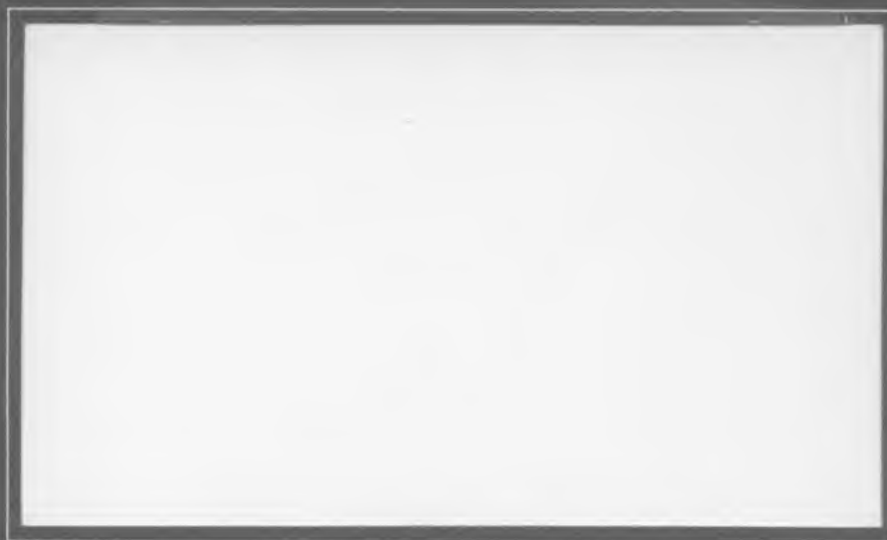A WORKING PAPER

FROM

The Center for Sociological Research

Department of Sociology

STANFORD UNIVERSITY   STANFORD, CALIFORNIA 94305

ORGANIZATIONAL TASK PERFORMANCE

IN MALE AND FEMALE GROUPS*

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Technical Report #58

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ABSTRACT

This paper reports an argument and some preliminary findings about
the consequences of features of a formal organizational setting for the way
in which a group goes about solving a task delegated to it by that organi-
zation. The argument applies to groups of any composition but is speci-
fied here for its distinctive implications for groups of different sex
composition. In brief, we argue that although both men and women expect
to adopt the same division of labor for task solution, the absence in fe-
male groups of a clearly legitimate incumbent for a particular differen-
tiated leadership role causes them to develop alternative modes of struc-
turing their interaction.

Ten male groups and ten female groups (each of size 4) were given a
group discussion task. Their interaction was video-taped and coded for
acts relating to the procedures developed by the group for solving the
task. Although not a strict test of the argument, the research produced
results supportive of the argument. We produced and described clear dif-
ferences between the way male and female groups organize themselves for
task solution: these differences seem more strongly related to quality
of task solution than does sex-of-group.

The paper concludes with a discussion of the validity of the results,
their implications for the argument, which now needs a strict test, and
a brief consideration of the implications of this line of reasoning for
the everyday work setting.

ORGANIZATIONAL TASK PERFORMANCE IN MALE AND FEMALE GROUPS

Introduction

We began the investigation reported here with a broad set of con-
cerns about the nature of sex-related differences in group settings and
the conditions under which they obtain. Are there distinctively female
and distinctively male modes of group functioning? If so, why? Are these
modes differentially related to quality of task solution? When women
move into positions of authority in organizations, do they require spe-
cial leadership training in order to function effectively in those posi-
tions? If so, is training aimed at counteracting the status effects
associated with mixed sex interaction sufficient or are there other proc-
esses at work in that setting which make effective female incumbency of
such positions more problematic than effective male incumbency? Our re-
view of the literature did not result in reliable or consistent identi-
fication of sex-related differences with respect to such questions. We
cannot evaluate with any confidence whether or not the disparate studies
are actually dealing with a single phenomenon or even a set of phenomena
theoretically related to each other.[1]

In order to develop a coherent framework with which to address our
questions, we found it necessary to identify a particular set of dif-
ferences in group functioning which are sex-related and to specify the
conditions under which we believe those differences occur. Thus, we will
begin this paper by presenting our argument about the consequences of
a formal organizational setting for the way in which a group goes about

solving a task delegated to it by that organization. This is a setting
of practical importance and it is the setting in which most experiments
occur. Although the argument applies to groups of any composition, we
specify and empirically investigate it for all-female and all-male
group interaction. That empirical focus insures that we will not confuse
the consequences of the argument we propose with those produced by status
processes which may occur in mixed-sex groups.

A decided advantage of the argument presented here is its ability
to offer new tools of intervention to organizations employing women or
other minority groups. Unlike the traditional explanations based on
sex role socialization, the structural explanation of male/female inter-
action differences allows an organization to ensure the full utiliza-
tion of all its personnel's capabilities through readily implemented in-
terventions. Such intervention strategies would consist of straight-
forward changes in structural arrangements rather than attempting the re-
socialization process implied by the explanation of differential sex
role socialization.

After presenting our argument, we report the results of our first
empirical investigation. The research reported here does not constitute
a strict test of the argument; rather it was aimed at accomplishing
three purposes each of which is essential to developing a strong test
of the argument at a later time. First, the research was conducted to
determine whether we can in fact produce the set of differences we ex-
pect. Second, the data aided in developing and evaluating a coding
scheme developed to permit us to describe these differences. Third,
the research was intended to produce the observed differences on a task

which itself produced sex differences on quality of performance; we
wanted to have pilot information about how the differences in group
functioning we produce might be related to differences on quality of
performances.

Overview

When groups try to solve a problem, they adopt some particular di-
vision of labor for performing the task; the particular division of labor
adopted may or may not be especially effective in producing good solu-
tions to the task on which they are working. In an organizational set-
ting, we believe that male and female groups are likely to adopt differ-
ent divisions of labor. Further, we believe that there are other be-
havioral differences associated with male and female groups that are a
reflection of the type of division of labor with which the group works.

We begin, then, by placing the task group in an organizational set-
ting. We are specifically concerned with how groups solve task problems
when the task is delegated by a formal organization[2] but when the way
to solve the task has not been specified by the delegation.

More formally:

1) There is a face-to-face group which has been delegated a task
   by a representative of a legal-rational authority system, and

2) Solving the task delegated to the group requires reciprocal
   interdependence.

The first condition limits the context in which the group inter-
action occurs to a formal organization which has legitimate jurisdiction
over the task. We do not require that the group members be members of the
organization but only that the delegator be so, and that the members

recognize him/her as legitimately acting as a representative of the organization in delegating the task.

The significance of our second condition is that it constrains our argument to a class of tasks to which we are certain it applies. By reciprocal interdependence, we mean that each member's contribution to task solution is contingent upon other members's task performance. The actions of each member must be adjusted to the actions of one or more of the other members (Thompson, 1967, p. 55).

Given these conditions, we argue that several features which are usually found in formal organizations trigger expectations which are both anticipatory and normative concerning how the members of the group are to divide their labor and concerning who are legitimate incumbents of the various roles in that division of labor. Most organizations use a system of two roles highly differentiated from each other in terms of authority rights; i.e., one role has extensive and exclusive authority rights and that role typically has a single incumbent. Group members in an organizational setting expect that they will and should develop a similar division of labor in carrying out the task given them. We believe that both males and females hold these expectations.

