

**RESEARCH
BULLETIN**

GROUP DECISION-MAKING UNDER RISK
OF AVERSIVE CONSEQUENCES

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This paper has been accepted for publication by the Journal of Abnormal and Social Psychology. Any citations should be made to the Journal rather than to the Bulletin.

Educational Testing Service
Princeton, New Jersey
December 1963

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Abstract

With the emphasis placed upon possible aversive consequences of risk taking (actual physical pain coupled with monetary loss), group consensus achieved through discussion was displaced in the risky direction relative to the average of the group members' prior individual decisions. Subsequent private decisions also exhibited this shift toward greater risk taking. These results were explained in terms of a process of responsibility diffusion. This interpretation was further reinforced by the findings observed for other experimental conditions, which effectively ruled out the alternative possibilities that greater risk taking ensued from its social desirability in a male sample or derived from affiliative propensities in a context where group members expect to experience aversive consequences in the company of like-minded others.

GROUP DECISION-MAKING UNDER RISK OF AVERSIVE CONSEQUENCES¹

In two previous studies of individual and group decision-making, Wallach, Kogan, and Bem (1962; 1964) found that group decisions reached through discussion and consensus tended to be more risky than decisions made by the group members as individuals. In our first investigation, the decisions involved a number of hypothetical life situations in which a protagonist was faced with the choice between a more risky and a less risky course of action. The second experiment inquired whether these risk taking tendencies in groups would be found in a decision situation in which the group members were actually exposed to the consequences of their decisions. Using risks and payoffs based on monetary gain and loss for problem-solving performance, we observed that groups were considerably more likely than individuals to select the more difficult, higher payoff (for correct solution) problems, even though problem-solving itself was carried out by a single group member. In both of the above experiments, the "risky shift" phenomenon was interpreted as the outcome of a process of responsibility diffusion.

The present experiment seeks to extend the generality of our previous findings to a type of group decision-making in which negative consequences are emphasized. In order to accomplish this end, we selected physical pain and discomfort, coupled with monetary loss, as the potential negative outcomes of risk taking. A second purpose of the present investigation was to examine in more detail whether processes other than a diffusion of responsibility might account for, or contribute to, a risk taking shift in group decision-making. We consider two possible alternative processes in turn below.

First, there is the possibility that risk taking, by connoting boldness, may be more socially desirable than conservatism. Such an association might be quite strong in the present experiment where physical pain and discomfort are being risked, since conservatism under such circumstances could imply cowardice. Further, the association may be especially likely to appear in a group setting where one's "image" is on public display. Accordingly, an experimental condition involving anticipated disclosure of one's decisions to others has been incorporated in the study design.

Second, an expectation that the consequences of one's decisions will not be experienced alone, but in the company of group members who are undergoing the same experience, may enhance the level of risk selected. This possibility might well be derived from Schachter's (1959) observations concerning subjects' strong preference for awaiting impending painful stimulation in the company of others in the same predicament. In the present case, subjects may be inclined toward greater risk taking if they know that others will be present to serve as a potential source of comfort during the course of any negative consequences ensuing from their risk taking behavior. Accordingly, we have included an experimental condition in which subjects were informed that like-minded peers would be present during any experimental session involving possible aversive stimulation.

The two conditions outlined above might or might not be sufficient, when considered separately, to elicit the "risky shift" effect. Suppose, however, that the processes at work in the preceding two conditions were allowed to operate simultaneously. Would such a state of affairs yield a shift in the direction of greater risk taking? To explore this third possibility, we added an experimental condition in which subjects would

make their decisions on the basis of an anticipated discussion to consensus. The possible social desirability of high risk taking would be expected to emerge even more dramatically under these circumstances, for beyond having one's decisions disclosed to others, one anticipates defending the selected risk level in the discussion to follow. In addition, the presence of others while consequences of the decisions are being experienced is also anticipated in this condition. Thus, only the discussion to consensus itself is omitted in the present case.

If we can show that the conditions stated above are unable or insufficient to account for the observed shift of group decisions in the risky direction, then we will possess a strong basis for proposing that the group discussion to consensus is an active causal factor. Such a finding would, of course, reinforce the "diffusion of responsibility" interpretation discussed earlier. On the other hand, if the conditions described produce a risky shift as large as that obtained under group discussion to consensus, then we shall know that diffusion of responsibility cannot be the sole explanatory principle.

