it would be necessary to conclude that actual face-to-face interaction is not crucial to the production of the shift to risk. Teger and Kogan have commented that in this condition a group might be implied and if a shift were found it might better be termed a quasi- rather than a pseudo-group effect (personal communication).

It is still possible that group interaction while it may not be necessary to the production of the shift may serve to enhance it. Perhaps information presented in a group condition is more salient than when presented in an alone condition. The obverse is also a logical possibility but it seems intuitively more likely that group interaction

would serve to make more pronounced the value specified by a risk-taking item. Willems (1969) has reported that groups are even more likely than individuals to report that they are taking more risk than others. He interprets this to mean that group interaction enhances the value specified. The position taken here is that the shift to risk can be produced in a noninteractional setting but that the addition of social interaction will serve to make the shift more pronounced.

The present design tests this contention by comparing the four information levels across both group and alone conditions. This analysis permits the identification of experimental interaction effects between the two major variables.

Hypotheses

The following specific predictions are offered:

(1) There will be a greater shift to risk under group than under alone conditions.

(2) The shift to risk will be greatest when full information is given, next greatest for risk-level only information and pro and con information, and smallest for the no-information condition. It is not expected that the risk level only condition and the pro and con condition will be significantly different.

(3) There will be a statistical interaction to the effect that the presentation of risk-level information will produce comparable shifts under both group and alone conditions, while shifts under the other information levels will be smaller in the alone than in the group conditions. That is, the magnitude of the shifts under full information and risk-level information should be approximately the same for both levels of interaction while shifts under the pro and con level should be larger

in the group than in the alone conditions.

METHOD

The overall experimental plan involves a social-interaction manipulation resulting in group (A_1) and alone (A_2) levels, and an information manipulation resulting in full information (B_1), pro and con information (B_2), risk-level information (B_3), and no information (B_4) levels. Thus, there are eight experimental conditions in all. The addition of a pre- and posttest, repeated measures factor (C_1, C_2) produces a 4 x 2 x 2 factorial design (Table 1).

TABLE 1

Experimental Design

	A_1		A_2	
	C_1	C_2	C_1	C_2
B_1				
B_2				
B_3				
B_4				

Subjects

One hundred twenty male and female students enrolled in introductory psychology courses at the University of New Hampshire and at Nasson College in Springvale, Maine served as subjects. None of the subjects had prior knowledge of the shift to risk phenomenon. Each subject was assigned to one of eight experimental conditions. In accordance with

prior research procedures only like-sex subjects were run in any one experimental session.

Materials

The materials consisted of six items from the Choice Dilemma test which had previously been associated with strong shifts to risk (#'s 1, 4, 6, 7, 8, and 11 from Kogan and Wallach, 1959--see Appendix) and verbatim transcripts of group discussions.

Procedure

All subjects were initially pretested on the risk-taking items. They were instructed to read the instructions printed on the test booklet and then were further instructed as follows:

> There are two points I should like to bring to your attention which may seem clear enough at the outset, but are easily over-looked when you become involved in some of the situations. The first is that alternative X--the riskier alternative--is always assumed to be more desirable than the safer course, if X should prove successful.
>
> The second point concerns the meaning of the odds you are being asked to mark. It is not your task to decide what the odds might actually be in a lifelike situation. The odds you mark indicate the lowest odds you would be willing to take and still advise the central figure to give the risky alternative a try. There is no time limit so take your time and consider the 6 situations carefully. You may return to one if you wish to change your answer after seeing some of the others. If there are no questions you may begin.

Subjects completed the pretest and then, depending on which condition they had been assigned to, were exposed to one of the following experimental manipulations.

Group Conditions (A_1)

Half of the subjects were run under group conditions. They met five at a time and were seated around a large discussion table. There

was a tape recorder present and subjects were told that it would be used to record their discussions. Subjects were then exposed to an experimental manipulation which represented one of the four information levels.

Full information (B_1). This condition is simply a replication of the typical group discussion procedure. These instructions were given:

> The questionnaire which you now have in front of you is the same one you just finished taking. We have had each of you fill out the questionnaire so that you would become familiar with all of the situations it contains. What we are really interested in is having you discuss each of the situations as a group. Let me now describe the purpose of these discussions. We are trying to develop a set of case motives for a human relations course. This means that we would like to develop situations for which people are likely to hold many different points of view. We want to see whether the situations we constructed will generate a diversity of opinions so your discussions will tell us how well the different situations are working out for our purposes. I am not going to participate in the discussions although I will be here to answer any procedural questions which may arise. All right, let's begin with the first item. Go right ahead.

When the discussion appeared complete the experimenter said the following:

> All right. That was a good discussion. For some of you, it may have raised issues that you had overlooked when filling out the questionnaires the first time. Now, we would like to find out whether the discussions influenced your judgment in any way. When making your decisions now, don't feel bound by what you did when filling out the questionnaire the first time. If you still feel the same way, that's quite all right but we should like you to consider each situation inthe light of the discussion. As I told you before, we're interested in seeing how much diversity of opinions is generated by each situation. Obviously the expression of such diversity should have some impact on everyone's personal opinions. All right, go ahead and make your decisions for the first situation--the one you just discussed.

Pro and con information (B_2). Subjects were directed to discuss each item. However, they were instructed to refrain from mentioning the exact level of risk each would advise. The instructions are the same as those used in the full-information condition except that the following phrases were added:

> In discussing each item you should concentrate on pointing out the most important issues to be considered in making each decision. What do you feel are the pros and cons attached to the risky action? You should not mention the exact level of risk you would recommend

> but only whether in your opinion the central figure should make a generally risky or a generally conservative decision.

There was a monitor present during each discussion to insure that no mention was made of specific risk levels. As usual after each discussion subjects were asked to indicate their posttest choices.

Risk-level information (B_3). This condition closely resembles the balloting condition of Teger and Pruitt. However, because of the interest in assuring vocal interaction subjects were instructed to speak their preferences rather than display them on cards. They were instructed as follows:

> The questionnaires you have in front of you are the same ones you just finished taking. We had you take them the first time so that you would become acquainted with the various problem situations. What we would like you to do now is to exchange information concerning the decisions you have made. Each of you will indicate to the others what level of risk you have chosen for the problem situation. I will roll a die to determine who goes first and we will continue around the table in a clockwise direction. When you finish going around once repeat the procedure until you have done it three times. Remember that you are limited to indicating the odds you prefer. You are not allowed at this time to give reasons for your choice.
>
> Consider what you are doing as a form of discussions. You are each getting an opportunity to compare your initial decision with that of others. You are also given a chance to change your decisions if you wish to. Feel free to change your answers at any time. Remember, if this were the usual form of discussion, many of you would change your answers for various reasons during the course of the discussion. Always consider your own decision in light of others' decisions but in the end do whatever you think is best. Please do not feel bound by what you marked as your decision on the practice booklet. Whether or not you change or how much you change is not important. What is important is that you reconsider each answer carefully.