However, it is also the "usual case" in our society that white males are incumbents of authority roles. Male groups, then, should adopt the expected division of labor because they have legitimate incumbents for the authority role. In general, there is nothing systematic to block male actors from adopting the expected role system; they have only to decide which of them should hold the authority role. Females, however, are not generally expected and do not generally expect to hold

authority positions. Therefore, in the absence of specific evidence of legitimacy, women will not attempt to occupy the authority role nor will they be expected to do so. In our society, then, men are legitimate holders of authority roles unless there is evidence to the contrary. Females, however, are legitimate only if there is evidence in favor of their incumbency.

By framing the problem in organizational terms, it is possible to formulate conditions under which behavior differences may occur. By emphasizing structural features rather than traits or attributes of individuals, it is possible to capture behavior differences which hold across a variety of settings. Although we are concentrating upon male and female groups, the argument, in its most general form, should apply to other groups (e.g. blacks, Americans of Spanish-speaking heritage). That is, the argument applies to the legitimacy of any individual entering a position which is generally held by people with different attributes than the ones he or she possesses (e.g. male nurses and male secretaries). Having presented our main ideas, we now turn to a more formal development of the theoretical framework with more thorough definition of central concepts.

Argument

In any task group, there are two classes of problems the members must solve. They must, of course, solve the problems defined by the explicit task assigned to the group. To do that, they must solve a second set of problems concerning the procedures the group will follow in solving the tasks. These procedures include: a) ordering of the task sub-units, b) establishing a method for allocating time and energy

to the sub-units and for moving from one to another, c) developing ways to deal with uncertainty and disagreement and for determining when a particular unit of the task has been finished. This second set of problems we shall call <u>Task Procedure</u> problems. We are distinguishing these problems from <u>Task Content</u> problems which have been the conventional focus of small group studies of task performance (Bales, 1950; Berger <u>et al</u>, 1966, 1974).

One way to solve both the procedural and the task content problems of the group is to develop a two-role division of labor in either or both of these areas such that there is one role with a single incumbent which has authority rights over issues in a particular area (procedural or task content) and another role with one or more incumbents which does not have authority rights. For instance, in the procedural area, one person can direct other members of the group as to how to organize themselves for task solution. This is, we believe, the way most formal organizations in Western society function.

Weber asserts that if a differentiated division of labor (two roles as described above) develops with respect to task content, the member of the group who is most competent will be perceived as the appropriate occupant of that authority role. However, there is no compelling reason to believe that competence is a necessary criterion for legitimacy in the procedural area (unless, of course, the two divisions of labor overlap). We do not believe that competence is the only criterion used in making such judgements. Our argument deals primarily with how factors other than competence affect the legitimacy of role incumbents. Since we do not know how competence interacts with these other effects, our

focus is on the procedural division of labor, rather than on task content.[3]

The primary assumption we make is that empirically usual events in the context within which the group is operating shape the expectations of the group members about how the task will and should be solved. Not all empirical regularities activate expectations. We have tried to spell out the features of empirical regularities which are able to produce expectations, both anticipatory and normative:

> If an event is known to be empirically usual in the organization which legitimates the task, and if the event is part of a set of acts which define the organization, then the event will activate expectations consistent with that event which are both anticipatory and normative.

There are two such empirical regularities that are of particular interest to us here:

> 1) With respect to procedures for task solution, organizations characteristically have a two-role system highly differentiated from each other in terms of authority rights.
>
> 2) In formal organizations in this society, incumbents of roles with authority rights are usually white men.

On the basis of these regularities and our initial assumption, we expect the following:

> In the absence of specific directions from the organization delegating the task, group members will expect to develop a division of labor with two roles highly differentiated from each other on authority rights over Task Procedure.

We expect this proposition to hold for both male and female groups, if initial scope conditions are met. In the overview of the argument we made a distinction between "legitimate" incumbents of an authority role and incumbents who were not legitimate. It is essential to define

our use of this concept in a specific and limited fashion because of the various ways it is used in the literature.

By "legitimate" we mean that the incumbents of offices in the organization delegating the task will consider the event proper and legal and would support it as such if called upon. We do not mean to connote with this term that the group members will approve of, agree with, or "like" the event in any other way or that they believe the organization would consider the event the best one possible. The distinction is similar to that made by Dornbusch and Scott (1975) between "authorized" and "endorsed." The judgment by group members that an event is legitimate means that the judges believe incumbents of offices with authority rights over the event or over the person who caused the event will "authorize" the act after the fact.

Because of the empirically usual relationship between the incumbent's sex and the authority distribution in a division of labor we hypothesize that:

> A male incumbent of an authority role will be viewed as legitimate unless there is evidence to the contrary.

> The particular exercise of an authority role by a male incumbent will be viewed as legitimate unless there is evidence to the contrary.

Given our definition of legitimacy, evidence which calls into question the legitimacy of an incumbent exists if the organization fails to support the incumbent or any of his/her acts when called upon. Our propositions are somewhat different for the case of females.

> A female incumbent of an authority role will be viewed as questionably legitimate unless there is evidence of legitimacy.

> The particular exercise of an authority role by a female incumbent will be viewed as questionably legitimate unless there is evidence of legitimacy.

Evidence of favor of legitimacy exists if <u>the organization explicitly delegates the incumbent and/or the incumbent's actions</u>, or if <u>the organization explicitly supports the incumbent's acts</u>.

Note that by the above definitions, evidence of competence is not automatically evidence of legitimacy. Our argument does not yet specify what the exact relationship between competence and legitimacy is. It suggests to us that either or both of two states of affairs could be the case. First, if the organization makes use of competence issues in giving or witholding evidence of legitimacy, then evidence of competence will be treated as evidence of legitimacy. Second, it could be the case that in our society evidence of competence is so frequently and usually employed by organizations in granting and withholding evidence of legitimacy that special competence is automatically expected to be a necessary condition of legitimacy for an incumbent of an authority position (according to our assumption on page 6). The literature is not definitive with respect to distinctions such as these (Weber, 1947; Evan and Zeldith, 1961; Gouldner, 1954). Generally, the literature suggests that if there is more than one member who would be a legitimate incumbent of a leadership role, relative competence will sometimes determine which of those members actually assumed the position (Bales, 1950; Berger <u>et al</u>, 1966, 1974). However, that literature predicts an "emergent" leader resulting from a period of time during which members are making relative evaluations of each other. There are some studies which suggest that the leadership role, even in groups with no apparent status distinctions among the male members, is filled almost instantly--precluding the idea of an emergent leader (Fisek and Ofshe, 1970).

The issues this discussion raises are complex ones which we cannot resolve now. Still, we feel that our argument is important if only because it suggests such issues for study in a manner not accomplished by other literature. Is it the case that there are multiple criteria of legitimacy, and that members attempt to somehow aggregate the information they have about each other on all of the criteria so as to arrive at some idea of a "most legitimate" incumbent? Our argument does not preclude this; however, it tends to suggest instead that any member who violates any criterion of legitimacy is automatically excluded from consideration for the position at issue. Thus, for females, competence evidence (whether or not it is itself a criteria of legitimacy) does not provide evidence of legitimacy since her status in an authority position is questionable on another criteria. The case for male groups, however, is more complex. Given a set of members who cannot automatically be excluded from consideration, under what conditions will the members attempt to determine who would be the "most legitimate" incumbent and under what conditions will they accept anyone among that set who "volunteers."

