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Models Of Group Productivity And Affiliation-related Motives

Rodney Douglas Hancock

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MODELS OF GROUP
PRODUCTIVITY AND AFFILIATION-RELATED MOTIVES

by

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Submitted in partial fulfillment of the
requirements of the degree of
Doctor of Philosophy

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Abstract

An experiment was performed to investigate the relationship between group size and group productivity within the framework of Steiner's (1971) model of group performance. Following Steiner's model, same-sex groups of size two and six performed under disjunctive and conjunctive task demands. In the disjunctive condition groups were instructed that performance would be determined by the member who did best at the task. Groups performing in the conjunctive condition were told that their productivity would be determined by the member who performed poorest. Thus it is statistically probable that groups would perform better under disjunctive as compared to conjunctive task demands and that increased group size would lead to increased productivity under disjunctive as compared to conjunctive task demands. What is of interest to the present investigation, however, is the relationship among member motivation, namely resultant affiliation motivation, group size and task demands. That is, affiliation-related motives may mediate the effects of group size and task demands on group productivity. When task demands are disjunctive it was hypothesized that those high as compared to low on this affiliation measure would increase their productivity as group size

increased. Under conjunctive task demands it was predicted that increased group size would lead to decreased productivity for those low as compared to those high on this measure.

One hundred and ninety-two males and females served as subjects in an experiment where three levels of resultant affiliation motivation (i.e., high, moderate, low) were examined and two levels of group size (i.e., two, six) and two levels of task demands (i.e., disjunctive, conjunctive) were independently manipulated. There were an equal number of groups in each cell of the design and groups were homogeneous with respect to motive designation. As task demands was a within-subjects factor, the order in which subjects performed the tasks was counterbalanced.

Analysis of variance was performed on a 3 x 2 x 2 split-plot factorial design where resultant affiliation motivation and group size served as between-subjects variables and task demands served as a within-subjects variable. These results did not support the predicted three-way interaction among resultant affiliation motivation, group size and task demands. However, results obtained using a measure designed to validate Steiner's model did yield the predicted three-way interaction.

A second study was designed to examine the possible effects of overmotivation on the predicted three-way interaction. Contrary to an overmotivation explanation, results indicated that approval-oriented persons performing under disjunctive task demands did better when approval incentives in the group situation were high rather than low. Interestingly, the three-way interaction appeared to be due to the approval-oriented performing better than the rejection-threatened in the disjunctive task when anticipating future interaction and better in the conjunctive task when future interaction was not anticipated.

Results were interpreted as offering limited support for motivational predictions related to Steiner's model, but suggestive of a number of potentially fruitful avenues of research.

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CHAPTER I

MODELS OF GROUP

PRODUCTIVITY AND AFFILIATION-RELATED MOTIVES

Overview

The purpose of the present investigation is to extend recent developments in the study of affiliation motivation to the study of small group processes. Using the traditional index of affiliation, which measures strength of tendency to establish, maintain and restore positive affective relationships with others, a number of researchers have found affiliation-related motives to be important determinants of small group behaviour. For example, Sorrentino (1973) in his study of emergent leadership found that changes in affiliation motivation lead to dramatic alterations in the leadership structure of small groups. That is, while considering achievement-related motives (hope of success, fear of failure) and conditions (noncontingent and contingent performance) he found the group leadership structure to be as predicted for persons low in n Affiliation, but completely reversed for persons high in n Affiliation. In another study the results of Sorrentino and Short (1975, Study II) indicated that performance of

individuals high and low in n Affiliation differed significantly when they performed alone as compared to a setting where future interaction with others was anticipated. Specifically those high in n Affiliation performed better alone than when they anticipated future interaction while the reverse was true for persons classified as low on this dimension. Thus, in the former study we note a complete reversal in group leadership structure as affiliation motivation varied. The latter investigation is important because it indicates that the performance of individuals differing in affiliation is drastically affected by the mere possibility of future interaction.

Recently, Short (1980) has suggested that it may be useful to consider affiliation motivation as being composed of an approach tendency (tendency to seek approval) and an avoidance tendency (tendency to avoid social rejection). Research utilizing Short's (1980) measure of resultant affiliation motivation, suggests that it also can serve as an important determinant of small group behaviour. In perhaps the most impressive study, Sorrentino and Shepard (1978) classified expert swimmers using Short's measure and examined performance under individual and group competitive situations. The results clearly indicate that swimmers classified as

high in resultant affiliation motivation performed better under group rather than individual conditions and the reverse was true for those classified as low in resultant affiliation motivation. The most interesting result was that experienced university-class swimmers who were high or low in resultant affiliation motivation actually increased or decreased their performance, by as much as 3.2 seconds, when they were in a group as compared to an individual situation.

Given that affiliation-related motives are important in determining small group behaviour, it seemed desirable to consider the effects of resultant affiliation motivation within the confines of a model of group performance where variables which may affect performance are clearly specified. Steiner's (1966, 1972) model of group performance fits these requirements. He suggests, and research supports his contention (e.g., Frank & Anderson, 1971), that group size and task demands are two important factors related to group performance. Basically Steiner suggests a positive relationship between group size and group productivity when group performance is determined by the most competent member (disjunctive model) and a negative relationship when the least competent member determines the group score (conjunctive model). These

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relationships are based on the idea that as group size increases, the probability of any member being very competent or very incompetent also increases if group members are randomly chosen from a population with a normal distribution of ability. Thus, when disjunctive task demands are in effect, increased group size should lead to increased group productivity because there is an increased probability that the group will have a highly competent member. Following this probabilistic argument, increasing group size should lead to decreasing group productivity when task demands are conjunctive. However, viewing these relationships in light of recent developments in resultant affiliation motivation it is argued that disjunctive and conjunctive task demands elicit affiliation-related incentives and under either of these conditions resultant affiliation motivation may be systematically related to group size. That is, increases in group size may be seen as accentuating affiliation-related motives which were aroused by the particular task demands. Specifically, a positive relationship between group size and group productivity would be expected when groups are composed of approval-oriented persons (high in resultant affiliation motivation), while the reverse would occur when group members are

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rejection-threatened (low in resultant affiliation motivation). Hence, although it is suggested that the specific task demands will be important determinants of group productivity, it is argued that resultant affiliation motivation will mediate the effect of group size and thus also serve as an important factor determining group performance.

Background of the Problem

The suggestion that particular personality variables be examined when investigating group productivity has been put forth in past research (e.g., Smelser, 1961; French 1956; French, 1958). However, it appears that this avenue of research has added relatively little to our understanding of the variables which determine group productivity. McGrath and Altman (1966) after an extensive review of small group research stated that available data "suggests that personality and attitudinal characteristics are not consistently related to group performance (p. 64)." These authors suggest that one possible explanation for these findings may be the tendency by investigators to look for linear relationships between personality variables and group performance. Indeed they state that. "for personal-social variables this monotonic

principle may not apply; rather we may be in a realm where either too much or too little of a characteristic interferes with performance (p. 65)." It seems plausible to infer from McGrath and Altman that their suggestion is consistent with a view of behaviour which emphasizes the importance of the interaction between personality and situational variables. That is, it may be that differing levels of any particular personality variable are differentially affected by situational constraints and in a group setting such effects result in performance differences. Such an approach to the study of behaviour has been put forth by a number of researchers including Lewin (1951), Mischel (1971), Bowers (1972) and more recently Endler and Magnusson (1976). Within the area of small group research this approach is exemplified by Hollander and Julian (1969) in the study of leadership and Marlöwe and Gergen (1969) in their consideration of the personality and social interaction literature. The latter authors, after an extensive review of this area, state "If there is one conclusion to be drawn from this review it would be that the consideration of motivational variables alone, without respect to the interaction of situation and personality, is a rather fruitless quest (p. 645)." It seems that a careful analysis of the

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relevant situational determinants of group performance while bearing in mind the possibility that motivational variables are nonlinearly related to situation variables may increase our understanding of the factors which determine group productivity. Therefore, the present investigation will examine group performance while considering member motivation (i.e., resultant affiliation motivation), relevant situational variables (i.e., task demands, group size), and the interaction between these personality and situational variables.

Resultant affiliation motivation

Four functions are served by this section. First, it is suggested that conceiving of affiliation motivation as bidirectional, that is utilizing Short's (1980) notion of resultant affiliation motivation, may be more useful than the traditional unidimensional conception. Second, research (e.g., Sorrentino, 1973) has shown that affiliation-related motives are important behavioural determinants in achievement-oriented situations. Third, there are studies that suggest (e.g., Sorrentino & Shepard, 1978) that resultant affiliation motivation may have a more powerful influence than resultant achievement motivation in achievement-oriented group activity.

Finally, it is argued that it is more appropriate to consider resultant affiliation motivation than resultant achievement motivation when examining Steiner's (1972) model, as the addition of group members as well as task demands would more directly arouse affiliation-related rather than achievement-related incentives.

Affiliation has been conceptualized as a unidimensional approach motive by Heyns, Veroff, and Atkinson (1958). That is, it is considered as a source of positive motivation and is defined as an individual's tendency to establish, maintain or restore positive relationships with others. Traditionally this conception of affiliation motivation has been closely associated with Atkinson's (1964) theory of achievement motivation and is viewed as a source of "extrinsic motivation" within this framework. This close association has led to a number of methodological and conceptual similarities. For example, affiliation motivation and the approach tendency in achievement motivation (i.e., motive for success) are measured using the Thematic Apperception Test. Also, an expectancy X value orientation is utilized in the conceptualization of both sources of motivation. Finally, in an area important in the proposed

investigation, affiliation motivation, and achievement motivation have often been jointly investigated. Specifically the research concerning the relationship between affiliation and performance has frequently included a consideration of achievement-related motives. Indeed much of our knowledge of affiliation motivation has resulted from attempts either to obtain a better understanding of the relationship between the theory of achievement motivation and performance or to extend the theory to small group processes.

Mehrabian and Ksionzky (1974) and Short (1980) have recently argued that it may be more appropriate to use a bidimensional measure of affiliation motivation, that distinguishes between persons with high approach affiliative tendencies and those with high avoidance affiliative tendencies. According to Short (1980), resultant affiliation motivation is conceptualized as being composed of an approach component, motive for approval, and an avoidance component, motive to avoid social rejection. In a manner analogous to resultant achievement motivation, individuals in whom motive for approval is greater than the motive to avoid social rejection are classified as approval-oriented. Conversely, individuals in whom the motive to avoid social rejection is greater than the motive for

approval are classified as rejection-threatened. Using Short's conceptualization it is possible to describe the patterns of behaviour one would expect most consistently from approval-oriented and rejection-threatened individuals. It is important to bear in mind that while there is some data to support the following characterizations, they are largely speculation. However, this speculation is based on an analogy to Atkinson and Feather's (1966) description of success-oriented and failure-threatened individuals.

Approval-oriented persons are generally attracted to activities which allow them to restore, establish or maintain positive relationships with others. They are not particularly interested in situations which do not permit them the opportunity of satisfying their affiliation need. Thus with respect to any activity they are relatively unconcerned about the nature of the task except to the extent that task performance allows them to establish or maintain positive relationships with others. Also such individuals will be most attracted to situations where there is an intermediate likelihood of gaining approval from others. That is, situations where it is either relatively easy to gain approval or relatively difficult to gain approval are likely to be less attractive to these individuals. For

example, gaining approval along with everyone else is not as satisfying to them as gaining approval in a situation where the probability of approval is intermediate. Conversely situations in which approval is very unlikely would not be attractive to them since they will most probably not be able to satisfy their affiliation need.

In contrast, we have the individuals in whom the motive to avoid social rejection is greater than the motive for approval. These persons are dominated by fear of social rejection, and hence avoid or resist situations in which they may be required to interact interpersonally with others. They would much rather be in situations where there are no approval or rejection incentives. However if they engage in situations where affiliation-related incentives are present they would prefer that the likelihood of gaining approval or rejection be either very high or very low. In the former situation they will likely gain approval and hence need not fear social rejection because the possibility of rejection is very low. In the latter situation they will probably be rejected but their fear of social rejection will likely not be relevant here since probability of not being rejected is very low. It is important to note, however, that

rejection-threatened persons would rather not be involved in situations where affiliation-related incentives are present. Were they not surrounded by other constraints (e.g., previous commitment to participate) they would not participate in such situations.

As previously mentioned, the above characterizations of approval-oriented and rejection-threatened persons are based on an analogy to Atkinson & Feather's (1966) description of success-oriented and failure-threatened individuals. It is possible that further elaborations of the theory of achievement motivation suggested by Raynor (1969, 1974) and more recently by Sorrentino, Short & Raynor (1983) may be extended to affiliation-related motives. For example, Sorrentino, Short & Raynor (1983) suggest that differences in performance due to achievement-related motives are moderated by individuals' uncertainty orientation. It may be that an individual's uncertainty orientation, that is, the degree to which situations of certainty versus uncertainty are cognitively relevant, will also affect affiliation-related motives.

It's possible that failure to consider approval-oriented and rejection-threatened individuals contributed to much of the confusion in the literature. For example, research by Sorrentino and Hancock (1976), which will be presented later, indicated that consideration of resultant affiliation motivation lead to a clearer understanding of the relationship between affiliation and conformity. Indeed, Short (1980) suggests that just as the introduction of resultant achievement motivation (hope of success minus fear of failure) substantially improved predictational precision, so resultant affiliation motivation will make a similar contribution.

Since the proposed investigation involves the prediction of performance while considering affiliation-related motives, it should be noted that in certain situations achievement-related motives may also have to be considered. The relationship between the two sources of motivation has been investigated, by a number of researchers who were interested in predicting individual behaviour. For example, Atkinson and O'Connor (1966) have examined the effects of one affiliation-related motive (i.e., motive for approval) upon achievement motivation and performance. Three basic findings resulted from their research. First,

the motive for approval was found to decrease differences in performance between success-oriented and failure-threatened individuals. Second, if approval of performance was expected in an achievement-oriented situation then the person who was classified as high in the motive for approval performed as well as the success-oriented individual. Finally, these investigators found that the motive for approval may combine with achievement motivation to decrease rather than increase the performance of individuals who are success-oriented. In a similar study Atkinson and Raphelson (1956) found that affiliation-related motives (i.e., motive for approval) predicted performance in situations where achievement incentives were minimized.