Three rounds of balloting were held. When this was completed each subject was asked to make a final decision on each item.

No-information (B_4). This was a control condition. After completion of the pretest subjects were handed copies of nonrisk items which they were to discuss. For this purpose the"doodlebug problem"

developed by Rokeach (1960, pp. 171-181) was used. Subjects were instructed as follows:

> Each of you now has a copy of what we call the doodlebug problem. It is a problem in logical reasoning. You are asked to describe the circumstances that Joe must have been in to lead him to his correct conclusion that only four jumps are required. We would now like you to discuss this problem as a group to see if among the five of you you can come to a correct solution concerning Joe's circumstances. You are to continue the discussion until all of you agree on what that correct solution must be. I will not take part in the discussion but I will be here to answer any procedural questions that arise. All right, begin if there are no questions.

When the discussions were finished the experimenter passed out new copies of the risk-taking questionnaire. Subjects were instructed as follows:

> The questionnaires you now have are the same ones you took earlier. We would now like to have you go back over them and reconsider each item carefully. We are not interested in seeing if you can remember the answers you put down the first time but rather we would like to have you rethink each problem. Some new thoughts may occur to you that you did not consider first time. If you still feel the same way that is all right but we are interested in finding out what your personal decision is at this time.

Alone Conditions (A_2)

The following procedures pertain to subjects run in non-interacting conditions. For each condition subjects were run individually in isolated rooms. They were allowed no opportunity to interact.

<u>Full information</u> (B_1). Subjects in this condition were exposed to the full information that is engendered in a typical group discussion. Each subject was presented with a verbatim transcript of a previous group discussion. He was instructed as follows:

> The questionnaire you now have in front of you is the same as the one you just finished taking. We had you take it the first time so you would become familiar with all the situations it contains.
>
> Many people feel that they could make better choices on each item if they had more information concerning the problem situations. In the past we have had various groups discuss each problem in order that we might get a better idea of the pros and cons involved in making each decision. In order that you might have a better idea

of what these pros and cons are we have prepared a verbatim transcript of a typical discussion. We should like you to read the transcript and indicate in the spaces provided what other pros and cons you feel the group should have considered. Since you may not previously have considered some of the information brought to light in the group discussion we would like you to reconsider each situation and make a new decision for each. If you do not wish to change your original decision that is perfectly all right. What is important is that you reconsider each decision in the light of the group discussion. Please mark what you feel to be the best decision.

Pro and con information (B_2). This condition was very similar to the full-information condition. Subjects were presented with verbatim transcripts of group discussions. However, the transcripts used were derived from the recordings made of the discussions in which subjects discussed pros and cons only and were not allowed to reveal risk-level information. The instructions used in the full-information condition were repeated here.

Risk-level information (B_3). Subjects were asked to reconsider each of their initial decisions in the light of responses given by others. They were presented with the actual pretest risk preferences of other subjects who were being run in neighboring experimental rooms at the same time. Each subject remained alone in his room and was individually instructed as follows:

> The questionnaire you now have in front of you is the same one you just finished taking. We had you take it the first time so that you would become familiar with all of the situations it contains.
>
> Many people are interested in finding out how others respond to these same questions. We thought you would be interested in seeing how the other people present have responded. On the attached sheet you will find an account of how other people present have actually answered. After looking at this information we would like you to go through and reconsider each of the problem situations. The way others answered may have brought new issues to mind. Please restudy each item and indicate on the questionnaire whatever your decision is at the present time. Do not feel bound by what you marked on the practice booklet the first time. Whether you change or not is unimportant--we are only interested in seeing what your personal decision is now. You can take as much time as you need.

No-information (B_4). This represents the control condition for the non-interacting sessions. After taking the pretest, subjects were asked to work on the doodlebug problems by themselves. Following this they were given the same instructions for completing the posttest as in the interacting condition.

RESULTS

A pretest and posttest risk-taking score was computed for each subject. This score represents the arithmetic sum of the subject's risk preferences over the six items. The risk preference is scored as a whole number. For example, if a subject chose 3 in 10, 5 in 10, 7 in 10, 5 in 10, 9 in 10, and 1 in 10 as his six risk preferences his score would be 30. The possible range of scores extends from six (maximum risk) to 60 (maximum caution). Table 2 contains mean pre- and posttest scores for the fifteen subjects in each experimental condition.

Initial homogeneity of variance for the various samples can be assumed. An F maximum test (Winer, 1962) performed upon the initial samples yielded an F ratio of 3.44 (df = 19; k = 8) which is not significant at the .05 level.

An analysis of variance for repeated measures was performed on the individual risk scores. The results are presented in Table 3. The only significant main effect was due to the pre-post factor. Averaged across all treatment conditions there was a significant shift to risk from pretest to posttest. However, the presence of statistical interaction effects indicates that this shift was not independent of either the information or social interaction factor.

Hypothesis 1 stated that there would be a greater shift to risk under group than under alone conditions. The main effect for the interaction factor did not reach an acceptable level of statistical significance. However, the main effect for social interaction disregards pre and posttest differences. The important statistic for testing this hypothesis is the

TABLE 2*

Mean Risk Score for Each Treatment Condition

Condition		Full Information B_1	Pro and Con Information B_2	Risk-level Information B_3	No Information B_4
Group A_1	Pre C_1	30.67	35.33	27.93	27.00
	Post C_2	24.80	30.20	26.20	26.13
Alone A_2	Pre C_1	30.60	33.13	37.60	28.13
	Post C_2	28.33	31.06	37.60	27.82

*Each entry represents the mean risk-taking score (based on the sum of the risk preferences over all six items) for the 15 subjects serving in that condition. Lower scores signify greater risk taking.

TABLE 3

Overall Analysis of Variance of Individual Risk Scores

Source	df	MS	F
Between Subjects			
Interaction level (A)	1	627.27	3.80
Information level (B)	3	416.58	2.52
A x B	3	373.90	2.27
$Error_b$	112	165.04	
Within Subjects			
Pre-Post level (C)	1	317.40	28.04**
A x C	1	79.35	7.01*
B x C	3	50.70	4.48*
A x B x C	3	7.29	
$Error_w$	112	11.32	

*$p<.01$
**$p<.005$

F ratio for the A x C interaction. The significance of this ratio indicates that pre to post risk-taking shifts were dependent on level of social interaction. Figure 1 describes the nature of the statistical interaction. A test for simple main effects (Winer, 1962) was used to determine the sources of this interaction. This test is summarized in Table 4.

TABLE 4

Analysis of Variance of Pre-Post Measures for Social Interaction Levels

Source	df	MS	F
C for A_1	1	357.07	31.54**
C for A_2	1	39.67	3.50
$Error_w$	112	11.32	

**$p < .005$

The results of this test indicate that there was a significant shift toward risk under interacting but not under non-interacting conditions.