Since we cannot yet settle these issues (nor even address them definitively with evidence at the moment), it is important that our preliminary investigation avoid confounding effects due to competence with effects due to sex. Although we can never be certain that such confounding did not occur, we can at least require that the role which we define as highly differentiated on authority rights over task procedure be one which occurs early in the group interaction, and we can attempt to ensure that all members of a group are homogenous with respect to characteristics which are known to produce competence evaluations. Assuming that our

experimental procedures are successful in accomplishing this, we assume
that all the members of male groups are legitimate incumbents of the
authority role in the procedural division of labor the members expect
to adopt. We expect, then, that male groups will generally adopt a proce-
dural division of labor with two roles one of which is highly differen-
tiated from the other in terms of authority rights over task procedure
and that there will be a single incumbent of the authority role. In
female groups, all of the women have questionable status as legitimate
incumbents of an authority role. Therefore, even though women initially
expect to adopt the same division of labor with respect to procedural
leadership as men, unless it is explicitly defined and filled by the or-
ganization (in this case, by the experimentors), female groups will tend
not to develop that division of labor. In no case will we make any pre-
dictions about which of the members in the group will occupy an authority
position; however, we will look to see whether the apparent incumbent of
such a role (if there is one) is viewed by the other members as more
"competent" at the task.

The Research

In order to evaluate the argument just proposed, we need to opera-
tionalize the particular procedural division of labor we predict for
males and to devise an appropriate empirical setting to investigate the
phenomenon. The data reported here constitute the results of a pilot
study aimed primarily at evaluating our ability to accomplish those ends.
This research had two other purposes, both exploratory. The first was to
gain preliminary information about the other divisions of labor with

respect to procedure which might occur, particularly in female groups.
We simply hypothesize what they will not do; we are unable, a priori,
to derive sophisticated descriptions of the type of divisions of labor
they will develop. We hoped that these results would provide us with
empirical information about that issue. Second, we wanted to conduct
this research using a task which was known to produce sex differences on
quality of performance in order to see whether the groups' division of
labor was related to performance differences. The task we selected is
described in detail later.

Operationalizing the Task Procedure: Division of Labor

We presented a task to ten male and ten female groups and recorded
the group interaction on videotape. The tapes were coded for frequency
and type of task procedure statements made by each actor. All acts which
explicitly or implicitly dealt with the organization of the groups' time
and behavior for solving the task were coded. The distribution of those
tasks over the members describes a division of labor. The particular
division of labor we predict that male groups will adopt has the following
properties:

1) There is one role which is

   a) sharply differentiated from the other role in terms of
      overall frequency of initiating task procedure acts,

   b) differentiated from the other role in terms of frequency
      of initiating task procedure acts which are explicit,

   c) differentiated from the other role in terms of frequency
      of initiating task procedure acts which are directive--
      i.e., which contain an order either for the solution to
      a problem or for the behavior of some other member(s) of
      the group; and

2) that role has a single occupant--i.e., there is one and only
   one member of the group who exhibits behavior as described
   in (1) and this person does so during both the first and
   second half of the group discussion; and

3) there is only one other role in the group--i.e., the other
   three members are undifferentiated with respect to each
   other by any of the criteria in (1) above.

Using these criteria, i.e., the distribution of procedural acts in
a group and differences among the members on types of procedural acts,
we can identify a completely undifferentiated division of labor with
respect to procedural leadership. It is one in which none of the mem-
bers are differentiated from each other with respect to overall frequency
of task procedure acts or with respect to any particular class of those
acts.

If our reasoning is sound:

1) the two-role division of labor highly differentiated on
   authority over task procedure occurs more frequently in
   male groups than in female groups; and

2) male groups will use more explicit statements in the task
   procedure area than female groups, while female groups
   would use more implicit statements in the task procedure
   than male groups.

Finally, we expect the various procedural divisions of labor to
have some relationship to the quality of the group solution, even
though this issue is not central to the main tenets of our argument.

The Task

We required a task which had rich opportunities to study procedural
acts as well as one for which the quality of the group's solution could
be ascertained. We also wanted the task to be such that it was very dif-
ficult for the members to make competence distinctions within the same-sex

group. The task we chose was the Desert Survival Task (Hall, 1971);
it has an optimal answer as given by a panel of experts. This feature
allowed us to compare the quality of a solution to the sex-composition
of the group and to the form of division of labor selected by the group.

The Experimental Procedures

Forty males and forty females participated in the study. All were
recruited from 30 classes at Stanford University. Participants were
grouped homogenously by age and sex to avoid effects due to visible status
characteristics. All participants were Caucasian, and they varied in
age from 18 to 30. The members of each four-person group were strangers
to each other or slight acquaintances.

The 20 four-person groups were presented the Desert Survival Task.
That task asks the participants to imagine themselves in the desert with
their downed aircraft along with 15 items salvaged from the wreck. Sub-
jects are asked to rank order the items in terms of their usefulness for
survival. This task is used for training work groups on the superiority
of group to individual solutions. Data available from the task developers
suggest that women obtain better group scores than men.

Before working in a group, each participant was given a description
of the Desert Survival Task and a deck of 15 cards representing the items
to be ranked. Subjects were asked to make individual rankings of the
items in terms of their usefulness to survival.

After the individual task was completed, the groups were assembled
to work on the same task in small rooms. Each group was again read the
task situation and instructions. They were told that they had unlimited
time in which to complete the task and they must reach agreement through

consensus (i.e., they were not permitted to vote). They were reminded that the task has an optimal solution (as determined by a panel of expert rankers) and that they were being videotaped. After the group indicated they were finished, each participant was interviewed and paid.

Data Collection--Coding Procedural Acts

A videotape of each group's discussion was separately coded by two coders and crosschecked for reliability. All verbal communication concerning the task procedure was coded as either "implicit" or "explicit" statements. Implicit procedure statements function to organize the discussion without referring directly to issues of procedure. (The most common item in this category was a "change of topic"discussion-- which was not accompanied by such direct phrases as "I think we should move on..." or "Let's discuss this next...") Explicit procedure statements directly refer to issues of procedure. They were further classified into three categories: "directive," "question," and "residual". The Explicit Directive category included those statements containing an order for group's procedure or for the behavior of the group's member(s). The category Explicit Question contains direct questions concerning group procedure; they are questions requiring answers. All other explicit statements on procedure (i.e., those which were not directives or questions) were placed in the Explicit Residual category. We remind the reader that only statements concerning task procedure were coded. (See appendix for scoring instructions.)

Data Collection--Operationalizing Differentiation

Two members are considered undifferentiated from each other if the difference between their frequency of initiating procedure acts was three

acts or fewer. We considered a difference of four or five acts the <u>minimum</u> number necessary to define 2 members as differentiated from each other. "<u>Sharply differentiated</u>" refers to a difference greater than or equal to twice the minimum (i.e., a difference of 9 or more acts).

Data Collection--Quality of Performance

Each individual's ranking of the fifteen items as to their importance for survival, obtained prior to interaction, was compared to the expert ranking; <u>individual scores</u> were obtained by summing the absolute differences between the expert and the individual rankings; thus a low score indicates a ranking of the items which closely agrees with the expert ranking. This same procedure was used to produce a score for each group's ranking, obtained by the group prior to cessation of interaction, (called a <u>group score</u>). A <u>Gain Score</u> is the difference between the group score and the average of that group's four individual scores.

Results

Table I reports the distribution and group average for each of our coding categories by sex of group.