Research more directly relevant to this investigation is concerned with group rather than individual behaviour. French (1956) examined task scores of groups of individuals who were classified in terms of the motive for approval and the motive to succeed. She found an interaction between situational characteristics and the motivational variables measured. That is, on the one hand task scores were related to achievement motivation when individuals could satisfy achievement goals by working on tasks in which success was primarily dependent on the effort the

person was willing to expend. On the other hand, when there were affiliation-related incentives (i.e., approval incentives) involved in the experimental task then performance was related to the motive to affiliate and not to achievement motivation. Thus, French has emphasized the importance of considering the incentives (e.g., achievement, affiliation) involved in any situation and the interaction of these incentives with motivational variables in order to predict behaviour. More recently there has been research extending theory of achievement motivation to small group processes which gives additional support for the importance of affiliation-related motives (i.e., motive for approval) in achievement-oriented group activity. For example, Sorrentino (1973), by considering that affiliation-related motives are aroused in task-oriented group activity and that the situation may serve to enhance or diminish both sources of motivation, was able to demonstrate that achievement-related motives (motive to succeed, motive to avoid failure) can serve as a source of determinants of emergent leadership (e.g., quantity and quality of verbal interaction, ratings of task leadership ability). What is important, however, is that achievement-related motives served as a source of

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determinants of leadership in task-oriented activity only when they were considered in conjunction with the affiliation motive. In another study Short and Sorrentino (1975) classified individuals according to resultant achievement motivation (High, Low) and motive for approval (High, Moderate, Low) and successfully predicted group performance based on the interaction of these motives in differing situations (Alone, Competitive, Cooperative).

The above studies establish a relationship between affiliation-related motives, specifically the motive for approval, and performance. However, there have been relatively few studies which have examined Short's (1980) conceptualization of resultant affiliation motivation. Previously it was suggested that researchers' failure to consider approval-oriented and rejection-threatened individuals may have lead to much confusion in the affiliation literature. For example, Sorrentino and Hancock (1976) found that consideration of individuals' resultant affiliation motivation lead to a clearer understanding of the conformity-affiliation relationship. That is, based on an expectancy-value analysis of the conformity process they were able to predict successfully the conformity behaviour of persons who vary in resultant affiliation

motivation. Specifically, they found that approval-oriented individuals conformed more in a situation where they anticipated future interaction with their group members, than when no future interaction was anticipated. Rejection-threatened persons conformed more when no future interaction was anticipated as compared to a situation where there was anticipation of future interaction. These results were expected since conformity in its initial stages, according to Hollander (1958), should lead to greater opportunity for interaction later. Hence, in the conformity situation employed by Sorrentino and Hancock (1976) the approval-oriented person conformed when he anticipated future interaction possibly because this behaviour should lead to greater opportunities for later interaction. By the same reasoning the rejection-threatened person conformed less when he anticipated future interaction than when he did not because such behaviour decreased the possibility of being called upon during the group interaction which he thought would follow. Thus, the perceived consequences of conformity behaviour and the value of those consequences determined the degree of conformity exhibited by rejection-threatened and approval-oriented individuals.

In a field experiment, Sorrentino and Shepard (1978) examined the relationship among athletic performance (i.e., swimming speed), sex, condition (i.e., individual competition, group competition) and two motivation variables, resultant affiliation motivation and resultant achievement motivation. These researchers found a number of interesting results. First, the results indicate that approval-oriented persons performed better under group competition as compared to individual competition conditions. More surprisingly, the expert swimmers who were rejection-threatened actually showed a performance decrement from the individual competition to the group competition setting. These performance differences were in the same direction for both sexes but the degree of variance was smaller for women. This finding is consistent with Sorrentino's (1973) results concerning the importance of affiliation-related motives in achievement-oriented group activity. Both studies suggest the importance of considering affiliation-related motives and furthermore, that they may be more powerful than resultant achievement motivation in certain group situations.

In summary there is growing evidence that affiliation-related motives and the general expectancy-value approach can be successfully applied to the study of small group processes (e.g., French, 1956; Short & Sorrentino, 1975; Sorrentino & Hancock, 1976). That is, research suggests that affiliation-related motives may be important determinants of small group behaviour. At a more general level it appears that examining the incentives involved in a particular situation, the expectancy that a particular action may lead to a specific consequence, and the value of that consequence to the individual, is a fruitful approach to the study of small group behaviour. Furthermore it is suggested that affiliation-related motives may be a more powerful determinant in achievement-oriented group activity than resultant achievement motivation. Such a suggestion seems reasonable in that the addition of group members as well as task demands would seem to arouse more directly affiliation-related rather than achievement-related incentives. The available research (i.e., Sorrentino, 1973; Sorrentino and Shepard, 1978) also supports this suggestion. It is the aim of the present investigation to utilize the above theoretical orientation to study the relationship between resultant

affiliation motivation, relevant situational variables, and an important group process namely group performance.

Steiner's Model of Group Productivity

Steiner (1966, 1972) presented a model of group behaviour which examined group size and its effect upon group productivity. He suggests that group productivity is a function of task demands, resources, and process. Since process "consists of the actual steps taken by an individual or group when confronted with a task" and "cannot be measured or evaluated before work begins" (Steiner, 1966, p. 274), he emphasized the importance of task demands and resources in the determination of potential group productivity. Steiner, it is important to note, made a distinction between actual and potential group productivity. Actual productivity is rarely if ever equal to potential productivity because of faulty social process in the group. Specifically Steiner suggested that decrements in potential group productivity were due to motivation losses and interpersonal coordination losses which result from faulty social process. Therefore actual group productivity was seen as being equal to potential group productivity minus motivation losses

minus coordination losses.

Steiner postulated five models of group behaviour and predicted the effect of increasing group size upon potential group productivity. Essentially his five models are differentiated on the basis of task demands or task requirements. His first model is referred to as additive. When it is in effect the group task requires that all members perform exactly the same function. In this situation group productivity is the sum of all member's responses. Steiner postulated that under this set of task demands an increase in group size would lead to an increase in potential group productivity. Under the disjunctive model all members have a common task but group productivity is determined by the group choosing one member's response to serve this function. Effectively this means that group productivity is determined by the performance of the most competent member. A positive relationship between group size and potential group productivity is hypothesized when this model is employed. However, potential productivity is predicted to increase at a decelerating rate. The conjunctive model is the reverse of the disjunctive in that the least competent member determines group productivity. In this case, Steiner (1966) postulated that potential group

productivity "decreases as a negatively decelerated function of group size (p. 279)." The fourth model, the compensatory model suggests that the average estimate of the group members individual task judgments is a more accurate estimate than any one member's judgment. Increasing group size is predicted to increase group productivity by increasing the accuracy of the group mean. Finally the complementary model represents situations where the group task is subdivided among the members and each member performs only a portion of the total task. Utilizing this model Steiner predicted that increasing group size would lead to increased potential group productivity because the resources available to the group are positively related to the size of the group. Notice that resources, the other determinant of group productivity, plays a relatively minor role in this model's theoretical predictions. This occurs because Steiner assumes group members are randomly selected from a large population with a normal distribution of talent and resources. However, it is important to note that Steiner maintains that his hypothesized group productivity-group size relationships will still hold even if the group members are not selected from a completely heterogeneous population. That is, even if an effort is made to

select individuals who have high levels of ability "unless extremely accurate techniques are available for identifying competent people, and unless the agent that makes the final choices has dictatorial control over those he would like to select, the members of groups represent approximately random subsets of the preselected population (p. 71)." It seems that even when the distribution of ability within a particular population is relatively restricted Steiner maintains that his theoretical predictions are still accurate. Thus by attending to the demands placed on a group as a result of this particular task, Steiner has generated a number of testable hypotheses concerning the potential group productivity-group size relationships.

Although there have been numerous studies examining the importance of task variables in a group setting (e.g., Hackman, 1968; Hackman & Vidmar, 1970; Kent & McGrath, 1969; Miller & Hamblin, 1963) and the effects of group size (e.g., Thomas & Fink, 1963; Slater, 1958) there have been relatively few studies which have investigated Steiner's (1972) conceptualization of group performance. Laughlin and Johnson (1966) examined Steiner's complementary model. This model suggests that the combination of individuals' unique resources gives the group

superiority over the same individuals working alone since the task demands are such that no one person may be able to solve the group's problem. Laughlin and Johnson (1966) extended Steiner's model by experimentally controlling the relevant task abilities of the group members while examining individuals alone and in pairs. They postulated that member task ability would moderate the positive relationship between group size and group productivity hypothesized by Steiner. The basic prediction was that a person working with a partner of greater or comparable ability would improve relative to his performance alone, while a person working with a partner of less ability would not improve relative to his performance alone. These researchers gave all subjects a task, classified them High, Moderate or Low in terms of their performance and then had all possible ability level pair combinations as well as individuals redo the task. The authors used the performance differences to test their hypotheses. In support of the Steiner model they found that pairs performed significantly better than individuals. They also found that improvement was inversely related to initial ability level. Their predictions concerning the performance of pairs relative to individuals while examining initial ability levels were supported in all

conditions except for Low-Low pairs compared to Low individuals. That is, Laughlin and Johnson (1966) found "S's working with partners of greater or comparable ability improve relative to subjects of the same ability level working alone, and subjects working with partners of less ability do not improve relative to subjects of the same ability level working alone (p. 413)." Thus this research offers general support for Steiner's suggested group size-group productivity relationship within the complementary model and points out the effect of individual task ability on this relationship.

In another study based on Steiner's model, Johnson and Torcivia (1967) considered the individual's task ability while examining disjunctive tasks. Under this model the group can solve the task if at least one member possesses the ability. These researchers had all subjects perform a task and then classified them as either correctly or incorrectly solving the problem. Following this all possible pairwise combinations (i.e., Right-Wrong, Right-Right, Wrong-Wrong) were given the initial problem again to solve together. Results indicated that Right-Right pairs did not diminish in performance relative to two Right individuals; that Wrong-Wrong pairs did not improve

their performance compared to two Wrong individuals; and Right-Wrong pairs performed better than the combined score of a Right and a Wrong individual. However, it is interesting to note that the performance of the Right-Wrong pairs was mediated by the individual's certainty in his/or her initial answer to the problem. That is, when the Right individual was highly certain that his/or her initial answer to the problem was correct the Right-Wrong pair improved their performance, but when he/or she had a low degree of certainty the improvement of their pair was decreased. This research makes two contributions to an understanding of group performance and the variables relate to it. First, it offers support for the intuitive notion that there is a "pooling of resources" by group members, at least when their task is disjunctive. Second, it extends Steiner's model by attempting to specify the effects of individual's task ability upon the overall productivity of the group.

One final study which examined a portion of Steiner's model was conducted by Frank and Anderson (1971). Utilizing a "production" task as defined by Hackman (1968), these researchers found support for hypotheses postulated by Steiner. They obtained support for Steiner's general hypothesis that a

differential relationship exists between group size and group performance when task demands are taken into consideration. Specifically their research indicated that increased group size leads to increased group performance when the task is disjunctive and decreased group performance when the task is conjunctive, (although they did not obtain a significant group size effect under conjunctive task demands). Their research also suggested that group members were more satisfied when the task was disjunctive as compared to conjunctive. Again this research, like the previous studies examining Steiner's model, offers support for the model. Note, however, that two of these studies (i.e., Laughlin & Johnson, 1966; Johnson & Torcivia, 1967) not only offer support for some of Steiner's hypotheses but also attempt to expand this model by examining the importance of individuals' initial task ability under varying task demands.

Expectancy-value theory and Steiner's model of group performance

As indicated earlier Steiner presented a model which attempted to specify some of the important variables affecting group performance. The proposed study will examine a number of Steiner's predictions

and the effect of resultant affiliation motivation on these predictions. Specifically, the study will investigate the effect of resultant affiliation motivation on the postulated group size-group productivity relationship for particular task demands (i.e., disjunctive, conjunctive). This approach considers the possible relationships between this motivational variable and situational variables known to affect group productivity. It may be that such an approach will be fruitful in establishing a link between personality and group performance. Furthermore, it seems that attention directed not only to this motivational variable but also to the incentives involved in a group situation, the possible consequences of particular actions, and the value of those consequences for the individual may add precision to Steiner's model.

Steiner makes a number of rather general hypotheses concerning the relationship between group size and potential group productivity within each of his five task situations. Although he clearly states that his model "does not involve a systematic consideration of process losses" (Steiner, 1966, p. 283), he has suggested that under certain conditions motivation decrement may alter his general group

size-group productivity hypotheses. It is suggested that resultant affiliation motivation may be a mediating variable which when taken into account, will more clearly specify Steiner's group size-group productivity relationships. That is, resultant affiliation motivation may be systematically related to Steiner's task demands and increasing group size may systematically affect this motivational variable. It is argued that conjunctive and disjunctive task demands will have systematic effects upon members' resultant affiliation motivation. It is suggested, since group productivity is determined by the most competent member under the disjunctive model that this model will arouse approval incentives. That is, because it is possible for any group member to determine the group product, approval from the other group members may be gained. The relative importance of approval incentives under disjunctive task demands means that individuals differing in resultant affiliation motivation may display different behaviour patterns. For example, group members who are approval-oriented rather than rejection-threatened may perform better in situations where task demands are disjunctive. Under the conjunctive model group productivity is determined by the least competent member. It is suggested here, that

rejection incentives will be aroused since the group can only be as productive as the least competent member and hence the slowest member must face the possibility of rejection by the other members. In this situation the relative importance of rejection incentives suggests that members varying in resultant affiliation may be differentially affected. It may be that rejection-threatened, as compared to approval-oriented members will perform more poorly in group settings where the task demands are conjunctive.

Taking into consideration the previous analysis of the affiliation-related incentives involved in both models it seems reasonable to suggest that increasing group size may enhance these incentives. That is, increasing group size may lead to increased approval incentives when the task is disjunctive and increased rejection incentives when task demands are conjunctive. The basic reasoning behind this suggestion being that it is more positive to gain approval from ten group members than from three. Similarly, it is more aversive to be rejected by ten members than it is to be rejected by three. Thus, increasing group size when disjunctive task demands are present will increase the aroused positive motivation of the approval-oriented person as compared to the rejection-threatened person.

Conversely, under conjunctive task demands increasing group size will increase the aroused negative motivation or inhibitory tendency of the rejection-threatened person relative to the person who is approval-oriented.