Hypothesis 2 stated that the shift to risk would be greatest under full information, next greatest for pro and con information and also risk-level information, and smallest for the no-information or control condition. The main effect for information was not significant but there was a statistical interaction effect between information level and pre-post level. The significance of the B x C interaction indicates that pre to post risk-taking shifts were dependent upon level of information given. Figure 2 represents this interaction graphically. Table 5 presents

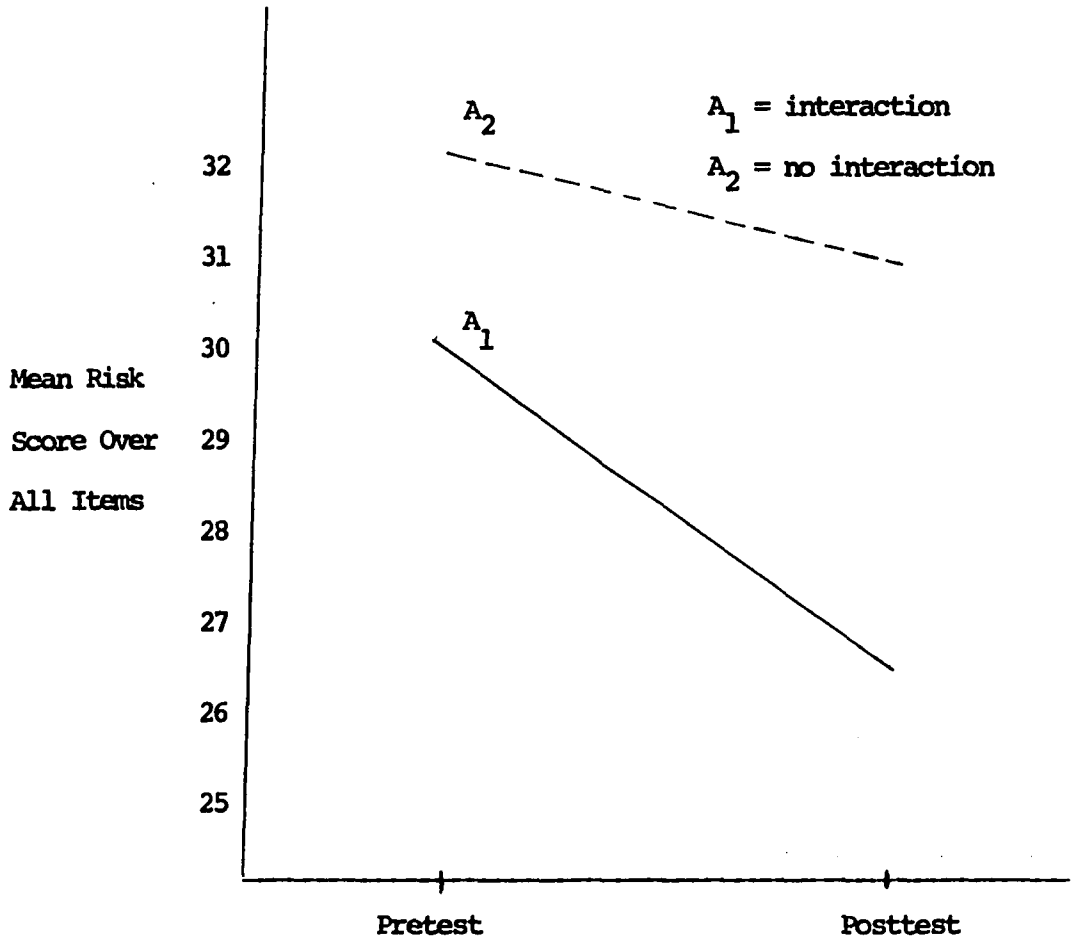

Figure 1

Risk Taking Shifts as a Function of Level of Social Interaction

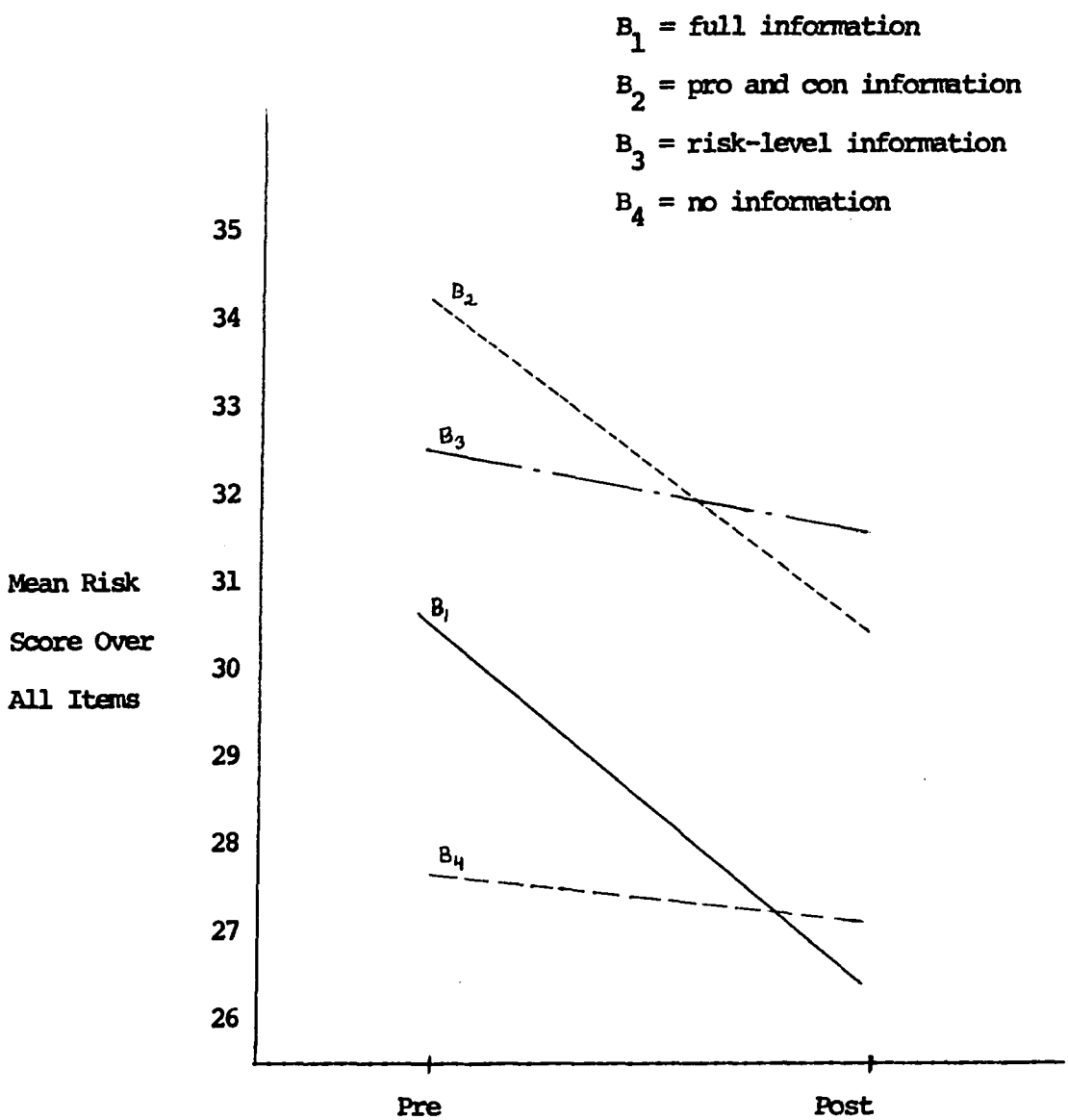

Figure 2

Risk Taking Shifts as a Function of Information Level

the results of a test for simple main effects performed upon the interaction.