Table I here

In male groups, the average number of explicit procedure statements (combining all three categories of explicit statements: directives, questions and residuals) was 29.8; the mean number of implicit procedure statements was 2.2. Female groups averaged 22.9 explicit statements and 3.1 implicit statements. In male groups the mean number of explicit directives per

group was 13.6 while in female groups the mean was 8.8. Male groups also averaged a greater number of explicit questions than female groups. The proportion of statements in the explicit residual category is similar in both male and female groups. We take the pattern of the results in Table I to be consistent with our argument.

The Division of Labor: Sharply Differentiated

We defined a very strong operationalization of the division of labor we predict for male groups. We assumed that the minimum difference between any two members which can be a reliable difference is 4 or 5 acts; and we required that this division of labor have one role whose occupant differed from all of the other members by twice that number of acts and that the occupant of that role differ at least minimally from the other members in the various sub-categories of procedure acts. That is, we defined one role which dominates overall frequency of procedure acts and its sub-categories. More precisely, we required that:

a) one and only one member be sharply differentiated (differ by 9 or more acts) from each of the other members in the group on overall frequency of initiating procedure acts; and

b) that member be differentiated from each of the other members (by 5 or more acts) on frequency of initiating explicit procedure acts, directive procedure acts, and at least one of the remaining categories of procedure acts (questions, residual, implicit), and that in the remaining two categories no other member have an initiation rate greater than this member's; and

c) the occupant of this role be stable during both the first and second half of the group's interaction; and

d) the other three members occupy the same role--i.e., they are undifferentiated from each other (by 5 or more acts) on overall frequency of initiating procedure acts and on every coding subcategory of procedure acts.

Four of the twenty groups met all the above criteria; three were male groups and one was a female group. The difference between the most active

initiator of procedure acts and the least active initiator ranged from 12 to 23 acts for these four groups.

Undifferentiated Division of Labor

Next we defined a completely undifferentiated division of labor in which we required that all members be undifferentiated from each other. We placed a group in this division of labor if:

a) when the members were rank ordered by overall frequency of initiating procedure acts, no two adjacent ranks differed by more than five acts, and

b) no member differed from all other members by more than three acts within any coding sub-category of procedure acts, and

c) the most frequent initiator of procedure acts did not hold that rank during both the first and second half of the interaction.

Five of the groups met these criteria exactly; two were female groups and three were male groups. The difference between the most active initiator of procedure acts and the least active initiator ranged from 3 to 8 acts for these five groups.

Weakly Differentiated Division of Labor with a Specialist

Applying these same criteria to the remaining eleven groups (which were neither sharply differentiated nor undifferentiated), we observed what appears to be another type of division of labor. In five groups, when the four members were rank-ordered on overall frequency of initiating procedure acts, the most active of the four was a "specialist". A member is a specialist if the greatest proportion of his or her procedure acts falls in a single coding category (e.g. directive acts, questions) and that member's frequency of initiating acts in that category is differentiated from each of the other member's acts in that category. More

exactly, for each of these five groups:

a) the member who was the most frequent initiator of procedure
    acts was a specialist; and

b) that member was so specialized during both the first and second
    half of the group's interaction, although that member was
    not necessarily the most active initiator of procedure acts
    during both the first and second half of the discussion; and

c) the specialist was not the most active initiator in any of the
    other categories of procedure acts; and

d) there was no other specialist in the group; and

e) no member was sharply differentiated from any other member and
    there was one and only one weak to moderate differentiation in
    the group (i.e., no two ranks differed from each other on fre-
    quency of procedure acts by nine or more acts and one pair of
    ranks were differentiated from each other by 4 to 8 acts.)

These five groups were all female groups. No member in any of the other

15 groups was a specialist. The difference between the most active ini-

tiator of procedure acts and the least active member ranged from 6 to 11

acts for these five groups.

Differentiated Divisions of Labor

    Five of the remaining six groups were characterized by the following

properties:

a) the most active initiator of procedure acts was most active
    during both the first and second half of the discussion; and

b) that member was also the most active initiator in three of the
    four categories of procedure acts; and

c) no two adjacent ranks were sharply differentiated from each
    other and there was at least one instance of weak to moderate
    differentiation (i.e., a difference of 4 to 8).

Two of these five groups were female groups and three were male groups.

The difference in number of procedure acts between the most active and the

least active member ranged from 7 to 12 acts for these five groups.

One male group fits none of the four divisions of labor exactly.
Even allowing for several coding errors, this group does not approximate
either the highly differentiated division of labor or the division of
labor with a specialist. The most active initiator of procedure acts
was not stable during both halves of the discussion, so it does not fit
the criteria for the division of labor last described. Ranks 2 and 3
are differentiated by 7 acts which violate our criteria for a completely
undifferentiated division of labor. For purposes of the rest of our data
analysis, we will include this group in the category it seems best to
approximate by our judgment--the undifferentiated division of labor
category. However, where it is important, we will note that this case
does not exactly fit the conditions for that category.

Table II here

Table II shows the performance scores on the task by sex of group.
It displays the mean and range of the highest individual scores in the
group, the group scores, and the group gain scores. The average score
of the best individual scores for both males and females is 50.8; however,
the female groups show a significantly higher average gain score than
males (11.35 for females as compared with 4.87 for males). For both
sexes, the variance of gain scores is wide.

Figure 1 displays group gain scores ordered by size of score for
male and female groups. Gain scores for female groups varied from one
to twenty-five; those for male groups varied from negative six to sixteen.

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Figure 1 here

_____

In short, the data indicate that the task we selected did indeed
produce a quality measure which is related to sex-of-group, as we had
hoped.

Division of Labor and Quality of Performance

_____

Table III here

_____

Table III lists the four procedural divisions of labor we observed
and displays the distribution of sex-of-group and gain scores associated
with each. Female groups dominate the division of labor with the highest
gain scores and male groups dominate those with the lowest scores. Mod-
erate gain scores are associated with a completely undifferentiated di-
vision of labor and both sexes developed that pattern. Figure 2, Scatter-
gram of Group Gain Scores by Type of Division of Labor, graphically dis-
plays the relationship between gain scores and pattern of procedural di-
vision of labor with lowest gain score through the highest scores.

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Figure 2 here

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We investigated the data for confounding effects. No systematic
relationship was found between length of group discussion and group score
or gain score, or between seating position and either group score or rate

of initiation. In addition there was no consistent pattern between the original score of the most active participant and group score. The average number of total acts and the average percent of total acts which were procedure acts are not different by division of labor, sex-of-group, or gain score.

Interpretation

Experimental procedures were successful in producing the expected differences between male and female work groups. There were only four groups with a highly differentiated procedural role according to our stringent criteria of sharp differentiation and stability over time of incumbency; three of these groups were male. The use of directive procedural statements was more characteristic of male groups than female groups. The findings that women were less likely to make directive moves and that there was only one female group with a sharply differentiated procedural leader are consistent with the basic argument that women will avoid volunteering for such a leadership role.

Female groups should not be thought of as typically undifferentiated in contrast to male groups. Only two female groups met the criterion of "non-differentiation"; four male groups were described this way. A most interesting pattern which emerged in five female groups was that of a weakly differentiated division of labor with a specialist. In these groups one person appears to specialize in one and only one of the kinds of procedural acts, almost as if this person were deliberately playing a partial leadership role. None of the male groups developed such a specialist; in all cases the most active man in the procedural area was uniformly active across the procedural sub-categories.