To summarize, this analysis leads to a number of group size-group productivity hypotheses which add more precision to the predictions made by Steiner's model. First, it suggests a two-way interaction between group size and resultant affiliation motivation. It seems that increasing group size may lead to increased group productivity when additional group members are approval-oriented and decreased group productivity when additional members are rejection-threatened. Second, this analysis suggests that there will be a three-way interaction among task demands, group size, and resultant affiliation motivation. On the one hand it is suggested that the addition of approval-oriented group members will lead to a greater increase in group productivity under the disjunctive as compared to the conjunctive model. On the other hand, it seems that the addition of rejection-threatened persons may lead to a greater decrease in group productivity when task demands are conjunctive rather than disjunctive.

The expectancy X value approach advocated clearly suggests that consideration of resultant affiliation motivation leads to differential predictions concerning the behaviour of approval-oriented and rejection-threatened individuals in particular group settings. The differential effects of task demands and situational variables upon the affiliation-related motives of group members clearly elaborate Steiner's general group size-group productivity hypotheses by indicating conditions under which these general hypotheses may not apply. Thus just as Johnson and Torcivia (1967) and Laughlin and Johnson (1966) found that consideration of members' task ability lead to a clearer specification of Steiner's group performance model so, it is argued, attention to resultant affiliation motivation may perform a similar function.

Based on the expectancy-value analysis presented above the following hypothesis will be examined in this investigation:

1. When task demands are disjunctive increased group size will lead to increased group productivity for approval-oriented as compared to rejection-threatened groups. When task demands are conjunctive increased group size will lead to decreased group productivity for

rejection-threatened as compared to approval-oriented groups.

Moderates Issue

There have been no predictions made concerning the behaviour of persons classified as Moderate in resultant affiliation motivation. This rather cautious position has been taken for a number of reasons. First, with respect to resultant affiliation motivation, past research does not indicate a consistent relationship among persons classified as Low, Moderate and High on this motive. For example, Sorrentino and Hancock (1976) found equivocal support for a linear relationship among the three motive levels while Sorrentino and Shepard (1978) found the Moderates to exhibit a level of performance higher than the Highs or the Lows. Second, at a more general level, Sorrentino and Short (1975) after an extensive literature review found "a pervasive inconsistency in the behaviour of those who score moderate or various motive measures (p. 1)." For these reasons it did not seem reasonable or possible to predict the behaviour of persons Moderate in resultant affiliation motivation.

CHAPTER II

METHOD

Overview

A 3 x 2 x 2 factorial design with three levels of resultant affiliation motivation, two levels of group size, and two task demands was used in the experiment. The latter variable, task demands, served as a within subjects variable while the other two served as between subjects variables. Ninety-six male and ninety-six female subjects were assigned to experimental conditions. Counterbalancing for order, same sex groups completed tasks in which conjunctive and disjunctive task demands were present. The written product of each group served as the dependent measure of group performance.

Subjects

One hundred and ninety-two male and female undergraduates who had completed a battery of tests were randomly selected from a large sample of introductory psychology students at the University of Western Ontario. The test battery was administered in two testing sessions held in the Fall Term of 1976. Students in these mass testing sessions were volunteers. Subjects in the experimental sessions

participated as part of their introductory psychology course requirement.

Personality Measures

As previously noted, Short's (1974) measure of resultant affiliation motivation served as the measure of affiliation motivation in this investigation. Following standard procedures (Atkinson, 1958, Appendix III) the projective measure of n-Affiliation was administered in the mass testing session to measure the approach component of Short's measure. These protocols were scored for n-Affiliation according to the scoring manual (Heyns, Veroff, and Atkinson, 1958) by an expert scorer who has correlated above .90 with the n-Affiliation practice material in Heyns, Veroff, & Atkinson (1958). Mehrabian's (1970) Fear of Social Rejection was used to assess the avoidance component in resultant affiliation motivation. A number of other secondary measures including Mandler and Sarason's (1952) Test Anxiety Questionnaire and the Thematic Apperception Test projective measure of n-Achievement were included in the test battery.

Motive Designation

In a manner analogous to that used by Atkinson and Feather (1966) to calculate resultant achievement motivation, measures of n-Affiliation and fear of social rejection were used to form a measure of resultant affiliation motivation. That is, standard scores for fear of social rejection were subtracted from the standard scores for n-Affiliation to provide a single indicator of the relative strengths of these two affiliative tendencies. A tertile split on this resultant measure permitted the classification of subjects as High, Moderate or Low on this dimension.

Based on this classification of subjects a 3 x 2 x 2 split-plot factorial design was employed. That is, resultant affiliation motivation and two levels of group size served as between-subjects variables and two of Steiner's task demands (i.e., disjunctive, conjunctive) served as the within-subjects variable.

Manipulation of situational variables

Subjects were placed into groups of two or six. These groups were composed of same sex individuals homogeneous with respect to resultant affiliation motivation. Groups were composed of same sex members as this procedure was used successfully by Frank and

Anderson (1971) in their study of Steiner's model and by Sorrentino and Shepard (1978) in their examination of resultant affiliation motivation. Assigning individuals to groups that are homogeneous in affiliation-related motives permits the investigation of the effect of this motivational variable in the experimental situation.

It is important to note that the members of the groups participating in this study worked individually. The group members were not permitted to discuss the task with their fellow members. This procedure was chosen for a number of reasons. First, successful research by Sorrentino & Shepard (1978) which examined resultant affiliation motivation and athletic performance was conducted under conditions where the participants performed individually. Second, the likelihood of individuals' perceiving success or failure either in themselves or in other group members may be minimized by having members perform individually. Thus, the possible effect that perceptions of success or failure may have on affiliation-related motives is reduced. Third, this procedure greatly reduces any possible effects on productivity which may result from characteristics specific to particular group sizes. That is, research

(e.g., Hackman & Vidmar, 1970; Slater, 1958) suggests that dyads have distinct characteristics such as exhibiting high levels of intensity in performance, being especially satisfied with group performance, and failing to report coordination difficulties. With regard to the motivational hypothesis being examined, it seems that having group members perform individually, with no discussion among themselves, provides a conservative test of the hypothesis. That is, the aroused affiliation-related motive is expected to affect behaviour in a situation where there is no member interaction.

The following instructions were given to the groups.

General instructions to all groups.

"There are three phases in this morning's (afternoon's) session and you will remain in this group for the entire experimental session. In each phase you will be required to perform a task composed of a series of problems. A score for your group will be determined for each phase based on the group's performance and this score will be compared with the scores of the other groups participating in this experiment. Thus, in each phase you will be competing against the other

groups. However, in the first two you will be working individually and your individual performance will contribute to the group's score. In the final phase you will be working as a group on a similar task in which group discussion will be involved."

Instructions for phase one

"We will now begin the first phase of this session. Each of you has been assigned a member number and given a booklet. This booklet contains a number of problems. Please do not open it until asked to do so. Your task in this initial phase is to answer each problem and then proceed onto the next one until either you complete the entire problem set or you are asked to stop. Recall that you are to work individually even though a score for your group will be determined by your responses to these problems. At the end of this phase the problem sets will be collected and scored while you are completing the second phase. At the conclusion of the session your group score, each member's score, as well as the scores of the other groups will be posted on the wall in this room." Following these instructions, the groups received instructions indicating that task demands are either disjunctive or conjunctive.

Instructions for disjunctive task demands

"Your group score will be determined by using the score of the group member who gives the best set of answers to these problems. Thus the score of the group member who is most competent at this set of problems will determine the score of your group. This score will then be compared with the scores of the other groups taking part in the session to see which group performs best. Before we begin please put your name and member number on the booklet so that everyone's score can be posted at the conclusion of the session."

Instructions for conjunctive task demands

"Your group score will be determined by using the score of the group member who has the poorest set of answers to these problems. Thus the score of the one group member who does least well at this set of problems will determine the score of your group. This score will be compared with the scores of the other groups taking part in the session to see which group performs best. Before we begin please put your name and member number on the booklet so that everyone's score can be posted at the conclusion of the session."

Instructions for phase two

After phase one has been completed using either disjunctive or conjunctive task demands the experimenter returns, collects the group's booklets and gives the following instructions.

"The problem set you have just completed will be scored while you are participating in the second phase of this session. The scores of each individual member, you group score, and the group scores of the other groups will be posted on the wall following the second phase." Subjects retain their initial member number and again are given a booklet containing a set of problems which are equivalent to the previous set. The two problem sets were those used by Frank and Anderson (1971) and are considered to be matched. "Again, each of you has been given a booklet which, as the last one, contains a number of problems. Please do not open it until asked to do so. Your task, as in the first part, is to answer each problem and then proceed onto the next one until either you complete the entire problem set or are asked to stop. A score for your group will be determined by your responses to these problems but again you are asked to work individually. As in the initial phase your group score as well as the score of

each member will be posted in this room."

Following these instructions the groups received the task demand instructions which they did not hear when they completed the first set of problems. Thus all groups performed the task under instructions which were disjunctive and conjunctive. The particular set of problems used with each model was randomized throughout the study.

Group task

As previously mentioned the task used by Frank and Anderson (1971) in their investigation of Steiner's model was employed in the present experiment. The task consists of a set of nine problems, which these authors consider to be production tasks (see Hackman, 1968). Each problem within the set requires the subject to generate a specified number of ideas about a particular topic (e.g., "Write three points pro and con on the issue of legalized gambling."). The subject is told that he is to proceed to the next problem after he has completed the first. The subject can move as quickly as he wishes through the problems but there is a fifteen-minute time limit on the task which prevents anyone from completing the entire set of problems. Frank and Anderson (1971) have developed two equivalent

sets of nine problems and both sets were used in this investigation since any one group performed this task under both types of task demands.

The proposed task was chosen above a number of others (e.g., Zajonc's, 1961, group task) largely for two reasons. First, previous research examining Steiner's model (i.e., Frank & Anderson, 1971) has successfully used such a task. Second, the set of nine production tasks have no readily obvious correct or incorrect responses and hence the problem of individuals feeling that they have succeeded or failed on a particular problem is greatly reduced.

Although this procedure borrows from Frank and Anderson (1971), a number of modifications have been made in order to facilitate examination of resultant affiliation motivation. For example, Frank and Anderson told the group members that as each of them completed one task in the series they were to announce it to the group. Hence, when disjunctive task demands were in effect everyone went on to the next task in the series as soon as one member completed the previous one. However, under conjunctive task demands the group members were not permitted to proceed until all members were finished. Thus, the group performed a series of tasks but the speed at which each member could proceed

was determined by the particular task demands. In the present research the booklet of nine tasks was presented as a single task which could possibly consist of nine trials. Recall there is a time limit imposed on the group and hence, only the possibility of doing nine trials exists. This procedure is desirable because it further attempts to isolate the effect of task demands and group size on resultant affiliation motivation. That is, by not allowing the individual members any information concerning the success or failure of themselves or the others the possibility of such information affecting individual and group performance has been minimized. While these essential methodological variations remove the sequential nature of Frank and Anderson's task this procedure still allows one to collect data which is relevant to Steiner's model of group performance.

Procedure

A maximum of three groups of subjects were run at one time with each group being placed in a small group laboratory room. Each member of a particular group was given instructions concerning the production task and then given either disjunctive or conjunctive instructions. Following a fifteen-minute period in

which the group members completed the task, their responses were collected. Group members were then given another production task and either disjunctive or conjunctive instructions depending upon which instructions they received initially. Again the responses to the task were collected after a fifteen-minute work period.

Dependent Measures

The performance of the group on each set of task problems served as the dependent measure in this investigation. There are, however, a number of ways of deriving group performance scores. Generally, group productivity can be measured qualitatively as well as quantitatively.

Quality of performance was determined in two ways in this experiment. First, Frank & Anderson's (1971) five point scale was employed. This procedure involved rating each individuals' written performance on a subjective quality scale ranging from 1 (low quality) to 5 (high quality). As each task was composed of a set of nine problems this quality score was determined by scoring each completed problem in the set. The scores for these problems were then averaged to yield the first quality score for a particular task. (The

reader is referred to Appendix I where a complete description of this scale is presented). In order to eliminate any scoring bias the scorer was blind to experimental conditions.

The second method for measuring quality was derived from a set of procedures developed by Hackman, Jones & McGrath (1967). These researchers suggested six dimensions that can be used to assess written group products. Each of these dimensions is composed of three 7 point scales and the scores on these subscales are averaged to yield a dimension score. The present study used one of these six dimensions, namely the Quality of Presentation dimension and the three subscales associated with it, as another quality measure. Thus, each completed problem in the set was scored on three 7 point scales which were labelled "choppy", "stylistically well-integrated" and "understandably presented". The scores derived from these three scales were then averaged to provide a composite measure of quality for each problem. Again, the scorer was blind to experimental conditions when determining this quality measure.

In summary, the present investigation used two measures of quality; the measure developed by Frank & Anderson (1971) and the composite measure suggested by

Hackman, Jones & McGrath (1967).

Quantity measures can also be determined in a number of different ways. For example, one could count the number of problems completed. Similarly a count could be made of the number of problems subjects' attempted. Both of these quantitative performance measures were employed in the present experiment. There was a third quantitative measure used in the present investigation which was a combination of the previous two. Specifically an efficiency score was derived by subtracting the number of completed problems from the number of problems attempted and dividing the difference by the number of problems attempted. This measure may reflect more accurately quantitative performance as it takes into consideration the possibility that some persons may choose to demonstrate performance by attempting many problems while others may choose to perform by completing every problem which they attempt.

For each dependent variable the group score was determined by averaging the members' scores. Thus, the average group score served as the dependent variable in examining the hypothesis of this investigation. Additionally, as a validation of the predictions derived from Steiner's model the score for each group

was determined by the procedure outlined under the particular experimental condition. Therefore, in the disjunctive condition the group score was determined by using the score of the member who performed best in the group and in the conjunctive condition the group score was determined by using the score of the member who performed poorest.

To summarize, the performance of each group was determined by averaging member scores for each measure of quantity and quality. As a validation check of Steiner's model, group scores based on the performance of either the best group member (disjunctive condition) or the poorest group member (conjunctive condition) were determined for each dependent variable. The quality measures were based on Frank & Anderson's (1971) scale and Hackman et al.'s (1967) composite measure. The number of problems attempted, the number completed and the efficiency score served as the quantity measures.

Post Experimental Questionnaire

Participants' perceptions of the various experimental conditions were examined following the experimental session. Using 5-point scales with "very low" and "very high" serving as end points, the post

experimental questionnaire examined interest in the task, task importance, perceived relaxation during the task, and relative enjoyment of each task. Also included in this questionnaire were questions designed to assess participants' affective reactions to experimental conditions. These reactions were obtained using five 7-point bipolar adjective scales which were anchored by at ease-uneasy, not anxious-anxious, threatened-not threatened, not annoyed-annoyed, and bored-entertained. (See Appendix III for a complete copy of the post experimental questionnaire).