TABLE 5

Analysis of Variance of Pre-Post Measures for Information Levels

Source	df	MS	F
C for B_1	1	248.1	21.92**
C for B_2	1	205.4	18.14**
C for B_3	1	11.2	< 1
C for B_4	1		< 1
$Error_W$	112	11.32	

**$p < .005$

The two significant F's indicate that there was a definite shift toward risk under full information and pro and con information but not under risk-level information and no information.

To determine if the magnitude of these shifts differed statistically from one another a special shift score was computed. Mean pre and post risk scores for each information level were obtained by averaging across the social interaction factor. Subtraction of the post score from the pre score yielded a mean shift score for each information level (See Table 6).

TABLE 6

Mean Shift Scores Under Each Information Condition

B_1	B_2	B_3	B_4
4.06	3.70	0.86	0.30

These shift scores were then compared by means of a Neuman Keuls post hoc test (Winer, 1962). The results of this test indicated that shifts under both full information (B_1) and pro and con information (B_2) were greater than those under risk-level information (B_3) and no information (B_4). The shifts under full information and pro and con information were not significantly different from one another. Also, there was no difference between risk-level shifts and no information shifts. All of these shifts are averaged across social interaction levels.

Hypothesis 3 stated that the presentation of risk-level information and full information would evoke comparable shifts under both group and alone conditions while shifts observed under other information levels would be different for non-interacting and interacting conditions. The F ratio for the A x B x C interaction was not significant and, thus, no support can be given to this hypothesis.

To gain further information about risk-taking shifts for specific experimental cells an analysis of simple, simple effects for the pre-post factor was performed (Winer, 1962). The results are presented in Table 7.

Highly significant shifts to risk resulted from both full-information and pro and con information conditions when these were combined with a group setting (C for A_1B_1; C for A_1B_2). Marginally

TABLE 7

Analysis of Variance of Pre-Post Scores for Individual Cells

Source	df	MS	F
C for A_1B_1	1	258.14	22.80**
C for A_1B_2	1	213.34	18.85**
C for A_1B_3	1	22.54	1.99
C for A_1B_4	1	5.64	<1
C for A_2B_1	1	38.54	3.40*
C for A_2B_2	1	32.03	2.82*
C for A_2B_3	1	0.00	<1
C for A_2B_4	1	0.53	<1
$Error_w$	112	11.32	

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

A_1 = interaction

A_2 = no interaction

C = pretest-posttest factor

B_1 = full information

B_2 = pro and con information

B_3 = risk-level information

B_4 = no information

significant risky shifts (p .10) were obtained when full-information and pro and con information were presented in an alone setting (C for A_2B_1; C for A_2B_2). The shifts in the other four experimental cells were small and did not approach an acceptable level of statistical significance.

To determine whether or not the magnitude of the four significant shifts differed from one another mean shift scores were computed and compared (Table 8).

TABLE 8

Mean Shift Scores for Full-Information and Pro and Con Information Under Both Group and Alone Conditions

A_1B_1	A_1B_2	A_2B_1	A_2B_2
5.77	5.33	2.27	2.07

The results of a Newman Keuls test indicate that the means in the group condition (A_1B_1 and A_1B_2) were significantly greater than the corresponding means in the alone condition (A_2B_1 and A_2B_2). Full-information produced a significantly greater shift in the group condition than in the alone condition. The pro and con shift was also significantly greater under group than under alone conditions. There was no significant difference between full information and pro and con information when compared under either interacting or no-interacting conditions. Thus, no greater shift was obtained under full information than under pro and con information regardless of level of social interaction.

In sum, both full information and pro and con information produced approximately equal shifts in risk taking. In the group condition these shifts were significantly larger than in the alone condition.

DISCUSSION

Only one of the three hypotheses was confirmed by the data. There was a significantly greater shift to risk under group than under alone conditions. While definite risky shifts were obtained in an alone condition for both full information and pro and con information this informational effect was greatly enhanced by the addition of group interaction. Thus, there is strong reason to believe that the full risky shift is not a psuedo group effect. The shift could have been considered a pseudo group effect if there had been little or no difference between group and alone conditions.

The second hypothesis was an extrapolation from Brown's value position. The prediction was that both risk-level and pro and con information would evoke small shifts of comparable magnitude and that only when both factors were jointly incorporated into the set of stimulus conditions would the full shift occur. This expectation was emphatically disconfirmed. Shifts obtained from pro and con information alone were of approximately the same magnitude as the full information shifts. In contrast, risk-level information was strikingly ineffectual. No shifts occurred in the alone condition and only small nonsignificant shifts under group conditions. The difference between the pro and con effect and the risk-level effect was highly significant. It appears on the basis of this data that a large portion of the variance can be accounted for by the contentual arguments provided in group discussion while the role of risk-level exchange is negligible.

The third hypothesis was a specific deduction from Brown's theory.

If the only information of relevance is the risk levels of others the presentation of this information should be equally effective in both group and alone conditions. Clearly, this was not the case. There was no shift in the alone condition and a small nonsignificant shift in the group condition. These results follow the general trend observed in the other experimental cells, namely that group interaction acted to increase the posttest risk level. In sum, the interaction and information factors combined in an additive rather than an interactive fashion.

Taken as a whole, the pattern of results are in striking disaccord with Brown's notion of the value process. Brown explicitly disclaims the role of the substantive content of the discussions and, instead, insists that it is "...the information about other people's answers that makes individuals move toward greater risk after group discussion (p. 702)." In this study information about other people's answers had little or no effect but the reasons behind the answers, the substantive arguments, had a great effect. Congruent with this finding are some of the results from a study by Zajonc, Wolosin, Wolosin and Loh (1970). When subjects responded alone or in the presence of others to a simple two-choice betting task the tendency over a series of 360 trials was a gradual shift in the conservative direction. As a consequence of hearing others respond first there was a slight retardation of this effect. The authors conclude that the sheer knowledge of others' answers does not produce a shift to either risk or conservatism, at least in a two-choice betting paradigm.