Groups with a specialist were associated with the highest gain scores and did much to account for the finding that female groups on the whole show greater gain scores than male groups. The understanding of what makes for quality performance is greatly enhanced by finding that division of labor predicts group gain scores better than sex of groups. A specialized leadership role may facilitate the exchange of ideas and knowledge in such a way that the group becomes the beneficiary on creative problem-solving tasks. In contrast, having a differentiated procedural role which is unspecialized was associated with the weakest gain scores. These groups had weaker gain scores than even the undifferentiated groups.

Despite these promising results, the data do not constitute a test of the idea that the division of labor with respect to procedure is causally related to quality of performance. Nor are these data a test of our argument about how legitimacy affects men and women so as to produce the patterns associated with procedure which we have called "divisions of labor". Only one of the patterns, that one with a highly differentiated "procedural leader," was described in advance of data collection. The others were derived from applying the basic concepts to the observed patterns. Some of these may not actually represent stable states of a division of labor, but may mean that the group is still in the process of developing a division of labor. Alternatively, some of the patterns may reflect conflict.

Construct Validity of Division of Labor Types

There are two issues of construct validity raised by the analysis:

1) it is possible that the patterns are an artifact of the coding scheme since we present no independent evidence that they represent phenomena; 2) it is possible that the coding scheme is essentially another measure of the "emergent task leader", a product of competence evaluations according to Berger (Berger et al., 1966, 1974). We have some information on both issues.

For the first issue we can examine the post-experimental questionnaire where the subjects selected the group member who "did the most to guide the discussion".[4] We can compare our measure of a differentiated role in the procedural area with the members' post-session judgements about who did the most to guide the group. If the participants in all the groups make the same judgements as the coding scheme, results are unlikely to be a coding artifact.

In the groups completely undifferentiated with regard to procedure, there was no consensus on who did most to guide the group. In three out of four of the groups sharply differentiated with respect to procedure, all three members identified the procedure leader as the person who did most to guide the discussion. In the fourth sharply differentiated group (the lone female group in this pattern), all three members disagreed with the coding and identified a low-active member as having done most to guide the group. Thus in two patterns (the undifferentiated and the sharply differentiated) the subjects' perceptions generally agreed with the behavioral coding scheme.

The other two patterns did not show clear-cut results. Half the groups agreed with the coding scheme and the other half failed to show consensus amongst themselves. Failure to agree with our judgement about procedural

leadership occurred most often in female groups. Of the eight female groups (all the female groups outside the undifferentiated category), only four groups were in consensus about who was the procedure leader and only three of those agreed with us on the matter. Since it may be that females avoid selecting a differentiated member as a leader because of legitimacy problems, it is difficult to determine the implications for construct validity of the low agreement between the women's judgements and our coding of procedural behavior.

With respect to the second issue of construct validity, all the groups were scored for the number of task content acts made by each actor in addition to the procedural scoring. If the procedural coding is essentially another measure of emergent task leadership, we would expect the procedure leader (when there is one) to hold top rank on task initiation and to be chosen with a fair degree of consensus as the person who contributed the best ideas and had the most knowledge.

Of the four sharply differentiated groups, there was only one in which the procedural leader was also a differentiated task leader (a male group).[5] In this group, however, members showed no consensus on competence (i.e., best ideas, most knowledge). In the other three groups, the procedural leader was one of two equally active members on task, but in no case did the members pick the procedural leader as most competent. The two male groups were agreed in picking the other active member who was not the procedural leader. The female group showed no consensus in their competence evaluations.

In the groups which were completely undifferentiated on procedure, there was also no differentiated task leader; two members were more active

than the other two. There was no consensus on who was the most competent.

Of the five female groups with a specialist, two of the specialists were also top rank on task acts; but there was no agreement among the members' competence evaluations. In the other three groups, the specialist took on every rank on task acts except rank one; and in all three, the most active woman on task was identified by the group as having the best ideas and the most knowledge.

Finally, in the differentiated groups, there was no consensus on competence in any of the groups. In three of these groups the procedure leader was also task leader; in the other two, the procedure leader was one of two equally active members on task acts.

We conclude from the above analysis that our coding system and our classification system do not appear to be artifactual. When we can identify a division of labor which is sharply differentiated with respect to procedure, the members of those groups generally agree with us; when we define a group as being undifferentiated with respect to procedure, the members have no consensual pattern of agreement about who did most to guide the discussion. We also conclude that the process we are identifying is different from the general notion of an emergent task leader who is believed to have special competence and who contributed ideas judged to be good ones by the other group members.

It seems to us that both a competence-based process and the one we describe are probably occurring in these groups, that each may be the basis of a division of labor, and that the two divisions of labor may or may not overlap. The groups which were undifferentiated on procedure were also relatively undifferentiated on frequency of task acts, and the

members did not agree in their competence evaluations of each other.
In the other three divisions of labor, however, when the procedure leader
was also differentiated on number of task content acts, the members were
not consensual in their competence evaluations. When the procedure di-
vision of labor did not also describe the task content division of labor,
the groups with a procedure specialist seemed to have a differentiated
leadership role in the task content area as well; i.e. the most frequent
initiator of task acts was not the specialist and was clearly differentiated
from the next active member, and the other three members were likely to
agree that she was the most competent at the task. When the two divisions
of labor did not overlap in differentiated groups without a specialist,
the most active member on task content was not clearly differentiated and
the next most active member was always the procedure leader. When the
members of these groups were consensual in their competence evaluations,
they selected the task leader, and the likelihood that they were consen-
sual seemed related to how sharply differentiated the procedure leader
was.

This suggests that the presence of a differentiated procedure role
does not depend on an emergent consensus about relative competence. In-
deed, even when the occupant of such a role is also differentiated in the
task content area, he/she is not judged to be the most competent member.
Clear consensus on competence seems to occur only when the task content
division of labor is quite distinct from the procedure division of labor.

Division of Labor and Task Performance

Nothing in our argument dealing with legitimacy and the group's
division of labor informs us about the consequences of the division of

labor for task performance. We believe that the _interaction_ dynamics of the particular division of labor sometimes affect quality of task solution.

The results reported here suggest that the division of labor on procedure may account for the observed sex-differences on quality of performance, but they do not test that idea nor do they test our interpretation of the effects of the division of labor. An alternate interpretation, for example, is that only the five high-scoring female groups were able to arrive at a "legitimate" division of labor. Legitimacy, then, not the dynamics of the particular form of the procedure division of labor, may account for the findings on task score. We cannot, with these data, determine the accuracy of competing interpretations. That is a job for our next empirical inquiry.

We do, however, have interview data which gives us some information on the possible dynamics by which the division of labor on procedure might affect task quality. We asked members whether they felt the others in their group were more or less confident of the group's final decision than they were. We were interested in the degree to which the members had shared perceptions of each other's confidence. We also asked the members to rank order a number of items concerning group process (e.g. getting agreement),[6] in terms of their importance to the group and in terms of their importance to themselves during the discussion. Here the strategy of analysis was to examine the degree to which perceptions of members matched those of the others in their group on either or both rank orders.

With respect to confidence in the group's final decision, each group with a specialist described themselves as having three members who were equally confident of the decision and a fourth member (the least active)

who was somewhat less confident. In the undifferentiated groups and the differentiated groups, the members agreed that the group had a two-two split with respect to confidence in the final decision--two people being more confident than two others. The answers to this question from members of groups with sharply differentiated divisions of labor tended to identify a split on confidence in the group, but there was no agreement among them about who was more or less confident.