Analyses

As the first task was completed under disjunctive task demands by half the participants and conjunctive task demands by the other half, analyses of variance was performed to check for order effects. There were no order effects found in these analyses which are contained in Appendix V. Given this situation, analysis of variance was performed on a 3 x 2 x 2 split-plot factorial design with resultant affiliation motivation and group size serving as between-subjects variables and task demands as a within-subjects variable. The group score served as the data point in this analysis and the appropriate within cell error

term was used to test for main effects and interactions. A priori predictions (i.e. Hypothesis 1) were examined using two tailed t-tests based on the within-cell error term of analysis of variance.

CHAPTER III

RESULTS

In the first part of this section the evidence validating Steiner's model is presented. Following these results the analyses of variance using the average member scores are presented with respect to the hypothesis suggested in this thesis. In both parts the quality results are presented first and the quantity findings follow. Where necessary, tables are included and appropriate two-tailed t-tests have been used to facilitate a clear understanding of these analyses of variance. All analyses of variance are based on a 3 x 2 x 2 split plot factorial design with resultant affiliation motivation and group size serving as between-subjects factors and task demands serving as a within-subjects factor. There are 8 groups in each cell of the above design.

Validation of the Model

The results of the present investigation are relevant to two predictions from Steiner's model. The first is that group productivity will be greater under disjunctive task demands than conjunctive task demands. The second is the prediction that with increased group size there will be increased group productivity when

task demands are disjunctive and decreased group productivity when task demands are conjunctive.

It is important to note that the validation results presented below were obtained by determining the group score according to the procedure outlined by the particular experimental condition (i.e. disjunctive, conjunctive). Thus, when the task demands were disjunctive the performance of the best group member served as the group score. When task demands were conjunctive the performance of the worst group member served as the group score.

Prediction 1

This prediction suggests that group productivity will be greater under disjunctive task demands than conjunctive task demands.

Measures of quality

Results of analyses of variance using Frank & Anderson's (1971) measure, $F(1,42) = 83.72, p < .001$, and Hackman et al's (1967) measure, $F(1,42) = 43.57, p < .001$, supported prediction one (see Tables 1 and 2).

ANALYSIS OF VARIANCE FOR QUALITY¹
OF PROBLEMS SOLVED

Source of Variance	Ms	dF	F
Resultant Affiliation Motivation (A)	0.01	2	2.50
Group Size (B)	0.08	1	0.24
A x B	0.02	2	0.08
Subjects Within Cells	0.24	42	
Task Demands (C)	11.77	1	83.72****
A x C	0.66	2	4.70**
B x C	4.95	1	35.25****
A x B x C	0.41	2	2.95
Ms (error)	0.14	42	

**p < .01

****p < .0001

¹Frank & Anderson (1971) Quality Measure

ANALYSIS OF VARIANCE FOR COMPOSITE
QUALITY MEASURE¹ OF PROBLEMS SOLVED

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	0.67	2	1.58
Group Size (B)	0.31	1	0.73
A x B	0.97	2	2.29
Subjects Within Cells	0.42	42	
Task Demands (C)	15.76	1	43.57****
A x C	0.30	2	0.83
B x C	7.46	1	20.61***
A x B x C	0.53	2	1.46
Ms (error)	0.36	42	

*** $p < .001$

**** $p < .0001$

¹Hackman, Jones & McGrath (1967) Quality Measure

Measures of quantity

Similar findings which validate prediction one were found for all measures of quantity. Analyses of variance presented in Tables 3, 4 and 5 indicate a higher quantity of group performance under disjunctive as compared to conjunctive task demands when the number of problems attempted, $F(1,42) = 46.06$, $p < .001$, number of problems completed, $F(1,42) = 65.98$, $p < .001$ and the ratio of the number of problems attempted minus the number completed divided by the number attempted, $F(1,42) = 23.85$, $p < .001$, served as dependent measures of quantity. The reader will note that the latter quantity measure, referred to as the efficiency score, has been transformed by subtracting the calculated value from one. This was done so that higher values would represent higher efficiency.

Prediction 2

Prediction 2 suggests that with increased group size there will be increased group productivity when task demands are disjunctive and decreased group productivity when task demands are conjunctive.

ANALYSIS OF VARIANCE FOR NUMBER
OF PROBLEMS ATTEMPTED

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	0.01	2	0.004
Group Size (B)	3.01	1	1.27
A x B	1.70	2	0.72
Subjects Within Cells	2.36	42	
Task Demands (C)	61.76	1	46.06****
A x C	1.57	2	1.17
B x C	10.01	1	7.47**
A x B x C	0.14	2	0.10
Ms (error)	1.34	42	

** $\underline{p} < .01$

**** $\underline{p} < .0001$

ANALYSIS OF VARIANCE FOR
NUMBER OF PROBLEMS COMPLETED

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	0.01	2	0.01
Group Size (B)	1.26	1	0.65
A x B	1.26	2	0.65
Subjects Within Cells	1.93	42	
Task Demands (C)	78.84	1	65.98****
A x C	0.66	2	0.55
B x C	19.26	1	16.12***
A x B x C	1.45	2	1.21
Ms (error)	1.19	42	

*** $\underline{p} < .001$ **** $\underline{p} < .0001$

TABLE 5

ANALYSIS OF VARIANCE FOR
EFFICIENCY¹ OF PERFORMANCE

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	0.01	2	0.10
Group Size (B)	0.08	1	0.97
A x B	0.06	2	0.74
Subjects Within Cells	0.08	42	
Task Demands (C)	0.86	1	23.85****
A x C	0.01	2	0.20
B x C	0.35	1	9.62**
A x B x C	0.13	2	3.71**
Ms (error)	0.04	42	

*p < .01

** p < .001

****p < .0001

¹This score was determined using the following formula:

$$1 - \left(\frac{\text{Number of Problems Attempted} - \text{Number of Problems Completed}}{\text{Number of Problems Attempted}} \right)$$

Measures of quality

The results from both quality measures validate this Steiner prediction. The analysis of variance using Frank & Anderson's (1971) quality measure (see Table 1) indicated an interaction between task demands and group size, $F(1,42)=35.25$, $p<.001$. The means for this interaction are presented in Table 6. They suggest that the quality of groups' performance increased as group size increased when task instructions were disjunctive, $t(42)=3.64$, $p<.001$ and decreased when instructions were conjunctive, $t(42)=-4.93$, $p<.001$.

When quality was measured using the procedure developed by Hackman et al. (1967) analysis of variance indicated an interaction between task demands and group size, $F(1,42)=20.62$, $p<.001$ (see Table 2).

As illustrated in Table 7, the cell means associated with this interaction indicate that quality of group performance increased when task demands were disjunctive, $t(42)=2.57$, $p<.01$ and decreased when task demands were conjunctive, $t(42)=-3.98$, $p<.001$.

Measures of quantity

Analyses of variance on the quantity measures also validate Steiner's prediction. That is, the results indicated that group performance increased from a group

TABLE 6

Quality¹ of performance as a function of
group size and task demands

Task Demands	<u>Group Size</u>	
	Two	Six
Disjunctive	2.97	3.37
Conjunctive	2.73	2.21

1. Quality determined by Frank & Anderson's (1971) measure

* Higher scores indicate greater quality of performance

Quality¹ of performance as a function
of group size and task demands

Task Demands	Group Size	
	Two	Six
Disjunctive	3.19	3.63
Conjunctive	2.94	2.26

1. Quality determined by composite measure of Hackman et al. (1967).

* Higher scores indicate greater quality of performance.

of size two to size six when task demands were disjunctive and decreased from size two to six when task demands were conjunctive. This pattern of results was obtained when the dependent variable was the number of problems attempted, $F(1,42)=7.47$, $p<.01$, the number of problems completed $F(1,42)=16.12$, $p<.001$, and the efficiency score, $F(1,42)=9.62$, $p<.001$. The means illustrating these results are presented in Table 8, Table 9 and Table 10, respectively.

Tests of the Hypothesis

The findings for the two quality measures and three quantity measures are presented. The group scores for each dependent variable was calculated by averaging the member scores. As with the validation results the efficiency score was transformed so that a high score indicates high efficiency.

According to these hypothesis of this investigation, it was anticipated that, on the one hand increased group size¹ under disjunctive task demands would lead to increased group productivity for approval-oriented as compared to rejection-threatened groups. On the other hand, increased group size when task demands were conjunctive would lead to decreased group productivity for rejection-threatened as compared to approval-oriented groups.

Number of problems attempted as a function
of group size and task demands

Task Demands	<u>Group Size</u>	
	Two	Six
Disjunctive	4.50	5.50
Conjunctive	3.54	3.25

TABLE 9

Number of problems completed as a function of group size and task demands

Task Demands	<u>Group Size</u>	
	Two	Six
Disjunctive	3.21	4.33
Conjunctive	2.29	1.63

TABLE 10

Group efficiency as a function of
groups size and task demands

Task Demands	Group Size	
	Two	Six
Disjunctive	.71	.80
Conjunctive	.66	.49

*Higher scores indicate greater efficiency of performance

Measures of quality

Results obtained from analyses of variance indicated no support for this hypothesis using either Frank & Anderson's (1971) quality measure, $F(1,42) = .36$, n s, or Hackman et al's (1967) measure of quality, $F(1,42) = .43$, n s (see Table 11 and Table 12).²

Measure of quantity

Analyses of variance offered no support for this hypothesis when the number of problems attempted, $F(1,42) = .11$, n s, the number of problems completed, $F(1,42) = .41$, n s and the efficiency score, $F(1,42) = 1.80$, n s served as dependent measures of quantity. These analyses are presented in Table 13, Table 14, and Table 15 respectively.

Post Experimental Questionnaire Results

Analyses of variance were performed on each of the nine post experimental questions. These analyses yield no significant results for seven of the nine questions. The analyses of variance for these are presented in Table 16 through Table 22.

ANALYSIS OF VARIANCE FOR QUALITY¹
OF PROBLEMS SOLVED USING AVERAGE MEMBER SCORES

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	.20	2	.87
Group Size (B)	.29	1	.26
A x B	.02	2	.75
Subjects Within Cells	.23	42	
Task Demands (C)	.34	1	2.57
A x C	.31	2	2.36
B x C	.59	1	4.50*
A x B x C	.05	2	.36
Ms (error)	.13	42	

* $p < .04$

¹Frank & Anderson's (1971) Quality Measure

ANALYSIS OF VARIANCE* FOR COMPOSITE QUALITY
MEASURE¹ OF PROBLEMS SOLVED USING AVERAGE MEMBER SCORES

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	.21	2	.55
Group Size (B)	.33	1	.87
A x B	.60	2	1.58
Subjects Within Cells	.38	42	
Task Demands (C)	.81	1	2.32
A x C	.05	2	.13
B x C	.55	1	1.56
A x B x C	.15	2	.43
Ms (error)	.35	42	

Hackman et al's (1967) Quality Measure

ANALYSIS OF VARIANCE FOR NUMBER OF PROBLEMS
ATTEMPTED USING AVERAGE MEMBER SCORES

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	.20	2	.11
Group Size (B)	4.66	1	1.26
A x B	1.49	2	.82
Subjects Within Cells	1.82	42	
Task Demands (C)	.01	1	.01
A x C	.52	2	.76
B x C	.01	1	.01
A x B x C	.08	2	.11
Ms (error)	.69	42	

TABLE 14

ANALYSIS OF VARIANCE FOR NUMBER OF PROBLEMS
COMPLETED USING AVERAGE MEMBER SCORES

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	.12	2	.09
Group Size (B)	.47	1	.34
A x B	1.39	2	1.01
Subjects Within Cells	1.38	42	
Task Demands (C)	1.60	1	1.94
A x C	.03	2	.03
B x C	.12	1	.14
A x B x C	.34	2	.41
Ms (error)	.82	42	

ANALYSIS OF VARIANCE FOR EFFICIENCY
OF PERFORMANCE USING AVERAGE MEMBER SCORES

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	.01	2	.03
Group Size (B)	.08	1	1.78
A x B	.03	2	.66
Subjects Within Cells	.04	42	
Task Demands (C)	.11	1	5.47*
A x C	.02	2	.96
B x C	.01	1	.05
A x B x C	.04	2	1.80
Ms (error)	.02	42	

* $p < .05$

TABLE 16

ANALYSIS OF VARIANCE OF GROUP MEMBERS
RATING OF TASK ENTERTAINMENT

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	.37	2	.30
Group Size (B)	.46	1	.38
A x B	.08	2	.06
Subjects Within Cells	1.20	42	
Task Demands (C)	.16	1	.31
A x C	.08	2	.15
B x C	.11	1	.22
A x B x C	.11	2	.21
Ms (error)	.52	42	

TABLE 17

ANALYSIS OF VARIANCE OF GROUP MEMBER
RATINGS OF ANNOYANCE

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	.17	2	.10
Group Size (B)	6.19	1	3.68
A x B	2.87	2	1.70
Subjects Within Cells	1.68	42	
Task Demands (C)	.16	1	.32
A x C	.19	2	.53
B x C	.17	1	.47
A x B x C	.26	2	.73
Ms (error)	.36	42	

TABLE 18

ANALYSIS OF VARIANCE FOR GROUP MEMBER
RATINGS OF RELAXATION

Source of Variance	Ms	df	F _r
Resultant Affiliation Motivation (A)	.39	2	1.05
Group Size (B)	.10	1	.28
A x B	.40	2	1.08
Subjects Within Cells	.37	42	
Task Demands (C)	.08	1	.85
A x C	.02	2	.19
B x C	.11	1	1.11
A x B x C	.02	2	.19
Ms (error)	.10	42	

TABLE 19

ANALYSIS OF VARIANCE OF GROUP MEMBER
RATINGS OF UNEASINESS

Source of Variance	Ms.	df	F
Resultant Affiliation Motivation (A)	1.59	2	1.30
Group Size (B)	.11	1	.09
A x B	.19	2	.15
Subjects Within Cells	1.23	42	
Task Demands (C)	.57	1	3.66
A x C	.14	2	.90
B x C	.55	1	3.54
A x B x C	.24	2	1.52
Ms (error)	.16	42	

TABLE 20

ANALYSIS OF VARIANCE OF GROUP MEMBERS
RATINGS OF ANXIETY

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	1.54	2	3.01
Group Size (B)	1.50	1	.84
A x B	.46	2	.26
Subjects Within Cells	1.79	42	
Task Demands (C)	.14	1	.61
A x C	.30	2	1.30
B x C	.33	1	1.44
A x B x C	.01	2	.06
Ms (error)	.23	42	

TABLE 21

ANALYSIS OF VARIANCE OF GROUP MEMBERS
RATING OF THREATENEDNESS

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	1.05	2	.41
Group Size (B)	.19	1	.08
A x B	1.60	2	.62
Subjects Within Cells	2.59	42	
Task Demands (C)	.06	1	.54
A x C	.01	2	.07
B x C	.23	1	2.19
A x B x C	.04	2	.35
Ms (error)	.10	42	

ANALYSIS OF VARIANCE OF GROUP MEMBER
RATINGS OF "PREFERRED CO-WORKER"

Source of Variance	Ms	Df	F
Resultant Affiliation Motivation (A)	.49	2	.52
Group Size (B)	1.35	1	1.44
A x B	.09	2	.10
Subjects Within Cells	.94	42	
Task-Demands (C)	.29	1	.86
A x C	.07	2	.19
B x C	.01	1	.01
A x B x C	.39	2	1.14
Ms (error)	.34	42	

The results obtained by analysis of variance on the question "To what extent were you interested in performing the task?" indicated there was more interest in performing tasks when persons were in groups of size two as compared to size six, $F(1,42) = 4.75, p < .04$ (see Table 23). The question was scored such that the lower the score the higher the interest and persons in groups of size two had a mean score of 2.69 while those in groups of size six had a mean score of 2.94.