Method

Subjects and General Procedure

One hundred twenty six male subjects, students at the summer session of the University of Colorado, were recruited to serve in an experiment disguised as a study of various "physiological effects on problem-solving." The mean age of the subjects was 22.6 years, and they were randomly assigned to five treatment conditions. The written description of the experiment used for recruiting subjects was designed to minimize self-selection; in particular,

neither the risk taking nature nor the possible aversive features of the experiment were mentioned. Potential subjects were told that there would be two sessions, a preliminary session of 1/2 hour during which they would fill out non-personal information forms, and a one-hour experimental session to be arranged at their convenience sometime later. Payment of \$2.00 was offered for the preliminary session in addition to payment (of unspecified amount) for the experiment itself. The "preliminary session," in actual fact, constituted the complete experiment. Subjects were paid \$2.50 after all participants had completed the experiment, at which time the deception was fully explained.

The experimental procedures were administered to groups of three previously unacquainted subjects at a time by a male experimenter. The subjects were seated along one side of a long table in a small experimental room which contained assorted pieces of mechanical and electrical apparatus. Movable wooden partitions separated the subjects' work spaces at the table. As soon as subjects were seated, they were given a paper-and-pencil questionnaire with the request that they read the initial instructions and the first item and then wait for further instructions. The six-item questionnaire was entitled, "Preliminary Session for Psychophysiological Experiment," and its instructions read as follows:

"With the recent interest in manned space exploration, scientists have become increasingly concerned with the effects of various physiological stimulations on the ability to perform various tasks. For example, it is well known that background noise interferes with the ability to solve simple arithmetic problems. In our research we are interested in having people

undergo various physiological stimulations for a period of fifteen minutes before engaging in a forty-five minute session of solving simple verbal and mathematical problems. An experimental session, then, lasts a total period of one hour.

"Each of the following sheets describes one of the six experiments we are conducting. Through a random drawing procedure, you may be selected to participate in one of these; no person will serve in more than one. If you are so selected, the information you provide on these sheets will then be consulted for selecting the exact procedure to be employed. Within the next few weeks, you will be informed by mail whether or not you have been selected to participate in one of these experiments. Whether you are selected or not, you will be paid \$2.00 for the present preliminary session at that time.

"We are employing this rather unusual preliminary session and selection procedure in order to partially overcome a difficulty which has impeded the research. This is the occurrence of unwanted disruptive side effects which sometimes result from the physiological stimulations under investigation. When such side effects do occur, it is impossible for the individual to provide meaningful results on the problem-solving and his participation in the experiment must then necessarily be terminated. Although we do know that all of the side effects subside within an hour and never leave any permanent effect, it is still not possible to prevent such side effects nor to predict in advance who is likely to suffer them. For these reasons, then, we are offering more money to those willing to undergo stimulation which is more likely to produce a side effect, with the understanding that those suffering the side effect cannot be used in the problem-solving and, hence, will be excused from the experiment and paid a flat fee of \$1.00 for their time and

inconvenience. That is, the greater compensation is paid only to those who complete the experiment after undergoing stimulation which was more likely to have produced the side effect, but did not do so.

"The forms of stimulation, side effects, and schedule of payments are described on the following sheets. For each experiment you are asked to indicate your preference on the stimulation to be employed; you are also given the option in each experiment of not undergoing the stimulation at all, but participating only in the problem-solving portion of the experiment."

The first "experiment" was entitled, "Olfactory Stimulation," and follows in its entirety:

"In the olfactory experiment, we are interested in assessing the effects on subsequent problem-solving of a 15-minute exposure to an odor. Some of the odors we are testing are known to produce side effects of nausea and intense sinus pain in a portion of the population. The side effects subside within an hour and leave no permanent effect. The table below indicates the approximate percentage of the population likely to suffer these side effects. You will note that the payment is larger if you are willing to choose an odor for which the likelihood of the side effects is greater. That is, greater compensation is offered to those who complete the experiment after experiencing a stimulation which had a greater likelihood of producing the side effects. If you happen to suffer the side effects, you will be excused from the experiment and paid a flat fee of \$1.00 for your time and inconvenience.