With respect to the ranking of the items on group process, virtually all members of every group indicated that the importance of the items to the group was the same as the importance of the items to themselves.[7] However, in all but the five groups which developed a procedure specialist, there was no pattern of actual agreement about how these items were ranked. Thus, only the members of these five groups in fact agreed among themselves on what was important to them individually and on the fact that this importance was shared by the whole group.

In review, the results of both analyses suggest to us that the procedure division of labor may well have direct consequences for task solution. In all but the groups with a specialist, the group may have terminated the task solution process before even three of the members had reached consensus. In two divisions of labor, the group concluded their discussion even though they knew that two members of the group were not as confident of the decision as two others. In the second set of results, the specialist division of labor was the only one which showed agreement among the members on both rank-orderings.

Implications For Men and Women at Work

We have been able to demonstrate differences between the way male

and female groups work in an organizational setting. We have argued that these differences occur because no female can legitimately take up the expected leadership role. The design of this study did not specifically test the legitimacy explanation but demonstrated the phenomenon.

The next step will be an experiment designed to show that we can modify observed differences by manipulating the legitimacy of the procedure leadership role, particularly in female groups. If we are correct, when the organization provides evidence for the legitimacy of a woman as an incumbent of the differentiated procedure role there should be no differences between the sex-groups on this dimension.

If we are able to support this line of argument, the implications for the work setting are significant. Because the problem is legitimacy rather than the lack of leadership skills, intervention takes the shape of changing the way the organization defines and delegates authority to the work group rather than remedial training for the women who supposedly lack skills due to their sex role socialization. In everyday work settings, women who are as competent as their coworkers nevertheless find themselves dealing simultaneously with status and legitimacy problems. The mixed-status work group reflects male dominance both as a result of the operation of differential competence evaluations due to status and as a result of differential legitimacy for male and female incumbents of leadership roles. Interventions may well have to attack both these problems if women are to be effective as leaders in mixed-sex work situations.

Another set of implications is suggested by the apparent superior problem-solving ability on the type of task represented in our study in groups we have described as having a specialist in the procedural area.

This mode of group organization was associated with the largest group gain scores and was used exclusively by women. This limited leadership role deserves further investigation; it may turn out to resemble that of the "facilitator" now employed in professional situations where maximum group input and creative "brainstorming" is desired. It is not, according to the procedural scoring system, synonomous with emotional leadership. Understanding the best mode of group organization for the type of task is a general problem having implications for groups of any composition. When the task is one requiring a strongly differentiated procedural leader (as when there is strong time pressure), legitimacy may have to be manipulated by the organizational authority in order for women (or other minorities) to assume the leadership role. When the task is one requiring creative problem solving and maximum interchange, male groups and mixed sex groups may need instruction on alternative ways to deal with task procedure in order to optimally deal with task content problems.

FOOTNOTES

[1]The literature on "sex differences" can be sorted into two classes
of findings. First, there are those based on data gathered on mixed-sex
groups (Strodtbeck and Mann, 1956; Strodtbeck, James and Hawkins, 1957;
Zander, 1969); we agree with Lockheed and Hall (1975) that these findings
are best explained by theories describing the effects of status proces-
ses. There is a second set of studies reporting differences between
men's and women's behavior in same-sex interaction (Exline, 1962, a, b;
Allen and Crutchfield, 1963; Oskamp and Pulman, 1965; Rapoport and Cham-
mah, 1965; Bass, 1967; Julian, 1969; Rubenstein, 1970; Wiley, 1973;
Wisenthal, Endler and Geller, 1973; Lockheed and Hall, 1975; Weil and
Sobieszek, 1976). The empirical generalizations in this literature are
presented as unconditionalized assertions; and as unconditionalized asser-
tions, they conflict with each other. At present, there is no way to
judge which experimental situations are comparable and which are not;
and thus it is impossible to determine the general conditions which govern
the findings. See Fennell et al., 1977, for a lengthier discussion of
this literature.

[2]For our purposes, an organization is an explicitly coordinated set
of activities (i.e., offices) forming an ongoing division of labor around
at least one definite purpose (Barnard, 1938). A formal organization is
an organization which has a legal-rational authority system, i.e., an
explicit distribution of decision-making rights and social-control rights
legitimated by law and governed by norms of rationality (Henderson and
Parsons, 1947).

[3]It is important to point out that the distinction made here between
task content and procedural divisions of labor is not equivalent or simi-
lar to the distinction between task leadership and socio-emotional leader-
ship made in much of the small groups literature. We did not investigate this
latter type of division of labor. In our research we have categorized
some groups as possessing a "completely undifferentiated division of la-
bor" with respect to the procedural area. The reader should be aware
of the fact that such a categorization does not preclude the existence
of differentiated divisions of labor along either the task content or
socio-emotional lines. The reader may best grasp the behaviors scored
as procedural by examining the coding scheme. (See appendix.)

[4]The members replied to the questions by ranking each of the other
three members on the appropriate criteria; they did not rank themselves.

[5]Since there are 10 to 15 times more task acts than procedure acts,
we used a different set of numbers to judge whether or not two members
were differentiated. We arbitrarily judged that differences up to and
including 10 were not likely to be reliable and that differences greater
than 20 probably were reliable differences.

Footnotes (Cont.)

[6]The following were to be ranked in terms of their importance to the group as a whole and to the subject:

- presenting own ideas
- listening to others' ideas
- getting agreement
- bringing the discussion to close
- winding up with the best possible ordering of the items

The following factors were to be ranked in terms of their importance in determining the final ranking reached by the group:

- the way in which the discussion proceeded
- the amount of relevant knowledge of group members
- the decision to walk out or stay with the plane
- the personal characteristics or manner of group members

[7]There is one exception to this. The most active initiator of procedure acts in groups in the differentiated category were not likely to report agreeing with the rest of the group on the importance of the items.

Table I

Distribution of Procedure* Statements

by Sex of Group

| | Sex of Group | | | |
| | Male (N=10) | | Female (N=10) | |
	Total	Average per Group	Total	Average per Group
Implicit	22 (6.8%)**	2.2	31 (11.92%)	3.1
Explicit				
Directives	136 (42.5%)	13.6	88 (33.84%)	8.8
Questions	84 (26.25%)	8.4	63 (24.42%)	6.3
Residuals	78 (24.3%)	7.8	78 (30.0%)	7.8
Total				
Explicits	298 (93.12%)	29.8	229 (88.07%)	22.9
Procedural	320 (100.00%)	32.0	260 (100.00%)	26.0

* The proportion of procedure acts to total number of task acts was

not different by sex of group. For male groups, procedure acts were

7.4% of the total acts, for females, the number is 6.3%.

** (%) = of total procedural statements.

Table II

Quality of Performance:

Average of Highest Individual Score in the Group, Average Group Score, and

Group Gain Score by Sex of Group

SEX OF GROUP

	Male	Female
Highest Individual Score		
Range	36-62	30-68
Mean	50.8	50.8
Group Score		
Range	48-68	36-64
Mean	57.4	55
Median	55	60
Gain Score		
Range	-6-16	1-25
Mean	4.87	11.35
Median	6.4	13

Table III

Group Gain Scores by Patterns of Division of

Labor by Sex of Group

Type of Pattern of Division of Labor	Group Gain Score by Sex of Group		Average Group* Gain Score
I	Male	0.5	
		6.0	
Highly		7.0	3.87
Differentiated			
	Female	2.0	
II	Male	16.00	
		6.7	8.6
Undifferentiated		9.0	6.1
		6.0	
	Female	6.5	
		7.5	
III			
Weakly	Female	13.0	18.40
Differentiated		14.0	
Specialist		17.0	
		23.0	
		25.0	
IV	Male	-6.0	
		-1.5	
Differentiated		5.0	0.6
	Female	4.5	
		1.0	

*Mean Gain Score for Male Groups = 4.87; Mean Gain Score for Female Goups = 11.35. Overall Mean Gain Score = 8.11.