Analysis of variance on the question "To what extent was it important for you to contribute to your group's score?" yielded an interaction between resultant affiliation motivation and group size, $F(2,42) = 3.52, p < .04$ (see Table 24). As Table 25 illustrates, approval oriented as compared to rejection-threatened persons rated their performance as more important in groups of size two relative to size six, $t(42) = 3.12, p < .01$.

Correlations Among Dependent Variables

The correlations among the dependent measures used to test the hypothesis are presented in Table 26. Table 27 is presented immediately following as it provides the variable names for the correlation table.

ANALYSIS OF VARIANCE FOR GROUP MEMBERS
RATINGS OF TASK INTEREST

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	.12	2	.35
Group Size (B)	1.58	1	4.75*
A x B	.39	2	1.16
Subjects Within Cells	.53	42	
Task Demands (C)	.10	1	.76
A x C	.26	2	2.11
B x C	.26	1	2.07
A x B x C	.01	2	.01
Ms (error)	.12	42	

*p < .04.

TABLE 24

ANALYSIS OF VARIANCE FOR GROUP MEMBER
RATINGS OF TASK IMPORTANCE

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	.57	2	1.31
Group Size (B)	.04	1	.08
A x B	1.53	2	3.52*
Subjects Within Cells	.44	42	
Task Demands (C)	.05	1	.32
A x C	.16	2	1.03
B x C	.01	1	.09
A x B x C	.10	2	.65
Ms (error)	.15	42	

*p < .04

2

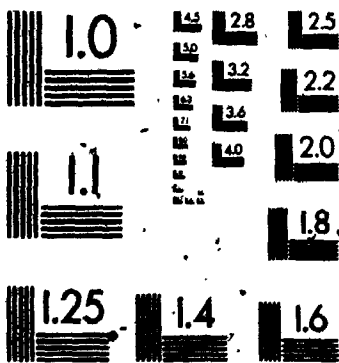


TABLE 25

TASK IMPORTANCE¹ RATINGS AS A FUNCTION OF
RESULTANT AFFILIATION MOTIVATION AND GROUP SIZE

Resultant Affiliation Motivation	Group Size	
	Two	Six
High	2.63	3.08
Moderate	3.03	2.87
Low	3.31	2.92

¹Higher scores indicate lower task importance ratings.

TABLE 26

Correlation Table for Average Member Scores on all Dependent Variables.

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆	V ₇	V ₈	V ₉	V ₁₀
V ₁										
V ₂	.73***									
V ₃	-.06	-.15								
V ₄	-.67***	-.04	.12							
V ₅	.22	-.07	.26**	-.26**						
V ₆	.29*	.35**	.14	-.10	-.01					
V ₇	-.20	.49***	.17	.17	.01	.71***				
V ₈	-.01	-.26*	.20	.25*	.06	-.28*	-.24*			
V ₉	-.15	.10	.02	.37**	-.04	-.50***	.22	.06		
V ₁₀	-.31*	-.50***	.07	-.12	.07	-.47***	-.43***	.41**	.01	

*p < .05

**p < .01

***p < .001

TABLE 27
 VARIABLE NAMES FOR CORRELATION TABLE

<u>Variable</u>	<u>Name of Dependent Measure</u>
V ₁	= Problems Completed on Disjunctive Task
V ₂	= Problems Attempted on Disjunctive Task
V ₃	= Frank & Anderson's Quality Score on Disjunctive Task
V ₄	= Efficiency Score on Disjunctive Task
V ₅	= Hackman, Jones & McGrath's Quality Score on Disjunctive Task
V ₆	= Problems Completed on Conjunctive Task
V ₇	= Problems Attempted on Conjunctive Task
V ₈	= Frank & Anderson's Quality Score on Conjunctive Task
V ₉	= Efficiency Score on Conjunctive Task
V ₁₀	= Hackman, Jones & McGrath's Quality Score on Conjunctive Task

As anticipated, Table 26 indicates a positive correlation between scores on the conjunctive and disjunctive tasks for problems completed ($p < .05$), problems attempted ($p < .001$), and efficiency ($p < .01$) for quantitative measures. Also, a positive correlation was found between problems completed and problems attempted under disjunctive ($p < .001$) and conjunctive ($p < .001$) task demands. Finally, the expected negative correlation between problems completed and efficiency was obtained under disjunctive ($p < .001$) and conjunctive ($p < .001$) conditions.

For each measure of quality there was no correlation between disjunctive and conjunctive scores. However, there was a positive correlation between the two quality measures when task demands were disjunctive ($p < .01$) and when they were conjunctive ($p < .01$).

Footnotes

1. The reader will recall that group sizes of two and six were used in this investigation. As group members were not permitted to interact when performing the task, the possible effects due to characteristics associated with particular group sizes (e.g. dyads) were minimized. Indeed, an increase in group size was conceptualized as accentuating the incentives aroused by disjunctive and conjunctive task demands. Also, the reader will note that prediction related to group size effects are stated in relative terms.

2. Results from the correlation matrix presented in Table 26 indicated low correlations between the two measures of quality. Specifically, there was a correlation of .26 between quality measures when task demands were disjunctive. When task demands were conjunctive, the correlation between quality measures was .41. Higher correlations between these variables was anticipated and these results suggest that one or both quality measures are unreliable. To the extent these measures were unreliable they undoubtedly contributed to the failure to support the hypothesis.

CHAPTER IV

DISCUSSION

The purpose of this dissertation was threefold. First, it provided an opportunity to validate Steiner's disjunctive and conjunctive model of group performance. Second, it permitted examination of Steiner's predictions concerning the effects of group size and task demands on group productivity. Third, and perhaps most important, this investigation attempted to extend recent developments in affiliation motivation to an other area of small group behaviour, namely group performance. The findings, presented in the previous chapter are reviewed with reference to each of these purposes.

Summary of Results

Validation of the Model

All quantitative and qualitative dependent measures validated Steiner's (1971) predictions concerning the relationship between group size, task demands and group productivity for his disjunctive and conjunctive models. That is, when performance was assessed according to the particular task demands of the situation then groups of size six performed better

than those of size two under the disjunctive condition and poorer than groups of size two under the conjunctive condition.

Tests of the Hypothesis

Both qualitative and quantitative dependent measures of group productivity did not support the predicted three way interaction among resultant affiliation motivation, task demands and group size. Interestingly, analysis of variance performed to validate Steiner's model yielded the predicted three-way interaction using the efficiency score as the dependent measure ($p < .001$) (see Table 5).

Implications for Steiner's Model of Group Performance

The present investigation validates Steiner's predictions concerning the relationship between task demands (i.e. disjunctive and conjunctive) and group size and their effect upon group productivity. However, one must bear in mind that validation of the aspects of Steiner's model used in this investigation is statistically probable. In other words, the disjunctive and conjunctive models are defined so that there will be greater productivity under disjunctive as compared to conjunctive task demands. It follows from

the model that increased group size should serve to increase productivity when task demands are disjunctive and decrease productivity when task demands are conjunctive.

Implications of affiliation-related motives for Steiner's model of group performance

It was hypothesized that the performance of rejection-threatened and approval-oriented groups would be differentially affected by conjunctive as compared to disjunctive task demands. Furthermore it was expected that these performance differences would be accentuated with increased group size. Unfortunately, there were no differences among the average group member means when this hypothesis was examined.

However, the reader will recall (see Table 5) that a significant interaction similar to the predicted three-way interaction was obtained using the efficiency measure of performance when group scores were calculated by using the score of the best (disjunctive task demands) and worst (conjunctive task demands) group member ($p < .001$). Bearing in mind that this result must be viewed with caution, it does suggest the possibility that affiliation-related motives may be extended to the study of group performance. That is,

persons differing in resultant affiliation motivation are not similarly affected by changes in group size and task demands. This may be due to the effect of conjunctive and disjunctive task demands on the affiliation incentives present in the group setting. On the one hand conjunctive task demands may emphasize rejection incentives because individuals in this situation must face the possibility of being identified as the group member who performed worst and hence the member who determined the group score. Recall group members were specifically told that everyone would be informed of their group score as well as the scores of all group members. On the other hand when task demands are disjunctive approval incentives may be emphasized. Group members in this situation may be able to gain their group's approval by performing well. Since these differing task demands enhance different incentives in the group setting, rejection incentives in the conjunctive task and approval incentives in the disjunctive task, it was expected that persons who vary in affiliation-related motives would be differentially affected by the particular incentives aroused under each group situation.

The means for the obtained three way interaction are presented in Table 28. As one can see, under conjunctive task demands increased group size lead to decreased efficiency for rejection-threatened as compared to approval-oriented groups, $t(42) = 3.21, p < .01$.

This result indicates that rejection-threatened groups are relatively unaffected by increases in group size when task demands are disjunctive as compared to conjunctive. That is, since approval incentives are present under disjunctive task demands and likely increase as group size increases while rejection incentives are present under conjunctive task demands and likely increase as group size increases changes in group size will have a greater effect upon the performance of rejection-threatened groups when task demands are conjunctive rather than disjunctive. Support was found for this prediction, $t(42) = 3.88, p < .001$. Under conjunctive task demands rejection-threatened groups respond to the increase in group size and the subsequent enhancement of rejection incentives by performing poorly. When task demands are disjunctive the increase in approval incentives that results from group size increases has relatively little effect on the performance of rejection-threatened groups. Indeed, although not significant, there is an

TABLE 28

Group efficiency as a function of
task demands, group size and resultant affiliation motivation.

	Task Demand			
	Disjunctive		Conjunctive	
	Group Size		Group Size	
	Two	Six	Two	Six
High	.71	.76	.57	.59
Moderate	.72	.81	.67	.52
Low	.71	.82	.75	.34

*Higher scores indicate greater performance efficiency.

increase rather than a decrease in their performance as group size increases. Unfortunately predictions concerning the behaviour of approval-oriented groups, while in the predicted direction, were not statistically significant. That is, an increase in group size did not improve the performance of approval-oriented groups under disjunctive as compared to conjunctive task demands.

While post experimental questions yielded few results the interaction between resultant affiliation motivation and group size obtained on the measure of perceived task importance ($p < .04$) may be viewed as consistent with the obtained three way interaction. The findings suggest that approval-oriented groups saw the task performed in a group of size two as more important than rejection-threatened groups. Given that incentive to perform is seen to be differentially affected by disjunctive and conjunctive task demands as a function of affiliation-related motives these results suggest that there may be a greater performance difference for disjunctive as compared to conjunctive task at size two for approval-oriented groups as compared to rejection-threatened groups. That is, the increased importance placed on performing in a group of size two by approval-oriented as compared to

rejection-threatened groups may have lead to accentuation of the incentives aroused by disjunctive demands and hence lead to greater performance differences here. Unfortunately while results are in the expected direction they are not statistically significant, $t(42)=1.49$, $p<.15$. The reverse finding for importance was obtained for groups of size six with rejection-threatened rather than approval-oriented groups placing the highest degree of importance on their performance under this condition. Again one would expect incentives aroused by disjunctive and conjunctive task demands to be accentuated under conditions of heightened importance and this to be reflected in greater performance differences for rejection-threatened as compared to approval-oriented groups. Group efficiency results reported in Table 28 are consistent with this post hoc interpretation, $t(42)=-2.31$, $p<.05$. Approval-oriented groups performing in groups of six were relatively unaffected by variations in task demands (conjunctive $M=.59$, disjunctive $M=.76$), $t(42)=1.79$, ns. Performance of rejection-threatened groups under similar conditions was greatly affected; being very poor under conjunctive ($M=.34$) as compared to disjunctive ($M=.82$) task demands, $t(42)=5.05$; $p<.001$.

Possible alternative explanations

Bearing in mind that some support for the predicted three-way interaction was obtained with the validation measure and not when the group score was determined by the group members' average score it is, nevertheless, interesting to consider the relationship among resultant affiliation motivation, task demands and group size. Recall that the prediction was supported when task demands were conjunctive but not when they were disjunctive. There are at least two plausible explanations which may account for this result.

First, it is possible that approval-oriented groups are overmotivated. In the experimental setting it may be that there are affiliation incentives not only in the disjunctive task but also when members anticipate future interaction with each other. The combination of these two sources of affiliation incentives may have aroused the approval-oriented to the extent that performance did not improve as a function of being too positively motivated in this condition (see Sorrentino and Short, 1975).

A second possible explanation for the failure to obtain the predicted result is concerned with other sources of motivation. It may be that disjunctive task

demands arouse incentives other than affiliation. For example, disjunctive task demands may arouse stronger achievement incentives than conjunctive task demands. To the extent that achievement incentives are present when task demands are disjunctive the predicted interaction between resultant affiliation motivation and group size may be altered.

Additional research

In an effort to examine the overmotivation explanation suggested another experiment was performed.