The results argue persuasively against both the leadership hypothesis and the responsibility-diffusion theory. Consider first the implications for the leadership hypothesis. In several of the experimental conditions in which a shift to risk occurred a high-risk leader, if

present, had little opportunity to influence his fellow discussants. For example, in the pro and con only conditions each group member is ignorant of how the others actually answered. A high-risk member may present more relevant arguments for the risky action but he is deprived of the means for pointing out the ideal risky position. He cannot, for example, lead a member who opted for 7 in 10 to the more risky position of 3 in 10. He knows neither the other member's position nor has he any viable means for communicating his own. The leadership dimension is even further removed in the related condition where subjects did not interact but read the pro and con transcripts of the previous discussions. Certainly there was no leader in the usual sense of the word. Yet, in both group and alone conditions there were definite shifts to risk. This, of course, merely indicates that the shift to risk can occur in the absence of explicit leadership. It does not indicate that a risky leader cannot produce a shift under more usual conditions. However, as noted earlier, other studies have failed to find a leadership effect.

The responsibility-diffusion theory holds that shared interactional experiences bring about the formation of affective bonds which in turn mediate a spread of responsibility. This, then, could hardly explain the occurrence of risky shifts in the two alone conditions where transcripts were read. Perhaps one could posit the occurrence of vicarious group experience as a response to the transcript and the subsequent formation of imaginary affective bonds resulting in a diffusion of responsibility and a subsequent shift to risk. This interpretation, while possible, is certainly non-parsimonious. At any rate the presence of a control condition (no information) in which subjects discussed irrelevant problems before taking the posttest appears to obviate this possibility. Any discussion,

if this theory is correct, should stimulate the formation of affective bonds necessary for the diffusion of responsibility. Yet, in this condition the amount of shift was negligible. Perhaps only certain types of discussions promote responsibility diffusion. If so, the theory obviously needs to be revised to take this into account.

The results have little bearing on the familiarization hypothesis as proposed by Bateson (1966). It could be posited, though, that a type of familiarization was involved in those conditions in which subjects read transcripts of prior group discussions. However, the additional arguments were produced by outside sources rather than by the subjects themselves. Also, contrary to what Bateson would predict, these arguments by themselves were not sufficient to produce the full shift to risk. Nevertheless, a reasonable interpretation might be that the recognition of the relevance of additional information leads to an increased willingness to support the risky action. Perhaps when this information is received in a group context the additional normative justification strengthens the effects of the arguments.

Relevant Argument Hypothesis

The relevant-argument position holds basically that the comprehension of relevant arguments is the immediate antecedent of the shift to risk and that these arguments will have a more powerful effect when produced and reacted to by an interacting group than when presented alone.

What is needed is a new theory that will provide a comprehensive interpretation of the shift to risk process. Such a theory may be constructed by combining some of the assumptions of the value hypothesis with a comprehension approach.

Assume first that any risk-taking item may engage either the value on risk or the value on caution. If the item is a risk-oriented one it will tend to arouse implicit arguments supporting a risky position. On the basis of these considerations the individual advocates a relatively risky stand. When confronted by the additional arguments of others, also elicited by the shared value on risk, the individual becomes willing to advocate an even riskier stand. Perhaps the greater the number of unfamiliar but relevant arguments he is exposed to the more he will shift his decision toward the risky end of the scale. At any rate, these arguments will be effective whether they arise through the give and take of group discussion or whether they are presented in an individual familiarization paradigm. However, should they arise through a face to face discussion they take on additional salience and the result is a much stronger shift to risk.

Support for this last statement can be found in a recent study by Willems (1969). When asked to estimate how others will respond to risk-oriented items subjects consistently guess that these others will respond more conservatively than themselves (Hinds, 1962; Wallach and Wing, 1968; Levinger and Schneider, 1969). Willems compared groups and individuals on this estimation index. He found that groups are even more likely than individuals to report that they are taking more risk than others. Willems suggests that group interaction increases the salience of the value specified. This increased salience may be due to norm-sending processes within the group. Whatever the case, the group recognition of the risky value may well act as an extra weighting mechanism for risk-supporting arguments.

In short, it is proposed that presence of additional information

is the most direct cause of the shift to risk. This assumes some sort of comprehension process. The stimulus for the production of these arguments in a group setting can be found in the value mechanism. This value becomes more salient when it is recognized by five people rather than just one and it is this increased salience that serves to give greater weight to the group-produced arguments. Thus, the shift to risk will be of a greater magnitude in a group than an individual context even though the specific information is the same for both.

A proposal which is similar in some respects has recently been made by Madaras and Bem (1968). They suggest that "...the crucial information transmitted in the group is not about the risk levels of others, according to this hypothesis, but about specific information regarding the situation being discussed (p. 359)." To test their conjecture they split a ten-item Choice Dilemma questionnaire into two five-item subtests. After completing the full ten-item pretest groups discussed one of the five-item subtests and following discussion made new choices on the full ten-item test. The authors reasoned that if the crucial information transmitted in discussion is, as Brown suggests, the risk levels of others then subjects would become aware of their relative risk positions in the group and would alter their subsequent decisions on both the discussed and undiscussed items. Since significant shifts occurred only for the items actually discussed the authors concluded that Brown's risk-level hypothesis cannot account for the results while their specific argument hypothesis can.

Unfortunately, the Madaras and Bem study is very weak. First, it is not at all clear that this prediction can be deduced from Brown's hypothesis. In fact, it would be reasonable to assume that a hypothetical

subject who begins with the assumption that he is relatively risky compared to others would hold to this view until specifically disconfirmed. Although he may receive contradictory information on the items actually discussed he may still assume that he is relatively risky on others. Secondly, this study is in no sense a test of the specific argument hypothesis. There was no direct manipulation of the amount or type of arguments involved. In fact, their conclusion is built on support by default. Since, in their opinion, the risk-level hypothesis was disconfirmed the specific-argument hypothesis must have been supported. However, disconfirming one hypothesis does not necessarily lend support to another. The results could equally well be construed as support for the leadership hypothesis or the comprehension hypothesis. In fact, either of these conclusions would seem more appropriate. There was no group interaction and thus no leader on the last five items nor were there any instructions given for further individual study. In sum, the experiment neither disconfirms Brown's hypothesis nor supports that of Madaras and Bem.

The Madaras and Bem report is the only one avowedly concerned with the relevant argument hypothesis. However, several other studies provide data that can be reinterpreted in terms of this mechanism.

The most immediately relevant study is Nordhøy's (1962) master's thesis. After listening to the tapes of Stoner's original discussion groups Nordhøy devised a content analysis scheme for categorizing the verbal content of the discussions. Individual statements were classified into those favoring risk and those favoring caution. The consistent finding was that more arguments favoring risk always preceded a shift to risk and more arguments favoring caution always preceded a shift to conservatism. Nordhøy felt that the arguments expressed tended to be a

reflection of values commonly accepted in the culture. This was actually the first statement of a value hypothesis which was later extended and refined by Brown (1965). For our purposes the important point is that Nordhøy adduces evidence that relevant arguments play a role in the shift to risk. The position to be defended here is that these arguments are a direct cause of the shift to risk.