"Please select one of the odors by circling its identification code letter. If you are selected for an olfactory experiment, this will be the odor which you will experience. If you prefer not to expose yourself to any

odor but only to participate in the problem-solving part of the experiment, circle 'none'."

| <u>Odor</u> | <u>Percentage of population experiencing side effects</u> | <u>Pay in addition to 75¢ for the hour of the experimental session</u> |
|-------------|---|--|
| None | -- | \$0.00 |
| a | 10% | \$2.80 |
| b | 20% | \$3.15 |
| c | 30% | \$3.60 |
| d | 40% | \$4.20 |
| e | 50% | \$5.00 |
| f | 60% | \$6.25 |
| g | 70% | \$8.35 |
| h | 80% | \$12.50 |
| i | 90% | \$25.00 |

The six experiments described in the questionnaire were identical in format to the one just presented, differing only in the stimulation employed and the possible side effects which might occur. The five other experiments were: (2) "Chromatic Stimulation," in which bright color patterns would be presented for fifteen minutes by means of special goggles containing prisms. Possible side effects were severe headache and intense burning sensation in the eyes. (3) "Movement Stimulation," in which a motor-driven apparatus used for flight simulation would provide bodily and vibratory movement. Possible side effects were dizziness and loss of muscular control in the limbs. (4) "Taste Stimulation," in which various tastes would be presented by means of flavored sticks held in the mouth. The possible side effect was an intense

burning sensation in the mouth. (5) "Auditory Stimulation," in which complex sound patterns would be presented through high-fidelity earphones. Possible side effects were intense, throbbing headache and ringing in the ears. (6) "Odorless Gases," in which non-toxic odorless gases would be presented for the fifteen minutes preceding the problem-solving. The possible side effect was stomach cramps.

After subjects had read the instructions and examined the first experiment, further verbal clarification of the procedures was given. The following points were covered: "(1) Subjects for the various experiments will be selected by a random procedure; in other words, responses on the questionnaire will not enter into the selection. Each individual will serve either in one or none of the experiments. (2) Responses on the questionnaire will be held confidential and the experimental sessions themselves will be private; you will undergo the stimulation and problem-solving alone. (3) We are equally interested in all of the stimulations; therefore, you should be guided only by your own preferences in making your decisions. (4) The side effects are all-or-none affairs; it is easy to tell when one is suffering from them, they appear almost immediately, and they cannot be hidden. (5) The scales of stimulations do not represent intensity scales; that is, the side effect from odor 'a', for example, would be just as severe as the side effect from odor 'i'. The only feature which varies as one goes down the scale is the probability that the given side effect will occur. Similarly, the stimulations themselves are not unpleasant--including the movement stimulation--nor do they differ very much from one another within a particular experiment. It is only the side effects which would be unpleasant. (6) The salary scale has been arranged to suit the percentages. Thus, for example, if you select the 90% level, you have a 10% chance of being paid--of not suffering the side effect;

if you select the 80% level, you then have a 20% chance of being paid. Since the chances have doubled, the salary has been halved. All of the salaries have been arranged in this way so that we can calculate our budget ahead of time."

These points were all emphasized so that they could not arise as new information in a group discussion and lead, thereby, to an artifactual shift in risk taking under the group discussion condition. As the last point made clear to the subjects, the probability of being paid multiplied by the size of the payoff is a constant. Therefore, since the side effects have negative utilities, the expected values of the various alternatives decrease as one becomes more risky. Hence, a "rational" decision-making strategy of maximizing expected values would lead to conservatism in the present situation.

This first administration of the questionnaire provided the individual baselines against which all subsequent shifts in risk taking were evaluated. After all subjects had completed the initial questionnaire, they either were told to return the following week or were given a second questionnaire (as noted below in the appropriate treatment conditions).

Test-Retest Control (N = 18 Subjects)

Subjects in this control condition were asked to return the following week in order to receive their salary and, possibly, to provide additional information. At that time they were told that selection of subjects had not yet been made and that a number of people had expressed a desire to change their responses either up or down after thinking about their participation. Since it is very important that nobody be asked to undergo stimulation which they do not really want, the experimenter explained further, they were being

encouraged to make any changes they desired before experimental subjects were actually selected. Thus, change was encouraged rather than discouraged. Separating partitions remained in place as in the first administration. This condition provides data on the test-retest reliability of the questionnaire as well as a practice or familiarity control for any shifts in risk levels observed in the other conditions.