The design was similar to the previous experiment and used a 2 X 2 X 2 factorial design. There were two levels of resultant affiliation motivation (approval-oriented, rejection-threatened), two types of task demands (disjunctive, conjunctive) and two levels of anticipation of future interaction (group, alone) serving as the three independent variables. All subjects performed in groups of size two and there were 10 subjects in each cell of this design and hence eighty subjects in the study. The same set of problems served as the group task in this experiment.

Following classification of subjects as approval-oriented or rejection-threatened the participants were randomly assigned to experimental

conditions. Those in the group anticipation of future interaction condition were informed that in the second phase of the study they would be working together as a group on a similar task in which group discussion would be involved (this condition was identical to that of the initial study). The subjects assigned to the alone anticipation of future interaction condition were told that they would be working alone in separate rooms on a similar task during the second phase.

It was anticipated that the motivation of approval-oriented persons performing under disjunctive task conditions would be less in the alone as compared to the group anticipation of future interaction condition. Thus, according to an overmotivation explanation the performance of the approval oriented would be better in the alone relative to the group condition when task demands were disjunctive as compared to conjunctive.

Analysis of variance using the number of problems attempted as the dependent measure indicated a significant main effect for resultant affiliation motivation, $F(1,32) = 5.73$, $p < .02$ (see Table 29). This finding indicated that approval-oriented persons attempted more problems ($M=3.78$) than rejection-threatened persons ($M=3.13$). This analysis

TABLE 29

ANALYSIS OF VARIANCE FOR NUMBER OF PROBLEMS
 ATTEMPTED: STUDY II

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	8.45	1	5.73 *
Task Demands (B)	1.80	1	1.22
Anticipation (C)	.45	1	.31
A x B	.45	1	.31
A x C	.20	1	.14
B x C	2.45	1	1.66
A x B x C	9.80	1	6.64 **
Ms (error)	1.48	32	1.36 ***
Ms (error)	.63		

* $p < .02$

** $p < .01$

*** $p < .005$

also yielded an interaction among resultant affiliation motivation, task demands and anticipation of future interaction, $F(1,32) = 6.64$, $p < .01$. However, examination of the cell means presented in Table 30 indicates that there is no support for the overmotivation hypothesis. As one can see the interaction appears to be due to greater differences between approval-oriented and rejection-threatened persons in the disjunctive task when anticipating future group interaction, whereas this difference is greater in the conjunctive task when future interaction was not anticipated. At the present time, this three way interaction is not interpretable.

Problems with this Investigation

When one considers Steiner's predictions concerning the relationship among disjunctive and conjunctive task demands, group size and group performance it may be that the conceptualization of the task lead to the present findings. The reader will recall that the subjects' specific task, a written production task, was presented under disjunctive task instructions or conjunctive task instructions. In other words, the particular task was performed when task demands were disjunctive or conjunctive. This

TABLE 30

Mean Number of Problems Attempted: Study II

Resultant Affiliation Motivation	<u>Anticipation of Future Interaction</u>			
	Group		Alone	
	<u>Task Demands</u>			
	Disjunctive	Conjunctive	Disjunctive	Conjunctive
Approval-Oriented	4.40	3.20	3.30	4.20
Rejection-Threatened	3.30	3.20	3.40	2.60

procedure was chosen as it permitted a careful examination of the predicted three way interaction among resultant affiliation motivation, task demands and group size. However, it is different from past procedures in two ways. First, unlike Frank & Anderson's (1971) procedure it examined group performance under disjunctive and conjunctive task demands when groups were performing individually. As indicated earlier, in their research the persons who performed the task under conjunctive task demands were working individually while those who performed under disjunctive task demands were interacting. Second, much past research examining disjunctive and conjunctive models has used different types of tasks to represent these two models (i.e. Bray, Kerr & Aitken, 1978; Kerr & Bruun, 1983). Once again, the present investigation used two matched tasks and manipulated the instructions for each task (i.e. disjunctive, conjunctive) in an effort to examine the effects of resultant affiliation motivation on Steiner's models without confounding task and task demands. It is possible that these two procedural differences may account for the present findings.

Finally, it is not clear why the very limited support for the hypothesis was obtained with only one measure of group performance. It would obviously be desirable to have multiple indices of group performance yield identical results, but the present pattern of results was not entirely unexpected. Frank & Anderson (1971) and more recently Bray, Kerr & Atkin (1978) note that models of group performance often do not specify the particular indices of group performance which are applicable. Bray et al. (1978) suggest that it may be necessary to examine Steiner's hypotheses with the idea of quantifying which measures of productivity are applicable to his model. At the present time the paucity of research would make any conclusions concerning the various indices of group performance premature.

Limitations of this Investigation

While every investigation has its limitations and one must continually deal with the issue of external validity whenever doing experimental laboratory research, there were a number of restrictions in this study which limit its generality but were required for an accurate examination of the motivational variable. First, no interaction among group members was

permitted. This meant that there was no possibility of group productivity losses from faulty social process. Thus, the potential group productivity and the actual group productivity were equal under these conditions and differences in group performance could not be affected by any social interaction characteristics specific to particular group sizes (e.g., dyads). Also, this procedure removed the possible confounding of task demands and group interaction present in the Frank & Anderson (1971) investigation. Second, the manipulation of task demands was presented in such a way that group members did not receive feedback concerning the performance of other members on the task. This eliminated any feelings of success or failure as the member performed the tasks and hence removed systematic effects of such feedback on performance. Third, members of all groups, in all conditions anticipated future interaction with their group following the no interaction phase of the study. Such a procedure was used largely because past research (i.e., Sorrentino & Hancock, 1976; Hancock & Sorrentino, 1980) indicated that affiliation-related motives were enhanced under these conditions. In one sense this procedure restricts the generality of results yet, interestingly, in another the anticipation

of future interaction may increase external validity by bringing these laboratory groups a little closer to "real world" groups. A fourth possible limitation was that all groups were competing against each other and told that a winner would be declared at the conclusion of the experiment. However just as anticipation of future group interaction may have increased external validity increasing the salience of competition among group may have a similar effect. Finally, two levels of group size were examined in this study. This experiment examined only groups of size two and six because the major thrust of the investigation was to assess the feasibility of applying affiliation motivation to the study of group performance.

Directions for Future Research

Although there was support for Steiner's predictions, the problems concerning the conceptualization of the disjunctive and conjunctive models suggest major procedural changes may be warranted. However, there are a number of avenues of research worthy of exploration before such changes are made. First, it would be desirable to examine more than two levels of group size. Examination of groups ranging in size from two through six would be an

important next step. Second, increasing the number of subjects in each cell may improve prediction.

With regard to the relationship between affiliation-related motives and Steiner's model of group performance, examination of a range of group sizes and increased cell size would also be useful extensions of the present investigation. There are, however, a number of directions for future research suggested by the findings of this investigation. For example, it would be interesting to pursue the results obtained in the overmotivation experiment.

Perhaps the most interesting aspect of the relationship between affiliation-related motives and Steiner's model of group performance is related to the subjects' post-experimental ratings of task importance. Results from the individuals' ratings of task importance indicated that approval-oriented as compared to rejection-threatened groups placed more importance on their performance in groups of size two relative to groups of size six ($p < .04$).

Recall that according to our conceptualization it was anticipated that approval-oriented and rejection-threatened groups would rate the task as more important in groups of size six as compared to size two. In the present investigation these ratings of

task importance were obtained after groups had performed the tasks. It is quite likely that evaluation of task performance may be quite different after a task has been completed as compared to a similar evaluation before the task is attempted. For example, considerations of perceived success and/or failure may enter into an evaluation of task importance taken after the task has been performed. Consideration of this data collection procedure as well as group members uncertainty concerning their likely success or failure suggest an explanation for the interaction between resultant affiliation motivation and group size on the importance ratings. That is, in the absence of any clear information regarding success or failure at the task it's possible group size served as an indicator of the probability of success or failure at the task. Their success or failure may have been seen as more likely in a group of size two, where the probability of being the best or worst group member is .5, as compared to a group of six where the probability of being the best or poorest performer is .17. Furthermore the absence of clear information concerning success or failure coupled with the novelty of the task may have differentially affected approval-oriented and rejection-threatened persons. On the one hand

rejection-threatened persons may have rated task importance higher in a group of six as compared to two because rejection by five persons may be more negative than rejection by one person. Such persons, drawing upon their past history of performance, may believe that they performed poorest in their group and thus attend to the incentive value of rejection that is greater in groups of six as opposed to two. On the other hand, approval-oriented persons may be more attuned to their probability of success and hence rate performance in groups of two more important than performance in groups of six because the likelihood of gaining approval is greater in the former. These persons, motivated by a desire to gain the approval of others, may weigh the likelihood of gaining approval with the amount of approval which may be gained in these two situations (i.e., size two vs. size six). What this explanation suggests is that rejection-threatened persons attend more to the incentive value of rejection than the probability of rejection while approval-oriented persons attend more to the probability of gaining approval than the incentive value of approval.

To summarize, rejection-threatened persons, believing that their likelihood of rejection is high, are mainly concerned with minimizing the amount of rejection received. Approval-oriented persons are mainly concerned with gaining approval and attempt to maximize the probability of gaining at least some degree of approval. It is important to remember that this explanation is speculative. Furthermore, there is no theoretical reason for approval-oriented and rejection-threatened persons to behave as suggested.

Given the speculative nature of this explanation and the absence of an interaction among affiliation-related motives, group size, and task demands on the task importance measure, one must view this explanation cautiously. Nevertheless, the idea that approval-oriented persons may not consider the relationship between the incentive value of approval and the probability of gaining approval in the same way as rejection-threatened persons is a very intriguing possibility and warrants further research. To speculate, future research could examine the performance of group members differing in affiliation-related motives, holding the incentive value of approval (I_a) constant, and manipulating the probability of gaining approval (P_a). Based on the

present data it is reasonable to hypothesize that approval-oriented persons would be more influenced by variations in Pa than rejection-threatened persons while variations in Ia may have a greater effect on rejection-threatened as compared to approval-oriented person.

Conclusions

A number of the problems and limitations of the present investigation have been detailed in previous sections. These caveats notwithstanding there are contributions made by the present investigation. First, it validates Steiner's disjunctive and conjunctive models and the predicted interaction between task demands and group size. The results indicated that an increase in group size accentuated performance when task demands were disjunctive and attenuated performance when task demands were conjunctive. Second, and more important, the investigation suggested that affiliation-related motives may be important for Steiner's model of group performance. Their possible importance is suggested by the interaction among affiliation-related motives, task demands and group size obtained using the validation measure and the interaction among affiliation-related

motives, task demands, and anticipation of future interaction found in the followup study. Although these two results do not indicate the precise nature of the relationship between affiliation-related motives and Steiner's model, they do suggest that affiliation-related motives may serve as determinants of group behaviour within Steiner's framework. Third, a number of intriguing research possibilities are suggested on the basis of the consistent relationship between the hypothesized three-way interaction and the post-experimental measure of task importance.

In conclusion, while the exact nature of the relationship between affiliation-related motives and Steiner's model of group behaviour is unclear the results suggest that affiliation-related motives may serve as important determinants of group behaviour. Indeed, the present investigation suggests that further research examining group members' affiliation-related motives within the framework of Steiner's model may be fruitful.

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APPENDIX I

SCALES FOR SCORING QUALITY OF
GROUP PRODUCTION

FRANK & ANDERSON (1971) 5 POINT SCALE FOR QUALITY

- 1 = extremely dull, routine answer showing practically no ingenuity
- 2 = very ordinary and very common answer showing little ingenuity
- 3 = ordinary, common answer which shows average ingenuity occurring fairly often in the population
- 4 = somewhat unusual, off-beat answer which shows above average ingenuity and which would occur relatively infrequently in the population
- 5 = very unusual, off-beat answer which would require high ingenuity and which would occur only seldom in the population

HACKMAN, JONES and McGRATH (1967) QUALITY OF PRESENTATION
SCALES

- A. Chippy: The degree to which the writing of a passage is fragmented, broken, discontinuous, or inappropriately staccato as opposed to flowing or harmonious.

very chippy							not at all chippy
1	2	3	4	5	6	7	

- B. Stylistically well-integrated: The degree to which the writing of a passage blends together in an appropriate manner. Consistency and synchronization of the style of the passage are of primary importance in making judgements on this scale.

low						high
1	2	3	4	5	6	7

- C. Understandably presented: The degree to which a passage can be read and understood without excessive difficulty; the clarity of presentation.

low						high
1	2	3	4	5	6	7

APPENDIX II

EXPERIMENTAL TASKS

TASK BOOKLET A

PLEASE DO NOT OPEN UNTIL ASKED TO DO SO

7'

We do not think this is likely to happen, but imagine for a moment what would happen if everyone after 1979 had an extra thumb on each hand. This extra thumb will be built just as the present one is, but located on the other side of the hand. It faces inward, so that it can press against the fingers, just as the regular thumb does now. Name three practical benefits and three difficulties which will arise when people start having this extra thumb.

Suppose that discoveries in physiology and nutrition have so affected the diet of American children over a period of 20 years that the average height of Americans at age 20 has about doubled. Comparative studies of the growth of children during the last 5 years indicates that the phenomenal change in stature is stabilized so that further increase is not expected. Name 5 adjustments that this situation would require.

Haiku is a form of Japanese poetry which consists of exactly seventeen syllables, no more, no less. Write a Haiku poem on the following subjects (one poem for each subject): quicksand, and biology.

Taken together, the poems should have a message.

Rube Goldberg was a master at inventing monstrously complicated devices for performing very simple acts. Describe a "Rube Goldberg" type method or procedure (not device) for taking a bath without getting your hands or feet wet.

Some people prefer "brewed" coffee (they say it tastes better), and others swear by instant coffee (like the convenience). Unfortunately, many advocates of one kind of coffee often deny that the other kind has any worth at all.

In addition to the points given above, list three advantages for each type of coffee.

In order to increase the supply of cadavers for medical students to use in their studies, a certain university commonly accepts the bodies of unclaimed persons.. This practice, however, is frowned upon by many people, some of whom have established special funds for providing proper burial for these unclaimed, unidentified people. The body then goes to whichever group becomes aware of the case first. This situation places a great limitation upon the schools of medicine and may have some effect upon the quality of physicians coming into the profession.

Develop a consistent policy which could be used in such cases and which would be acceptable to both groups. Write about a paragraph summarizing your conclusions.

Atomic scientists tell us that if atmospheric tests of nuclear weapons continue unabated, mutations may occur frequently in the human population.