Consider also the Kogan and Wallach (1967c) study in which individual subjects listened to tape recordings of groups discussing the Choice Dilemma items. The major finding was that subjects in the listening conditions showed a shift to risk which, although statistically significant, was consistently smaller than that for the discussion groups. The experimenters interpreted these results as providing negative evidence with respect to the value and comprehension formulations but supporting evidence for their own responsibility-diffusion theory. However, the results also fit in neatly with the relevant-argument hypothesis. In the listening condition subjects became aware of additional arguments relevant to each problem item. Thus, the weight of these additional considerations prompted them to opt for greater risk in the posttest. However, since these arguments did not arise through face-to-face interaction that directly involved the subject they were deprived of participation in the development of a group norm favoring risk. In the original discussion, however, group members were exposed to the identical arguments that the listeners heard yet the resulting shift was of a significantly greater magnitude. This finding is compatible with our two-process relevant-argument hypothesis. In the original interacting condition the same arguments had a stronger effect due to the additional normative salience.

Several studies (Teger and Pruitt, 1967; Clark and Willems, 1969) have shown that a small but significant shift results when group members exchange risk-level information but do not enter into a substantive discussion. The current investigation found a small, but nonsignificant shift for this condition. Such a finding, in addition to offering support for Brown's risk-level hypothesis, would seem to militate against the relevant-argument hypothesis. Consider, however, the instructions typically given in this condition. To justify his manipulation in the eyes of the subject the experimenter usually indicates that the purpose of this procedure is to see if the diversity of views expressed will call to mind additional considerations that the subject has not previously thought of. Part of Teger and Pruitt's final instructions for this condition read "...possibly by comparing notes with each other and reconsidering each problem...you will have a better idea of the kind of decision that you would like to make." In addition, subjects are told, "consider what you are doing as a form of discussion" and "you might want to change your decision after comparing it with others and thinking about it longer." It is quite possible that the subjects construed the emphasis on "comparing notes," "reconsidering each problem," and "thinking about it longer" as encouraging them to think of additional pros and cons relevant to the problem situation. This would render the condition similar to a familiarization paradigm. However, if we assume that the subject originally thought of relatively risk-provoking arguments and now finds that certain others are even riskier he may well try to think of other pro-risk arguments that could support this position. In addition, his involvement in the interactional process may serve to initiate normative weighting for the arguments he has already thought of. Such a procedure could conceivably

lead to a posttest shift to risk. The shift would be small, however, because of the severe constraint on the information-exchange process.

Strong support for the risk-level hypothesis appears to be given in the recent study by Vidmar (1968). Included in his results is an internal analysis of the degree of shift exhibited by each group member on each item. In general, the amount of shift for each of the other group members was inversely proportional to his rank ordering in the group. Thus the individual who held the lowest rank, i.e. the most conservative member, shifted the most, the second most conservative member shifted slightly less, and so on until we reach the high-risk individual who did not shift at all. This is directly in line with Brown's proposal that if an individual values risk, the farther behind the others he finds himself the more catching up he has to do. However, the relevant-argument position holds that an individual's initial responses depend on the pros and cons he is able to think up for himself. If he can think up few arguments in favor of the risky action he is likely to take a moderate or conservative position. When he then enters into group discussion he is likely to discover many additional pro-risk arguments. In fact, the greater the number of new arguments he hears the more he should shift. The high-risk individual has already thought up many pro-risk arguments and thus is likely to hear few if any novel arguments. Consequently his shift is small or nonexistent. It is also plausible to assume that a moderate-risk individual has taken his position on the basis of a smaller number of pro-risk arguments. When he hears additional arguments he is justified in shifting toward greater risk. Of course, matters are probably not this simple. In addition to the absolute number of arguments their relative importance and perceived relevance should also have an

effect. Obviously this interpretation is ad hoc and would have to be tested on the basis of new data. What is important though is that Vidmar's results do not provide unambiguous support for the risk-level hypothesis.

Vidmar's results are paralleled to some extent by the findings of Wallach and Mabli (1970). Three-person discussion groups were formed with either a conservative majority or a risky majority. In both conditions the initially conservative members showed strong, approximately equal shifts to risk while the risky members evinced small, nonsignificant shifts to conservatism. Pursuing his new-found devotion to value theory, Wallach interprets these results as especially dramatic evidence in favor of the exchange-of-risk-levels hypothesis. Again, however, a lively possibility is that the conservatives shifted because they were exposed to new arguments in favor of the risky solution. Assuming an initial value on risk they were now provided with additional justification for moving toward a more desirable risk level. Risk takers, on the other hand, probably were not exposed to additional risky arguments and, in fact, may have been confronted with some of the cautious concerns of the conservative members. This may have accounted for the small, insignificant trend toward conservatism.

To recapitulate, the model presented here consists of four basic propositions. First, each problem situation will elicit the value on risk, the value on conservatism, or no value at all (in which case there will be no consistent shifts in risk taking). This is in line with Brown's initial value formulation and the evidence to date (e.g. Stoner, 1968) seems to indicate that this is a viable assumption. Second, when deciding upon an initial response each individual will take into

consideration some of the pros and cons attached to the risky action. The amount of risk he takes will depend, in part, on the number of risky arguments he is able to produce and the importance he attaches to each. Third, individual shifts to risk will occur as a function of the respondent being presented with additional relevant arguments or other information that increases the importance of arguments he has already produced. Fourth, the magnitude of these shifts will be greatly increased when this additional information grows out of an interactional context of which the individual is a part. It was suggested that the mechanism responsible for this last step may be the increased salience given to risky arguments as a function of group recognition of the value. When caution-oriented items are involved the model should work in analogous fashion to produce conservative shifts.

Implications for Future Research

Since the model is presented a posteriori rather than a priori it is clearly in need of an independent test. Future research could proceed along several lines. Perhaps the most fruitful first step would be a replication of the present design using both risk-oriented and caution-oriented items. The model predicts small shifts to conservatism when additional conservative arguments are presented in an individual familiarization paradigm and significantly larger shifts to conservatism when the same arguments arise through group discussion. These shifts should occur regardless of whether or not the announcement of initial risk levels accompanies the relevant arguments. Any theory which proposes to account for the shift to risk must also account for those instances in which there is a shift to conservatism. The explanation gains

generality if both types of shift can be accounted for by invoking the same theoretical processes.