Discussion to Consensus (N = 18 Groups)

Group Decisions. This condition was designed to answer the basic question: will discussion to consensus lead to increased risk taking in the present decision-making context? Subjects were told:

"This questionnaire I have just handed you is identical to the one you have just completed. It is to be used for a second phase of our research. In this second phase, we are interested in examining an even more important problem than individual problem-solving, that of the effects of various stimulations on the ability of a crew or group of men who must perform joint tasks, tasks which require them to coordinate their efforts. It is for this reason that three of you were asked to be here at the same time. If you are selected for an individual experiment, then the information you gave on your first questionnaire will still be consulted; but we are also selecting groups of three, at random, to participate in a group problem-solving session after undergoing the same stimulation. In these sessions, if one person suffers a side effect, he will be paid his dollar and dismissed and a stand-in will replace him; if two suffer the side effects, then two replacements will be used. In any case, if you do not suffer the side effect, you will be solving problems with two other individuals who have experienced the same physiological

stimulation. If you are selected for a group experiment, you will not also serve in an individual experiment.

"Since this group may be selected for one of the six experiments, we would like you to go through the questionnaire and decide among yourselves which stimulation you would like to experience in each case. That is, you should discuss each experiment and come to a unanimous decision regarding the stimulation to be employed; be sure the decision is unanimous and that a majority is not just bulldozing the third member into something." At this point, the partitions which had separated the subjects' working space on the table were removed. As in our previous experiments, the subjects were encouraged to take ample time for their deliberations.

Private Decisions. In order to assess the possible effects on individual risk taking levels of the discussion to consensus, the above subjects went over the questionnaire again following the group decisions and indicated their private opinions. They did this, the subjects were told, since ". . . it is important to us that nobody in this research be required to undergo an experience he has not chosen for himself, if possible If it is at all possible, then, we will put you in a group with two others who have selected the same level of stimulation rather than placing you in this group." Partitions were again placed between the subjects.

Anticipated Public Disclosure (N = 18 Subjects)

As one check on the possibility that the social desirability of increased risk taking might enhance the risk levels selected, this condition was identical to the Test-Retest Control except that the subjects were further told at the retest session that each person's decisions would be made public and discussed

after they filled out the questionnaire, since " . . . a number of people have expressed an interest in knowing what the other people have been deciding." In addition, the wooden partitions which had previously separated the work spaces were not present this time. Again, change was encouraged rather than discouraged. Note that subjects still anticipated that the experimental session itself would be private.

Anticipated Presence of Others (N = 18 Subjects)

This condition examined the effect on risk taking levels of expecting to undergo the consequences of one's decisions in the company of others who have selected the same levels of risk. Subjects received the second questionnaire immediately after the first one. The first paragraph of instructions was identical to the first paragraph for the condition of Discussion to Consensus--group decisions. The subjects then were requested to go through the questionnaire and " . . . mark the stimulation in each experiment you would prefer to undergo for this group problem-solving. If you are selected for an experiment on group problem-solving, then you will participate in the experiment with two other individuals who have selected the same stimulation."

Anticipated Discussion to Consensus (N = 18 Subjects)

This condition contained all the features of the Discussion-to-Consensus condition except for the discussion itself. Subjects were given the second questionnaire immediately following the first one. Again, the first paragraph of instructions was identical to the first paragraph for the condition of Discussion to Consensus--group decisions. The instructions then continued: "If this group is selected for an experiment, then it will be necessary for the three of you to reach an agreement as to which stimulation you will all

undergo. For this reason, we would like each of you to go through the questionnaire, marking the stimulation in each experiment which you would prefer to undergo in the group experience. When and if you are selected for an experiment, then your decisions on that experiment will be made available to the three of you so you can discuss them and make a unanimous selection on just which stimulation is to be employed. In other words, you should now mark the stimulation in each experiment which you would want to suggest to the group for the stimulation to be used."