Some scientists feel that this may be good for the human race, since it is by mutation that adaptive evolution takes place; others feel that mutations will be more bad than good, pointing to the deformed babies which are likely to be born if mutations are increased.

Your task is to write three points for each side of this issue.

A few years ago Beardsley Ruml wrote a book (Memo to a College Trustee) advocating the use of large lecture sections to improve the economic efficiency of institutions of higher education.

The theses of his book was based on the assumption that large, lecture classes are educationally as worthy as small, discussion type classes. This assumption has been challenged by many educators, and has caused a small furor in higher education circles. Empirical research on the question has been largely inconclusive.

You, as college students are in a position to make a unique and valuable contribution to this question. Drawing on your own personal experiences in college classes, give 3 points for each sided.

This task is a test of your ability to cooperate in using the English language. Your job will be to write a description of a typical "modern" chair in a certain grammatical and structural format.

Your writeup must include:

1. exactly one compound sentence
2. a sentence with a participial phrase
3. no more than 8 adjectives
4. one sentence fragment
5. a sentence with a split infinitive
6. at least one use of (a) "i.e." construction and (b) "e.g." construction
7. exactly two legitimate paragraphs

TASK BOOKLET B

PLEASE DO NOT OPEN UNTIL ASKED TO DO SO

Because of the rapidly increasing birthrate beginning in the 1940's, it is now clear that by 1982 public school enrollment will be very much greater than it is today. In fact, it has been estimated that if the student-teacher ratio were to be maintained at what it is today, 50% of all individuals graduating from college would be induced to enter teaching. Name five steps that might be taken to insure that schools will continue to provide instruction at least equal in effectiveness to that now provided.

Each year a great many Canadian tourists go to visit Europe. But now suppose that our country wished to get many more European tourists to come to visit Canada during their vacations. Propose three suggestions to bring more European tourists to this country.

Assume you are employees in the records department of a large company. All employees have a number and a job classification.

This is your job: develop and write down a cross-filing or referencing system so that having one of any three pieces of information about an employee (number, name or job classification), it would be possible to locate his file at a moment's notice. This will probably also entail developing a system of assigning employee numbers.

Needless to say, such a system should be as economical as possible and must be immediately compelling so that your manager will be moved to give it careful consideration. This means that the way in which you present the proposal may be of importance.

Early in the summer of 1964 a women's dress designer introduced the topless bathing suit to the beaches and parks of the world. The first appearances of these on the beaches were met with arrests and charges of indecent exposure.

Give three points for both sides of this issue.

Recently a machine known as an artificial kidney was developed. This machine, when connected to the blood-stream of a person with diseased kidneys, carries away harmful wastes from the system. This is a lifesaving device for people with defective kidneys. The problem is that there is only one machine and many people to benefit by its use. A single treatment requires several hours, so that the number of possible treatments per week is far below the total number of applicants.

Remembering that this is the only alternative for survival available to persons with defective kidneys, describe a systematic plan to decide who should have access to the treatment and who should be rejected. Your position should be written clearly with reasons for your opinions.

Many people want to see gambling legalized in this country. Many reasons are given for this such as increased government revenue, keeping gangsters from running gambling, as is the case now, etc. Write 2 points pro and con on the issue of legalized gambling (disregard the points above).

Mention multiple choice test and about half the professional educators in the country will give you a sharp, icy stare. Mention essay test and the other half of the country's educators will stare at you in profound disbelief of your naivete. The lines of disagreement are sharply drawn. But the controversy seems confined to the ivory tower. Nobody asks the students. As it's the students who have to take the darned things. Give three points for each type of exam (positive comments).

The biggest reason given for the decline in the popularity of baseball is that the game has slowed down to such an extent that it has become boring. What are five steps that could be taken to speed up the game?

On this card is a series of 3 figures. You are to write a short story (with title) about these 3 figures, so that they serve as the main thread of continuity in your narrative. You may interpret the figures in any way that seem reasonable to you. Limit your story to one page.

APPENDIX III

POST-EXPERIMENTAL QUESTIONNAIRE

Name _____

Group No. _____

140

Member No. _____

Post Experimental Questionnaire

These questions are designed to obtain your perception of yourself and the two task situations you have just experienced. Indicate your answer by circling the appropriate number on the scales below.

1. To what extent were you interested in performing the task?

	Very High Interest	High Interest	Fair Interest	Low Interest	Very Low Interest
First Task:	1	2	3	4	5
Second Task:	1	2	3	4	5

2. To what extent was it important for you to contribute to your group's score?

	Very Low Importance	Low Importance	Moderate Importance	High Importance	Very High Importance
First Task:	1	2	3	4	5
Second Task:	1	2	3	4	5

3. What was your relaxation level in each situation?

	Very High Relaxation	High Relaxation	Moderate Relaxation	Low Relaxation	Very Low Relaxation
First Task:	1	2	3	4	5
Second Task:	1	2	3	4	5

4. Which task situation did you most enjoy?

Enjoyed first task most	Enjoyed first task much more than second	Enjoyed first task slightly more than first	Enjoyed second task slightly more than first	Enjoyed second task much more than first	Enjoyed second task most
1	2	3	4	5	6

5. While taking part in this experiment I felt:

	At ease					Uneasy	
First task:	1	2	3	4	5	6	7
Second task:	1	2	3	4	5	6	7

	Not anxious					Anxious	
First task:	1	2	3	4	5	6	7
Second task:	1	2	3	4	5	6	7

	Threatened					Not Threatened	
First task:	1	2	3	4	5	6	7
Second task:	1	2	3	4	5	6	7

	Not annoyed					Annoyed	
First task:	1	2	3	4	5	6	7
Second task:	1	2	3	4	5	6	7

	Bored					Entertained	
First task:	1	2	3	4	5	6	7
Second task:	1	2	3	4	5	6	7

6. If you were to be in an experiment similar to the one you have just experienced, who would you choose as group members if given the opportunity?

	Grade 13 High School Students	First Year University Students	Second Year University Students	Third Year University Students	Fourth Year University Students
First task:	1	2	3	4	5
Second task:	1	2	3	4	5

APPENDIX IV

PRELIMINARY QUESTIONNAIRES

QUESTIONNAIRE ONE (MALE)

SENTENCE INTERPRETATIONS

Instructions

You are going to see a series of sentences, and your task is to tell a story that is suggested to you by each sentence. Try to imagine what is going on. Then tell what the situation is, what led up to the situation, what the people are thinking and feeling, and what they will do.

In other words, write as complete a story as you can--a story with plot and characters.

You will have twenty (20) seconds to look at a sentence and then 4 minutes to write your story about it. Write your first impressions and work rapidly. I will keep time and tell you when it is time to finish your story and to get ready for the next sentence.

There are no right or wrong stories or kinds of stories, so you may feel free to write whatever story is suggested to you when you look at a sentence. Spelling, punctuation, and grammar are not important. What is important is to write out as fully and as quickly as possible the story that comes into your mind as you imagine what is going on.

Notice that there is one page for writing each story. If you need more space for writing any story, use the reverse side of the paper.

1. TWO MEN ARE WORKING IN A LABORATORY ON A PIECE OF EQUIPMENT

1. What is happening? Who is (are) the person(s)?

2. What has led up to this situation? That is, what has happened in the past?

3. What is being thought? What is wanted? By whom?

4. What will happen? What will be done?

2. A MAN IS WORKING WITH A TYPEWRITER AND BOOKS

1. What is happening? Who is (are) the person(s)?

2. What has led up to this situation? That is, what has happened in the past?

3. What is being thought? What is wanted? By whom?

4. What will happen? What will be done?

3. A GROUP OF YOUNG PEOPLE ARE SITTING IN A LOUNGE TALKING

1. What is happening? Who is (are) the person(s)?

2. What has led up to this situation? That is, what has happened in the past?

3. What is being thought? What is wanted? By whom?

4. What will happen? What will be done?

4. A BOY IS STANDING: A VAGUE OPERATION SCENE IS IN THE BACKGROUND

1. What is happening? Who is (are) the person(s)?

2. What has led up to this situation? That is, what has happened in the past?

3. What is being thought? What is wanted? By whom?

4. What will happen? What will be done?

QUESTIONNAIRE ONE (FEMALE)

SENTENCE INTERPRETATIONS

Instructions

You are going to see a series of sentences, and your task is to tell a story that is suggested to you by each sentence. Try to imagine what is going on. Then tell what the situation is, what led up to the situation, what the people are thinking and feeling, and what they will do.

In other words, write as complete a story as you can--a story with plot and characters.

You will have twenty (20) seconds to look at a sentence and then 4 minutes to write your story about it. Write your first impressions and work rapidly. I will keep time and tell you when it is time to finish your story and to get ready for the next sentence.

There are no right or wrong stories or kinds of stories, so you may feel free to write whatever story is suggested to you when you look at a sentence. Spelling, punctuation, and grammar are not important. What is important is to write out as fully and as quickly as possible the story that comes into your mind as you imagine what is going on.

Notice that there is one page for writing each story. If you need more space for writing any story, use the reverse side of the paper.

1. TWO PEOPLE ARE WORKING IN A LABORATORY ON A PIECE OF EQUIPMENT

1. What is happening? Who is (are) the person(s)?

2. What has led up to this situation? That is, what has happened in the past?

3. What is being thought? What is wanted? By whom?

4. What will happen? What will be done?

2. A PERSON IS STANDING, LOOKING OUT THE WINDOW

1. What is happening? Who is (are) the person(s)?

2. What has led up to this situation? That is, what has happened in the past?

3. What is being thought? What is wanted? By whom?

4. What will happen? What will be done?

3. A PERSON IS WORKING WITH A TYPEWRITER AND BOOKS

1. What is happening? Who is (are) the person(s)?

2. What has led up to this situation? That is, what has happened in the past?

3. What is being thought? What is wanted? By whom?

4. What will happen? What will be done?

4. A PERSON IS STANDING: A VAGUE OPERATION SCENE IS IN THE BACKGROUND

1. What is happening? Who is (are) the person(s)?

2. What has led up to this situation? That is, what has happened in the past?

3. What is being thought? What is wanted? By whom?

4. What will happen? What will be done?

QUESTIONNAIRE TWO

QUESTIONNAIRE ON ATTITUDES TOWARD THREE
KINDS OF TESTING SITUATIONS

(Preliminary Form)

NAME: (please print) _____

BIRTHDATE: Month _____ Day _____ Year _____

EXPECTED YEAR OF DEGREE: _____ CLASS: _____

MAJOR FIELD: (if already decided) _____

This questionnaire is designed to give you an opportunity to indicate how and what you feel in regard to three types of testing situations:

- (a) The group intelligence or aptitude test, such as those you took upon entrance to college.
- (b) The course examination.
- (c) The individual (face-to-face) type of intelligence test.

One of the main reasons for constructing this questionnaire is the fact that very little is known about people's feelings toward the taking of various kinds of tests. We can assume that people differ in the degree to which they are affected by the fact that they are going to take a test or by the fact that they have taken a test. What we are particularly interested in here is how widely people differ in their opinions of and reactions to the various kinds of testing situations.

The value of this questionnaire will in large part depend on how frank you are in stating your opinions, feelings, and attitudes. Needless to say, your answers to the questions will be kept strictly confidential; they will under no circumstances be made known to any instructor or official of the University.

We are requesting you to give name, class, etc., only because it may be necessary for research purposes.

Each of you has taken a course examination and a group intelligence or aptitude test, but not all of you have taken an individual intelligence test. Those of you who have not taken such a test are requested to answer the relevant questions in terms of how you think you would react to them. We want to know what you think your attitudes and feelings toward taking such a test would be and not what you think they ought to be. Those who have taken an individual intelligence test will, of course, answer the questions in terms of what they actually experienced.

For each question there is a line or scale on the ends of which are statements of opposing feelings or attitudes. In the middle of the line you will find either the word "Midpoint" or a phrase, both of which are intended to reflect a feeling or attitude which is in-between the statements of opposing feelings described above. You are required to put a mark (X) on that point on the line which you think best indicates the strength of your feeling or attitude about the particular question. The midpoint is only for your guidance. Do not hesitate to put a mark on any place on the line as long as that mark reflects the strength of your feeling or attitude.

If you have any questions at this time, please ask the person who has passed out the questionnaire.

THERE ARE NO "CATCH" QUESTIONS IN THIS QUESTIONNAIRE. PLEASE READ EACH QUESTION AND EACH SCALE VERY CAREFULLY. THERE IS NO TIME LIMIT.

THE MIDPOINT IS ONLY FOR YOUR GUIDANCE. DO NOT HESITATE TO PUT A MARK (X) ON ANY PLACE ON THE LINE AS LONG AS THAT MARK REFLECTS THE STRENGTH OF YOUR FEELING OR ATTITUDE.

7. Before taking a group intelligence test, to what extent are you aware of an "uneasy feeling"?

_____ /
Am very much aware of it Midpoint Am not aware of it at all

8. While taking a group intelligence test to what extent do you experience an accelerated heartbeat?

_____ /
Heartbeat does not accelerate Midpoint Heartbeat noticeably accelerated

9. Before taking a group intelligence test to what extent do you experience an accelerated heartbeat?

_____ /
Heartbeat does not accelerate at all Midpoint Heartbeat noticeably accelerated

10. While taking a group intelligence test to what extent do you worry?

_____ /
Worry a lot Midpoint Worry not at all

11. Before taking a group intelligence test to what extent do you worry?

_____ /
Worry a lot Midpoint Worry not at all

12. While taking a group intelligence test to what extent do you perspire?

_____ /
Perspire not at all Midpoint Perspire a lot

13. Before taking a group intelligence test to what extent do you perspire?

_____ /
Perspire not at all Midpoint Perspire a lot

14. In comparison with other students how often do you think of ways of avoiding a group intelligence test?

_____ /
Less often than other Midpoint More often than other

15. To what extent do you feel that your performance on the Canadian Scholastic Aptitude Test (or a similar test) was affected by your emotional feelings at the time?

_____ /
Affected a great deal Midpoint Not affected at all

THE MIDPOINT IS ONLY FOR YOUR GUIDANCE. DO NOT HESITATE TO PUT A MARK (X) ON ANY PLACE ON THE LINE AS LONG AS THAT MARK REFLECTS THE STRENGTH OF YOUR FEELING OR ATTITUDE.

QUESTIONNAIRE THREE

General Ability Questionnaire

This Questionnaire is designed to measure your general ability. The test is divided into three parts. DO NOT begin each part until instructed to do so. After completing each part, wait for further instructions.