As previously mentioned the first proposition has already received considerable empirical support. On those items which shift to risk people see others as taking less risk than they themselves (Hinds, 1962; Stoner, 1968; Wallach and Wing, 1968; Levinger and Schneider, 1969). In addition, they also see the ideal level of risk as being slightly riskier than their original answers (Levinger and Schneider, 1969). Stoner (1968) has shown that on risk-shifting items subjects consistently rank value statements associated with the risky alternative as more important than value statements associated with the conservative alternative. Also, risk-acceptors are viewed more favorably than risk-rejectors (Madaras and Bem, 1968). Thus, it seems reasonable to postulate that risky items evoke some sort of widely shared value on risk. However, it remains to extend these value-specification indices to group betting situations of the type used by Pruitt and Teger (1969) and the problem-solving formats of Wallach, Kogan and Bem (1965).

The evidence is not as clear with respect to cautious items. Levinger and Schneider found that on the two Choice Dilemma items that had previously shown shifts to conservatism there was a tendency for others to be seen as holding riskier positions. However, ideal choices were also seen as somewhat more risky than subjects' own positions. Stoner (1968) tested six caution-oriented items, two made up by Nordhøy (1962) and four which he constructed in an attempt to elicit cautious values. On five of these subjects saw others as being more risky. On all six there was a tendency to rank the value statement associated with the conservative alternative as more important than the value

statement associated with the risky alternative. Unfortunately, only two of the six items showed significant shifts to conservatism while for one there was actually a significant shift to risk (this was the item on which subjects saw others as being more conservative). Evidently shifts to conservatism are much harder to produce than shifts to risk. Future research should concentrate more heavily on the conditions under which shifts to conservatism will or will not occur. Brown (1965) suggests that items will go conservative when the vital interests of others are at stake. Rabow et. al. (1966) feel that conservative shifts will be obtained when the risky action conflicts with societal norms. However, several of Stoner's four items which failed to show a conservative shift did involve the vital welfare of others (items #1 and #6 of the Stoner list) and one of his two successful conservative shifts was found for an item which neither involved the vital interests of others nor seemed to be in conflict with any widely accepted norms (item #2). A new approach seems warranted. This might involve scaling the perceived reinforcement value of the gain versus the perceived magnitude of the stake. Perhaps when the stake outweights the gain there will be a tendency to shift to conservatism. It would appear that the most important contribution that could be made to the risk-shift literature would be the development of a general prescription that would specify in advance how a risk-shifting or conservative-shifting item should be constructed. Besides contributing to our understanding of the shift phenomenon the existence of such a prescription would, as Brown points out, "...be a general statement about American culture (p. 705)."

The second proposition has not yet been tested. There is evidence to show that people initially answer risk-shifting items in a relatively

risky fashion and conservative-shifting items in a relatively cautious fashion (Pruitt and Teger, 1967; Stoner, 1968). However, this does not necessarily indicate that they do so on the basis of implicit risky or conservative arguments or, further, that the number or perceived importance of such arguments bears any relation to the extremity of the response. It is probably impossible to ascertain with any certainty what goes on in a person's mind when he is making a decision. You could ask him afterwards to indicate the pros and cons he considered but there is always the possibility that his post-decision responses represent justifications rather than true antecedents. Inquiring before the decision is made probably constitutes an invasion and disruption of the natural ongoing process. Despite these factors, however, we would expect that the number and perceived importance of the relevant arguments reported by the subject should bear some relation to the degree of risk actually taken. One could proceed by asking the subject to list the pros and cons attached to the risky action and to indicate by means of a rating scale how important each is for the making of the decision. The relevant-argument theory holds that on risk-oriented items the pros will outnumber the cons and further that the average degree of import attached to the pro statements will outweigh the import of the con statements. In addition, across subjects there should be a positive correlation between number of pros adduced and initial risk. Perceived import of the risky arguments should also correlate positively with initial risk. Negative correlations should be found between number and importance of conservative arguments and initial risk. Such evidence, if found, would constitute support for our second proposition and might be useful as an additional index for distinguishing between risk-shifting and conservative-shifting

items.

The third proposition is the most crucial since it presents a major alternative to the exchange-of-risk-levels hypothesis. The contention that the presentation of additional relevant arguments is an immediate cause of the shift to risk can easily be tested. The most direct approach is to simply present additional risky or conservative arguments in an individual familiarization paradigm. Posttest responses should show a net shift to risk on risk-oriented items and to conservatism on caution-oriented items. But what would be the effect of presenting additional conservative arguments for a risk-oriented item? According to the relevant-argument approach there would be a tendency to shift in the conservative direction. However, since the value specifies risk the net shift should be small; smaller than the risky shift when risky arguments are presented. Conservative arguments should not be weighed as heavily as risky arguments. In fact, this contention can easily be tested by presenting both types of arguments and asking the subject to rate the perceived importance of each.

As a corollary to this third proposition we could posit that the magnitude of the shift will be a positive function of the number of unfamiliar arguments provided. A direct measure of this can be obtained if we ask the subject to specify pros and cons before the initial response and eliminate from the familiarization material the arguments that he has already thought of. A similar relationship should hold when we take into consideration the perceived importance of the new arguments; the greater the summated ratings for perceived importance the greater the degree of shift.

The last proposition, that these arguments should have greater effect when presented in an interactional context, is not as easy to test. The presentation of individual arguments is rather readily controlled

by the experimenter but the manipulation of discussion is an entirely different matter. A restricted communication paradigm where the subject communicates to others by written message provides a possible approach. The experimenter could directly control the group discussion content through the introduction of bogus messages. However, such a set up would represent little more than an individual familiarization paradigm. The only added component is the impression of interaction with others and the effect of the impression may not add up to the effect of the real thing. A second possible approach is analogous to the one used here. Allow a normal group discussion and abstract the relevant arguments from a transcript of the proceedings. The presentation of the same arguments in a non-interactional setting should produce a shift, but one considerably smaller than in the actual discussion. Perhaps the best approach would be the employment of confederates in the group discussion. The confederates are provided with a standard list of relevant arguments and are instructed to insert these arguments at appropriate times in the course of the discussion. By employing say four confederates and one naive subject the experimenter should retain fairly good control over the verbal content from one group discussion to the next. The prediction, of course, is that the same arguments will have a significantly greater effect when deliberately presented in a group-context than when presented alone.

In sum, the relevant-argument hypothesis has not yet been subjected to a critical test on the basis of independent data. However, the importance of collecting such data now seems clear.

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APPENDIX

Risk-taking Questionnaire

Instructions

On the following pages, you will find a series of situations that are likely to occur in everyday life. The central person in each situation is faced with a choice between two alternative courses of action, which we might call X and Y. Alternative X is more desirable and attractive than alternative Y, but the probability of attaining or achieving X is less than that of attaining or achieving Y.

For each situation on the following pages, you will be asked to indicate the minimum odds of success you would demand before recommending that the more attractive or desirable alternative X be chosen.

Read each situation carefully before giving your judgment. Try to place yourself in the position of the central person in each of the situations. There are six situations in all. Please do not omit any of them.