The male group which had a Gain Score of 16 did not fit any of the four patterns exactly (see Text for discussion). We list the group in the category it best approximates but report two averages for that category; the starred average included this group, the other number is the average without this group.

Figure 1

Graph of Group Gain Scores Ordered by Size
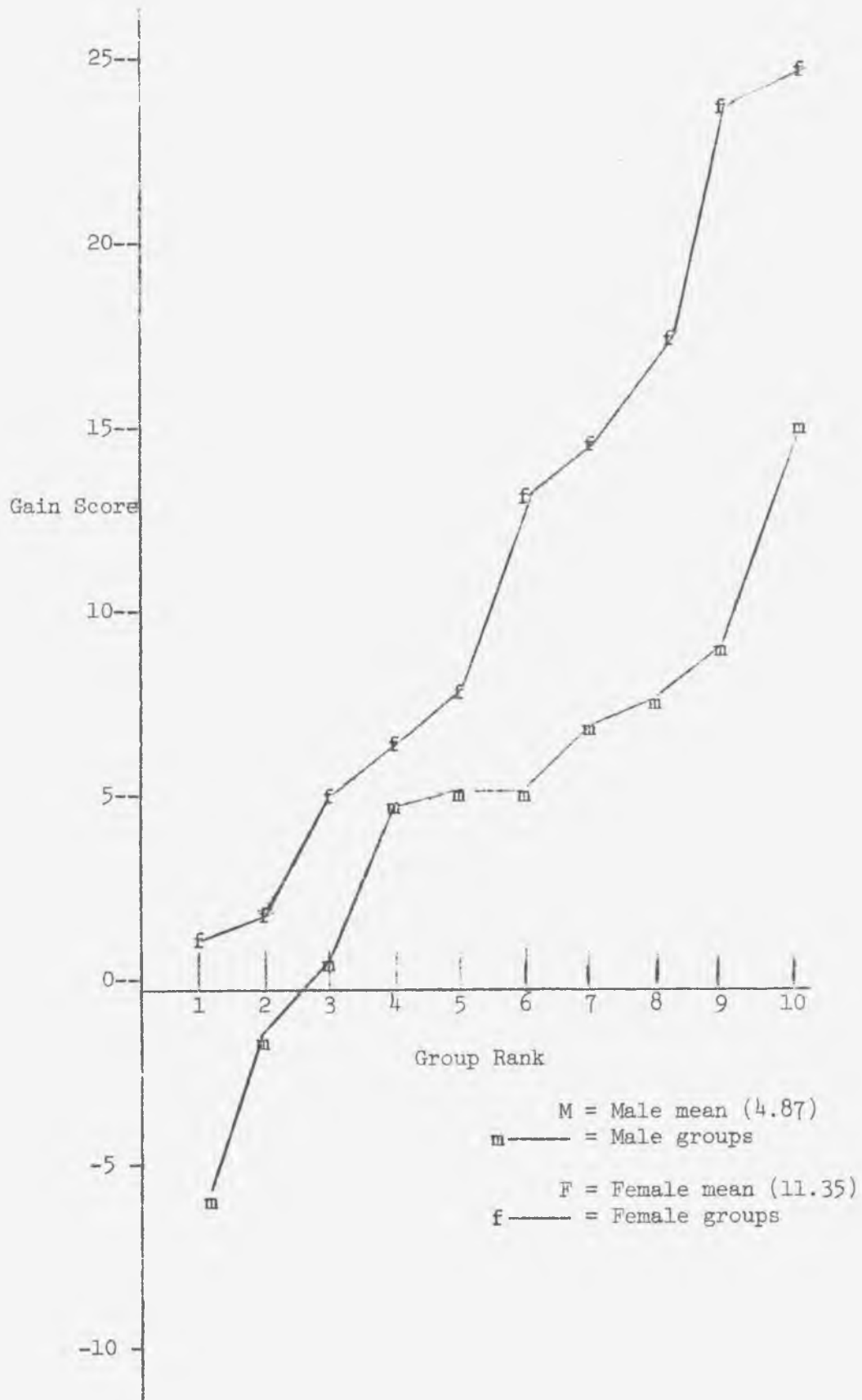of Score for Male and Female Groups

M = Male mean (4.87)
m——— = Male groups

F = Female mean (11.35)
f——— = Female groups

Figure 2

Scattergram of Group Gain Score by Type

of Division of Labor

Type of Division of Labor
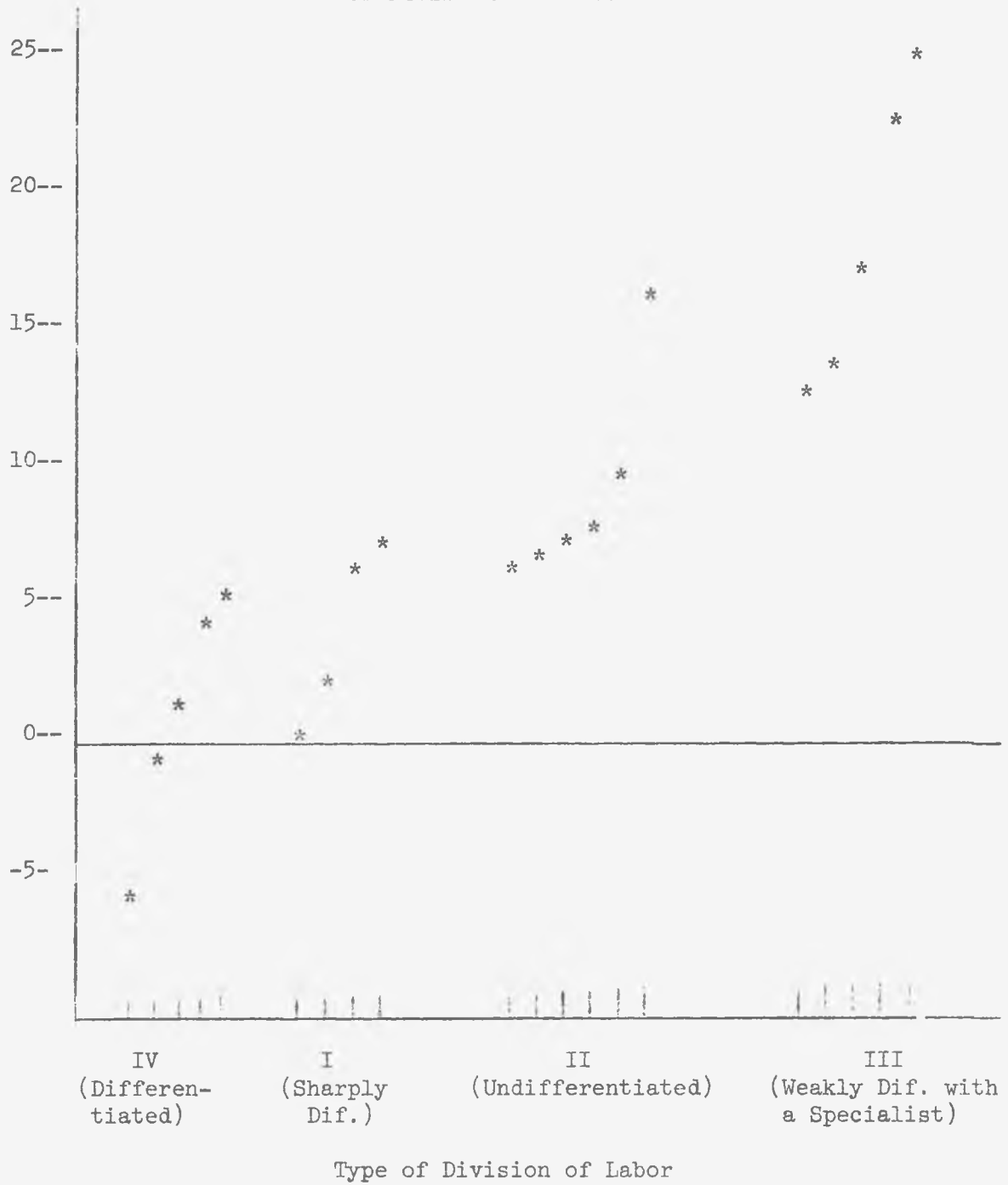
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APPENDIX I