PART I - Code Substitution

The following part contains some code substitution problems. The code consists of nine (9) numbers, each of which is paired with one letter. There are ten lines of numbers. Each line has ten numbers. When a number appears in the top space, write the corresponding letter in the space directly below that number. Your task is to write in as many correct letters as you can in the allotted time. Take a moment to look at the problem but DO NOT begin to work on it. Time Allowed: 1 min.

S T A R T

1	2	3	4	5	6	7	8	9	
B	L	D	C	W	F	U	G	M	

8	6	7	3	9	3	4	6	9	8	4	4	2

7	4	6	8	5	3	4	5	6	7	2	2	1

9	5	2	7	2	6	5	7	3	9	8	3	1

1	1	4	8	5	5	3	7	2	8	6	4	3

7	5	2	9	3	8	5	4	1	7	7	1	2

4	9	4	1	8	1	5	7	9	5	1	6	3

2	8	3	4	1	8	9	4	8	6	5	9	1

3	6	8	1	9	4	6	8	2	7	5	2	9

7	8	2	3	9	7	8	1	7	8	6	4	5

2	9	9	6	5	1	9	8	6	7	4	3	1

S T O P

PART II

Series Completion

Complete each of the following series:

EXAMPLE: What number follows 10 in this series: 2, 4, 6, 8, 10,

ANSWER: 12

Time Allowed: 3 minutes

1. What number follows $16 \frac{1}{3}$ in this series: 3, $6 \frac{1}{3}$, $9 \frac{2}{3}$, 13, $16 \frac{1}{3}$

ANSWER: _____

2. What number follows the last term of this series: $2 \frac{1}{2}$, $6 \frac{3}{4}$, 11, $15 \frac{1}{4}$, ...

ANSWER: _____

3. What is the 5th term in this series: 3, 5, 9, 17,

ANSWER: _____

4. Find the missing term in this series: 3, 7, 18, 26, 37, 53, ____, 96.

ANSWER: _____

5. What number precedes the first term in this series: 8, 12, 18, 27.

ANSWER: _____

S T O P

PART III

List as many possible things you can think of that one can do with a paper clip.

Time allowed: 1 min.

START

QUESTIONNAIRE FOUR

INTERPERSONAL OPINION QUESTIONNAIRE

Indicate for each of the following personal attitude items, the extent of your agreement or disagreement with that item by circling your choice (+4 to -4) to the right of each statement. Please mark each statement, and follow the scale given below.

- +4 VERY STRONG AGREEMENT
 +3 STRONG AGREEMENT
 +2 MODERATE AGREEMENT
 +1 SLIGHT AGREEMENT
 0 NEITHER AGREEMENT NOR DISAGREEMENT
 -1 SLIGHT DISAGREEMENT
 -2 MODERATE DISAGREEMENT
 -3 STRONG DISAGREEMENT
 -4 VERY STRONG DISAGREEMENT

- | | | | | | | | | | |
|--|----|----|----|----|---|----|----|----|----|
| 1. I sometimes prefer being with strangers than with familiar people. | +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 |
| 2. If I don't enjoy a party, I don't mind being the first to leave. | +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 |
| 3. I would be very hurt if a close friend should contradict me in public. | +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 |
| 4. When a group is discussing an important matter, I like my feelings to be known. | +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 |
| 5. I tend to associate less with people who are critical. | +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 |
| 6. I often visit people without being invited. | +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 |
| 7. I don't mind going some place even if I know that some of the people there don't like me. | +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 |
| 8. I try to feel a group out before I take a definite stand on a controversial issue. | +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 |
| 9. When two of my friends are arguing I don't mind taking sides to support the one I agree with. | +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 |
| 10. If I ask someone to go someplace with me and he refuses, I'm hesitant to ask him again. | +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 |
| 11. I am cautious about expressing my opinions until I know people quite well. | +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 |
| 12. If I can't understand what someone says in a discussion, I will let it pass rather than interrupt to ask him to repeat it. | +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 |

13. I enjoy discussing controversial topics like politics and religion.	+4	+3	+2	+1	0	-1	-2	-3	-4
14. I feel uneasy about asking someone to return something he borrowed from me.	+4	+3	+2	+1	0	-1	-2	-3	-4
15. I criticize people openly and expect them to do the same.	+4	+3	+2	+1	0	-1	-2	-3	-4
16. I can still enjoy a party even if I find that I am not properly dressed for the occasion.	+4	+3	+2	+1	0	-1	-2	-3	-4
17. I sometimes take criticism too hard.	+4	+3	+2	+1	0	-1	-2	-3	-4
18. If someone dislikes me, I tend to avoid him.	+4	+3	+2	+1	0	-1	-2	-3	-4
19. It seldom embarrasses me to ask someone for a favour.	+4	+3	+2	+1	0	-1	-2	-3	-4
20. I seldom contradict people for fear of hurting them.	+4	+3	+2	+1	0	-1	-2	-3	-4
21. I am very sensitive to any signs that a person might not want to talk to me.	+4	+3	+2	+1	0	-1	-2	-3	-4
22. Whenever I go somewhere where I know no one, I always like to have a friend come along.	+4	+3	+2	+1	0	-1	-2	-3	-4
23. I often say what I believe, even when it alienates the person with whom I am speaking.	+4	+3	+2	+1	0	-1	-2	-3	-4
24. I enjoy going to parties where I don't know anyone.	+4	+3	+2	+1	0	-1	-2	-3	-4
25. If I were meeting a stranger whom I would not see again, I'd prefer to talk to someone who my chances of being liked were 50-50, than where my chances would be very high or very low.	+4	+3	+2	+1	0	-1	-2	-3	-4
26. If I were meeting a stranger whom I could possibly interact with many times in the future, I'd prefer someone who my chances of being liked were very high, than where my chances would be very low.	+4	+3	+2	+1	0	-1	-2	-3	-4

QUESTIONNAIRE FIVE

GENERAL ATTITUDE SURVEY

The following is a study of what the general public thinks and feels about a number of important social and personal questions. The best answer to each statement below is your personal opinion. We have tried to cover many different and opposing points of view; you may find yourself agreeing strongly with some of the statements, disagreeing just as strongly with others, and perhaps uncertain about others; whether you agree or disagree with any statement, you can be sure that many people feel the same as you do.

Circle a number on the right margin of each statement to show how much you agree or disagree with it. Please mark each statement.

Circle +3, +2, +1, or -1, -2, -3, depending on how you feel in each case.

+1: I AGREE A LITTLE

+2: I AGREE ON THE WHOLE

+3: I AGREE VERY MUCH

-1: I DISAGREE A LITTLE

-2: I DISAGREE ON THE WHOLE

-3: I DISAGREE VERY MUCH

- | | | | | | | |
|---|----|----|----|----|----|----|
| 1. There is hardly anything lower than a person who does not feel a great love, gratitude and respect for his parents. | +3 | +2 | +1 | -1 | -2 | -3 |
| 2. An insult to our honor should always be punished. | +3 | +2 | +1 | -1 | -2 | -3 |
| 3. Books and movies ought not to deal so much with the unpleasant and seamy side of life; they ought to concentrate on themes that are entertaining or uplifting. | +3 | +2 | +1 | -1 | -2 | -3 |
| 4. What the youth needs most is strict discipline, rugged determination and the will to work and fight for family and country. | +3 | +2 | +1 | -1 | -2 | -3 |
| 5. No safe, normal, decent person could ever think of hurting a close friend or relative. | +3 | +2 | +1 | -1 | -2 | -3 |
| 6. Young people sometimes get rebellious ideas, but as they grow up they ought to get over them and settle down. | +3 | +2 | +1 | -1 | -2 | -3 |
| 7. Religion is important in one's everyday life. | +3 | +2 | +1 | -1 | -2 | -3 |

- | | | | | | | |
|--|----|----|----|----|----|----|
| 8. The findings of science may some day show that many of our most cherished beliefs are wrong. | +3 | +2 | +1 | -1 | -2 | -3 |
| 9. It is highly unlikely that astrology will ever be able to explain anything. | +3 | +2 | +1 | -1 | -2 | -3 |
| 10. People ought to pay more attention to new ideas, even if they seem to go against the Canadian way of life. | +3 | +2 | +1 | -1 | -2 | -3 |
| 11. A person who has bad manners, habits, and breeding can hardly expect to get along with decent people. | +3 | +2 | +1 | -1 | -2 | -3 |
| 12. If people would talk less and work more everybody would be better off. | +3 | +2 | +1 | -1 | -2 | -3 |
| 13. Insults to our honor are not always important enough to bother about. | +3 | +2 | +1 | -1 | -2 | -3 |
| 14. It's all right for people to raise questions about even the most sacred matters. | +3 | +2 | +1 | -1 | -2 | -3 |
| 15. Obedience and respect for authority are the most important virtues children should learn. | +3 | +2 | +1 | -1 | -2 | -3 |
| 16. There is no reason to punish any crime with the death penalty. | +3 | +2 | +1 | -1 | -2 | -3 |
| 17. Anyone who would interpret the Bible literally just doesn't know much about geology, biology, or history. | +3 | +2 | +1 | -1 | -2 | -3 |
| 18. In this scientific age the need for a religious belief is more important than ever before. | +3 | +2 | +1 | -1 | -2 | -3 |
| 19. When they are little, kids sometimes think about doing harm to one or both of their parents. | +3 | +2 | +1 | -1 | -2 | -3 |
| 20. It is possible that creatures on other planets have founded a better society than ours. | +3 | +2 | +1 | -1 | -2 | -3 |
| 21. The prisoners in our corrective institutions, regardless of the nature of their crime, should be humanely treated. | +3 | +2 | +1 | -1 | -2 | -3 |
| 22. The sooner people realize that we can't get rid of all the traitors in the government, the better off we'll be. | +3 | +2 | +1 | -1 | -2 | -3 |
| 23. Some of the greatest atrocities in man's history have been committed in the name of religion and morality. | +3 | +2 | +1 | -1 | -2 | -3 |

APPENDIX V

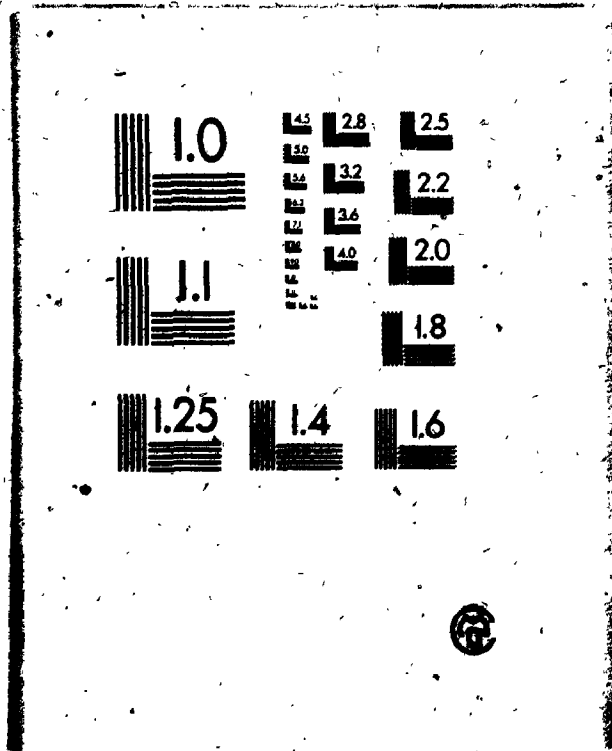
ANALYSES OF VARIANCE FOR ORDER EFFECTS

ANALYSIS OF VARIANCE FOR COMPOSITE QUALITY
MEASURE¹ OF PROBLEMS SOLVED USING AVERAGE MEMBER SCORES

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	.21	2	.50
Group Size (B)	.33	1	.80
Order of Presentation (C)	.03	1	.08
A x B	.60	2	1.45
A x C	.13	2	.32
B x C	.41	1	.99
A x B x C	.17	2	.41
Subjects Within Cells	.42	36	
Task Demands	.81	1	2.58
A x D	.05	2	.15
B x D	.55	1	1.74
C x D	.01	1	.02
A x B x D	.15	2	.48
A x C x D	.75	2	2.38
B x C x D	.06	1	.18
A x B x C x D	.93	2	2.95
Ms (error)	.31	36	

3 3

OF / DE



ANALYSIS OF VARIANCE FOR EFFICIENCY
OF PERFORMANCE USING AVERAGE MEMBER SCORES

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	.01	2	.04
Group Size (B)	.08	1	1.98
Order of Presentation (C)	.08	1	2.09
A x B	.03	2	.74
A x C	.10	2	2.53
B x C	.05	1	1.23
A x B x C	.04	2	1.13
Subjects Within Cells	.04	36	
Task Demands	.11	1	6.09*
A x D	.02	2	1.07
B x D	.01	1	.06
C x D	.03	1	1.69
A x B x D	.04	2	.199
A x C x D	.03	2	1.73
B x C x D	.01	1	.08
A x B x C x D	.05	2	2.74
Ms (error)	.02	36	

* $p < .02$

ANALYSIS OF VARIANCE FOR QUALITY¹
OF PROBLEMS SOLVED USING AVERAGE MEMBER SCORES

Source of Variance	Ms	df	F
Resultant Affiliation Motivation (A)	.20	2	.87
Group Size (B)	.29	1	1.27
Order of Presentation (C)	.74	1	3.28
A x B	.02	2	.08
A x C	.16	2	.70
B x C	.05	1	.22
A x B x C	.15	2	.66
Subjects Within Cells	.23	36	
Task Demands	.34	1	2.54
A x D	.31	2	2.33
B x D	.59	1	4.44*
C x D	.06	1	.42
A x B x D	.05	2	.35
A x C x D	.13	2	.95
B x C x D	.22	1	1.65
A x B x C x D	.10	2	.76
Ms (error)	.13	36	

* $P < .04$

¹ Frank & Anderson's (1971) Quality Measure

APPENDIX VI

MULTIVARIANCE ANALYSIS OF VARIANCE
FOR ALL DEPENDENT MEASURES

MULTIVARIANCE ANALYSIS OF VARIANCE

Source of Variance	DF	F	Significance of F ¹
Resultant Affiliation Motivation (A)	68	.90	.594
Group Size (B)	33	1.67	.131
Task Demands (C)	33	75.84	.001
A x B	68	1.24	.254
A x C	68	1.15	.320
B x C	33	15.17	.001
A x B x C	68	1.68	.059

¹Significance levels were determined using the Pillars test of significance.

END

1	9	H	0	3	1	8	4
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FIN