1. Mr. A, an electrical engineer, who is married and has one child, has been working for a large electronics corporation since graduating from college five years ago. He is assured of a lifetime job with a modest, though adequate, salary, and liberal pension benefits upon retirement. On the other hand, it is very unlikely that his salary will increase much before he retires. While attending a convention, Mr. A is offered a job with a small, newly founded company which has a highly uncertain future. The new job would pay more to start and would offer the possibility of a share in the ownership if the company survived the competition of the larger firms.

Imagine that you are advising Mr. A. Listed below are several probabilities or odds of the new company's proving financially sound.

Please check the lowest probability that you would consider acceptable to make it worthwhile for Mr. A to take the new job.

_____ The chances should be at least 1 in 10 that the company will prove financially sound.

_____ The chances should be at least 3 in 10 that the company will prove financially sound.

_____ The chances should be at least 5 in 10 that the company will prove financially sound.

_____ The chances should be at least 7 in 10 that the company will prove financially sound.

_____ The chances should be at least 9 in 10 that the company will prove financially sound.

_____ Place a check here if you think Mr. A should not take the new job unless it is certain that the company would survive.

2. Mr. B, a competent chess player is participating in a national chess tournament. In an early match he draws the top-favored player in the tournament as his opponent. Mr. B has been given a relatively low ranking in view of his performance in previous tournaments. During the course of his play with the top-favored man, Mr. B notes the possibility of a deceptive though risky maneuver which might bring him a quick victory. At the same time, if the attempted maneuver should fail, Mr. B would be left in an exposed position and defeat would almost certainly follow.

Imagine that you are advising Mr. B. Listed below are several probabilities or odds that Mr. B's deceptive play would succeed.

Please check the lowest probability that you would consider acceptable for the risky play in question to be attempted.

_____ Place a check here if you think Mr. B should not attempt the risky play unless its success could be assured.
_____ The chances should be at least 9 in 10 that the risky play would succeed.
_____ The chances should be at least 7 in 10 that the risky play would succeed.
_____ The chances should be at least 5 in 10 that the risky play would succeed.
_____ The chances should be at least 3 in 10 that the risky play would succeed.
_____ The chances should be at least 1 in 10 that the risky play would succeed.

3. Mr. C, a married 30-year-old research physicist, has been given a five year appointment by a major university laboratory. As he contemplates the next five years, he realizes that he might work on a difficult, long-term problem which, if a solution could be found, would resolve basic scientific issues in the field and bring high scientific honors. If no solution were found, however, Mr. C. would have little to show for his five years in the laboratory, and this would make it hard for him to get a good job afterwards. On the other hand, he could, as most of his professional associates are doing, work on a series of short-term problems where solutions would be easier to find, but where the problems are of lesser scientific importance.

Imagine that you are advising Mr. C. Listed below are several probabilities or odds that a solution would be found to the difficult long-term problem that Mr. C has in mind.

Please check the lowest probability that you would consider acceptable to make it worthwhile for Mr. C to work on the more difficult long-term problem.

_____ Place a check here if you think Mr. C should not choose the long-term difficult problem unless he is certain to find a solution.
_____ The chances should be at least 9 in 10 that Mr. C would solve the problem.
_____ The chances should be at least 7 in 10 that Mr. C would solve the problem.
_____ The chances should be at least 5 in 10 that Mr. C would solve the problem.

_____ The chances should be at least 3 in 10 that Mr. C would solve the problem.
_____ The chances should be at least 1 in 10 that Mr. C would solve the problem.

4. Mr. D, a college senior, has studied the piano since childhood. He has won amateur prizes and given small recitals, suggesting that Mr. D has considerable musical talent. As graduation approaches, Mr. D has the choice of going to medical school to become a physician, a profession which would bring certain prestige and financial rewards; or entering a conservatory of music for advanced training with a well-known pianist. Mr. D realizes that even upon completion of his piano studies, which would take many more years and a lot of money, success as a concert pianist would not be assured.

Imagine that you are advising Mr. D. Listed below are several probabilities or odds that Mr. D would succeed as a concert pianist.
Please check the lowest probability that you would consider acceptable for Mr. D to continue with his musical training.

_____ The chances should be at least 1 in 10 that Mr. D would succeed as a concert pianist.
_____ The chances should be at least 3 in 10 that Mr. D would succeed as a concert pianist.
_____ The chances should be at least 5 in 10 that Mr. D would succeed as a concert pianist.
_____ The chances should be at least 7 in 10 that Mr. D would succeed as a concert pianist.
_____ The chances should be at least 9 in 10 that Mr. D would succeed as a concert pianist.
_____ Place a check here if you think Mr. D should not pursue his musical training unless he was certain to succeed as a concert pianist.

5. Mr. F is currently a college senior who is very eager to pursue graduate study in chemistry leading to the Doctor of Philosophy degree. He has been accepted by both University X and University Y. University X has a world-wide reputation for excellence in chemistry. While a degree from University X would signify outstanding training in this field, the standards are so very rigorous that only a fraction of the degree candidates actually receive the degree. University Y, on the other hand, has much less of a reputation in chemistry, but almost everyone admitted is awarded the Doctor of Philosophy degree, though the degree has much less prestige than the corresponding degree from University X.

Imagine that you are advising Mr. F. Listed below are several probabilities or odds that Mr. F. would be awarded a degree at University X, the one with the greater prestige.
Please check the lowest probability that you would consider acceptable to make it worthwhile for Mr. F to enroll in University X rather than University Y.

_____ Place a check here if you think Mr. F should not enroll in University X unless he is certain to be awarded the degree.
_____ The chances should be at least 9 in 10 that Mr. F would receive a degree from University X.

_____ The chances should be at least 7 in 10 that Mr. F would receive a degree from University X.
_____ The chances should be at least 5 in 10 that Mr. F would receive a degree from University X.
_____ The chances should be at least 3 in 10 that Mr. F would receive a degree from University X.
_____ The chances should be at least 1 in 10 that Mr. F would receive a degree from University X.

6. Mr. H is the captain of College X's football team. College X is playing its traditional rival, College Y, in the final game of the season. The game is in its final seconds, and Mr. H's team, College X, is behind in the score. College X has time to run one more play. Mr. H, the captain, must decide whether it would be best to settle for a tie score with a play which would be almost certain to work or, on the other hand, should try a more complicated and risky play which could bring victory if it succeeded but defeat if not.

Imagine that you are advising Mr. H. Listed below are several probabilities or odds that the risky play would prove successful.

Please check the lowest probability that you would consider acceptable for the risky play to be attempted.

_____ The chances should be at least 1 in 10 that the risky play will work.
_____ The chances should be at least 3 in 10 that the risky play will work.
_____ The chances should be at least 5 in 10 that the risky play will work.
_____ The chances should be at least 7 in 10 that the risky play will work.
_____ The chances should be at least 9 in 10 that the risky play will work.
_____ Place a check here if you feel that the risky play should not be attempted unless Mr. H was certain that it would work.