Results

In the presentation of results, risk scores on the questionnaire represent the percentage level (probability of side effect) selected by a subject or group for the average of the six "experiments." Thus, scores can range from 0% (for the "none" alternative) to 90%, with higher scores reflecting greater risk taking. A shift score for an individual is computed by subtracting his score on the first administration of the questionnaire from his score on the second administration (\underline{N} = number of subjects). When group decisions are under consideration, a shift score represents the group questionnaire score minus the mean of the questionnaire scores obtained by the same three individuals in the first administration (\underline{N} = number of groups). When private decisions after group consensus are under study, a shift score represents the mean of the post-consensus private decisions by a group's members minus the mean of their scores on the first administration (\underline{N} = number of groups). All subjects thus serve as their own controls. Positive shift scores represent shifts in the risky direction. One-sample t tests of the difference scores (Walker & Lev, 1953, pp. 151-153) are used to evaluate the null hypothesis that the mean shift for a condition is zero.

The mean initial risk score for the 126 subjects was 65.5%, with a standard deviation of 16.8%. Table 1 displays the mean shift score obtained in each of the conditions, and its statistical test.

Insert Table 1 about here

With regard to the test-retest control (Table 1, row 1), permitting subjects to reconsider their decisions after a period of one week and under circumstances that encourage change, does not lead to any systematic shift in either direction. The r between the first and second administrations of the questionnaire is .79, thus indicating that the test-retest reliability of the instrument is quite satisfactory.

Concerning discussion to consensus, group decisions are significantly more risky than the mean of the decisions made by the group members as individuals (Table 1, row 2a). The groups selected levels of risk which averaged over one-half a scale step more risky than individual decisions. Sixteen of the eighteen groups in this condition display a shift in the risky direction, which argues for the consistency of the effect. Row 2b of Table 1 indicates, in turn, that the private decisions of these same subjects, obtained after completion of the group discussions, also shifted significantly in the risky direction. Thus, subjects did not revert to their original pre-discussion decisions, but rather showed a high degree of personal acceptance of the greater risk taking ensuing from discussion to consensus.

Regarding anticipated public disclosure, there is no evidence for either a risky or conservative shift due to knowing that one's decisions are to be disclosed to others rather than being held confidential (Table 1, row 3).

The results are quite comparable to those for the Test-Retest Control condition.

The data for anticipated presence of others (Table 1, row 4) indicate that individuals actually tend to be more conservative when they anticipate undergoing the consequences of the decisions in the company of others who have selected the same levels of risk. Although the magnitude of the shift is small, it is statistically significant, given the consistency of the effect. Note the very small standard deviation relative to that of the other conditions.

Finally, concerning anticipated discussion to consensus, decisions made under this expectation are considerably more conservative than decisions made by those same individuals under conditions of confidentiality (Table 1, row 5). The shift in the conservative direction under anticipated discussion to consensus is about as large as the shift in the risky direction which appears when the discussion is actually held.

Discussion

The present investigation has demonstrated in a context of aversive consequences that (a) unanimous group decisions concerning matters of risk show a shift toward greater risk taking when compared with individual decisions, and (b) post-discussion individual decisions that follow group consensus reflect the risky shift of the group rather than the original prediscussion decisions. Hence, the general conclusions drawn from our two previous experiments (Wallach, Kogan, & Bem, 1962; Wallach, Kogan, & Bem, 1964) can now be extended to include decision-making contexts emphasizing negative consequences.²

The proposal that a diffusion of responsibility is the process underlying such group-induced risky shifts received further support in the present experiment. Each of the alternative explanations that has been suggested in order to account for the group-induced risky shift phenomenon has been found inapplicable.

Consider first the proposal that higher risk taking has greater social desirability than conservatism. If this were the causal factor at work in the group discussion, one would also expect higher risk taking to appear when a person knows that his decisions, rather than remaining private, will be made available to others for inspection. Yet, in the Anticipated-Public-Disclosure condition, such enhanced risk taking failed to appear. Furthermore, a dramatic conservative shift appeared in the Anticipated-Discussion-to-Consensus condition where each subject not only knew that his decisions would be disclosed to others, but also knew that he would be expected to defend his decisions before the other members of the group.

Second, the proposal that increased risk taking might be caused simply by knowing that one would be experiencing the consequences of one's decisions in the company of others who had made similar decisions, also was clearly disconfirmed. Such a proposal followed from the consideration that a person might accept greater risk of aversive consequences if he knew that others would be present as a source of potential sympathy and comfort during the period when those aversive consequences might be experienced. We find, however, a significant conservative shift in the Anticipated-Presence-of-Others condition. Perhaps, male subjects faced with the uncertainty of how they will "take" the side-effects of physiological stimulation are concerned about the possibility of conveying an impression of weakness in the presence of peers. Such a process would enhance conservatism.

In a previous experiment (Wallach, Kogan, & Bem, 1964), a conservative shift was displayed by individual decision-makers when responsibility for others was introduced in the absence of group interaction. The conservative shift which appeared in the present experiment's condition of Anticipated-Discussion-to-Consensus seems to be an example of the same phenomenon, even though here the individual's decisions are not yet binding on the other members of the group. In the present condition, the individual is proposing a decision which he presumably intends to urge upon the group, a decision whose consequences, therefore, will be experienced by all. It seems likely that a feeling of responsibility for others would be generated under such circumstances. When no discussion to consensus has yet occurred but is only expected, the effect of these forces is to make the individual favor conservative decisions. When the discussion to consensus actually takes place, on the other hand, increased risk taking is the result. These findings offer direct support for explaining the group-induced risky shift phenomenon in terms of a diffusion of responsibility.³

In our previous paper (Wallach, Kogan, & Bem, 1964), we touched upon some of the implications of our work for committee decision-making concerning national and military policy. While recognizing that these latter concerns introduced risks and deterrents likely to be qualitatively different from those capable of study in a laboratory context, we nevertheless felt that our research might be of some relevance to the decision-making characterizing affairs of state. Indeed, the present experiment may be viewed as a closer approximation to the real-life cases cited above, for the reason that the risk of aversive consequences is here an important ingredient of the decision-making process. It is precisely such risks that underlie the deterrence policies of

the major powers. Of course, the decisions reached in this experiment affect only the group members participating in the study; the decisions have no impact on the larger populations from which the subjects are drawn. Despite this important qualification, it would be most surprising if the shifts toward risk taking observed here and in our previous experiments did not have some counterpart in the actions of governmental decision-making bodies. Such matters would clearly be worthy of careful study.

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Footnotes

1. The present research was supported by an Auxiliary Research Award from the Social Science Research Council and by a grant (G-17818) from the National Science Foundation. We are indebted to the University of Colorado Psychology Department for facilitating the research, to R. L. Lee for his invaluable aid, and to A. E. Myers and D. L. Rosenhan for critical comments.

2. The content of the discussions revealed that the present experiment was indeed successful in shifting the focus of the decision-making to the negative or aversive consequences of risk taking. In fact, the monetary payoffs were rarely mentioned in achieving consensus; rather, discussion centered around the relative aversiveness of the various side effects for the group members.

3. Wallach, Kogan, and Bem (1962) reported low but significant positive correlations between initial risk taking levels and perceived influence exerted in the group discussion. While this finding could well represent an outcome of a responsibility diffusion process, the possibility remains that high risk takers may dominate the group discussion and hence exert a disproportionate influence in the risky direction on the other members of the group. Although quantitative data on this point were not obtained in the Discussion-to-Consensus condition of the present study, the experimenter observed that group members appeared eager to defer to and sympathize with any member who found a given side effect particularly aversive. There appeared to be little indication of particular group members urging an across-the-board strategy of high risk taking.

Table 1

Percentage Degree of Shift in Risk Taking for Each of the Experimental Conditions

| Condition | Mean Degree of Shift in Percent | S.D. | <u>t</u> | Two-tailed <u>p</u> |
|--|---------------------------------------|-------|----------|---------------------|
| 1. Test-Retest Control (<u>N</u> = 18 subjects) | 1.11 | 12.78 | 0.36 | n.s. |
| 2a. Discussion to Consensus--Group Decisions (<u>N</u> = 18 groups) | 5.43 | 7.82 | 2.86 | < .02 |
| 2b. Discussion to Consensus--Private Decisions (<u>N</u> = 18 groups) ^a | 3.97 | 6.02 | 2.71 | < .02 |
| 3. Anticipated Public Disclosure (<u>N</u> = 18 subjects) | 1.85 | 11.86 | 0.64 | n.s. |
| 4. Anticipated Presence of Others (<u>N</u> = 18 subjects) | -1.30 | 2.52 | 2.12 | < .05 |
| 5. Anticipated Discussion to Consensus (<u>N</u> = 18 subjects) | -4.91 | 8.14 | 2.48 | < .025 |

^aTest based on subjects pooled within groups in order to preserve independence. There hence are 17 degrees of freedom.