CODING MANUAL FOR PROCEDURAL ACTS, AND SCORING SHEETS

Coding Manual for Male and Female Work Group Project
March 1976
P. Hildebrand
School of Education

The groups that you will be watching and scoring have been videotaped.
They are four-member all male or all female groups that have been in-
structed to come to a consensus (not by voting). The setting is a
downed air craft with four survivors and 15 objects. Through discussion
the four subjects in each group are to decide what ranking of items
best insures survival. (See attached description of task).

In the discussion you will hear many kinds of comments. Some are
irrelevant to the task in that they are expressions of emotion or have
nothing to do with the task at hand. Other comments share information
and argue the merits of a particular item. Still others suggest an
agenda to be followed and tend to organize the efforts of the group.
You will be focusing on these latter types of acts in your coding of the
tapes.

In order to reach a final decision on the ranking of the objects,
the group must make a number of additonal and prior decisions about how
to proceed in discussion. They must, implicitly or explicitly, decide
what topic is under consideration at any given time, and how and when to
proceed from one topic to another; they must develop ways to handle agree-
ments and disagreements; they must recognize what constitutes consensus
in order to move to a conclusion. Often they must handle the timing of
decisions relating to their overall strategies as well as the timing of

decisions on subtasks. Since the groups were not directed to debate these issues of procedure formally or explicitly, they often deal with these procedural issues indirectly and informally. It is, therefore, necessary to study the following pages carefully to see what kinds of statements we have defined as procedural.

In general, procedural statements consist of all verbal acts which have the function of organizing and allocating the group's time and energy, either explicitly or implicitly. Included are remarks which deal with agenda sequencing and timing; remarks which call for group decision on specific issues; remarks which explicitly or implicitly suggest directions which the discussion of the group should take; and procedural remarks which are made in response to other procedural statements.

Any given act can be relevant or irrelevant to the procedural issue. Therefore, there will be statements which you do NOT score. In addition, any given statement may serve several group functions: we are asking you to focus on the procedural aspect only. For example, a call for consensus (a procedural act) may also be a declarative statement about the way the speaker thinks a particular object should be ranked. In this case you would score the procedural act and ignore the other aspects of the statement. All scoring will be coding interaction concerning procedure.

Cautionary notes to coders:

(1) The first bit of interaction is crucial. You may need to run and rerun the tape, especially the beginning sections, in order to capture the statements.

(2) Toward the end of the tapes, statements frequently serve a dual purpose, dealing with both procedure and ranking. Coding becomes difficult. When coding gets too confusing toward the end of the tape, STOP. Note what was said in the last discussion you coded, or where you gave up, and/or the time elapsed on the tape.

(3) Statements which are procedural are sometimes flagged by references to time and timing. Listen for the words: "should," "ought," and "must"; they may indicate procedural statements.

(4) Sometimes conversation is difficult to hear. Statements you do not hear until you have played the tape three or four times should NOT be scored. If you did not hear a statement the first listening, it is likely the members of the group did not hear it either. To decide whether or not to rerun the tape to catch a statement, take the point of view of a member of the group; if it was important to them it should be important to you.

(5) When subjects discuss the usefulness of an item you may hear what sound like procedural statements such as, "I think A should go before B", but are, in fact, not. You are to code how the subjects arrive at the ranking, not the actual decisions they make.

For example, the task requires that items be ranked according to utility in the desert. A statement complying with the instructions of the task, "I think A should go before B", would not be coded. A statement about how to complete the task, "First we need to decide...and then ..." would be coded.

Coding categories:

There are three major categories of procedural statements which are made in these groups and which you will code. They are (1) request for consensus, (2) statements that have implicit functions with respect to procedure, and (3) explicit statements about procedure. These will be scored by the actor who makes the statement.

Consensus statements: These statements call for a final decision on stra-
(coded C)   tegy and ranking. They may involve issues such as
1) staying or walking away from the plane, 2) the
rank of any given item, and 3) the final set of ranks.
A call for consensus functions as if it is the last
consideration of that specific issue.

Some groups proceed from general to specific
classifications for ranking. During the course of
the discussions they assign items to broad categor-
ies such as, most important and least important,
must have and could live without, and then rank items
within those groupings. Since this type of organiza-
tion is one method of ranking, these decisions are
procedural and would be covered by classification
2) above.

Implicit statements: These statements serve the function of organizing the

    (coded I)   behavior of the discussion group although the refer-

ence is not explicit. Stated differently, these

statements serve the function of proposing an agenda

item. Although not as blatant as other statements,

they indicate an abrupt shift of topic.

For example, obtaining food is being discussed and

the gun is under consideration with respect to obtain-

ing food. One person says that the knife would be more

useful for that purpose. That is a substantive comment

that does not direct procedure; we do not consider

that a topic change and would not code it. Another

group member shifts the focus of conversation to using

the flashlight for an emergency signal and does not

relate it to obtaining food. That directs the dis-

cussion to a different topic, changing the procedure

in terms of order of consideration. We would code

that statement I.

Explicit statements: These statements refer directly or overtly to an issue

of procedure. There are three categories of explicit

statements: directives, questions, and residuals.

Explicit directives: These are statements containing instructions about pro-

    (coded eD)   cedure for the group. They may or may not refer speci-

fically to the rank of an item. Directives cannot be

questions.

Explicit questions: These are specific questions, requiring answers,

    (coded eQ)   about the group's procedure. If you were transcribing

        the tapes, these would be written with question marks.

Explicit residuals: These are all other explicit statements concerning

    (coded eR)   procedure, that are not directives or questions.

        They often take the form of evaluation or reflection

        on procedure.

PLEASE STUDY THE FOLLOWING EXAMPLES

They are probably your best guide.

Examples for Social Control Behavior Scoring
of Procedural Acts of 1/25/76

IMPLICIT (I)

Group is discussing article x. Suddenly one actor says, "Does anybody think the X should be next?"

"I'd be interested to know what were some of your reasons for your individual ratings."

CALLS FOR CONSENSUS (C)

Actor turns to group as a whole after a discussion, "So what do you think?"

"Do we agree that this is important?"

"So you think that water goes first?"

"So the raincoat goes next?"

"Do we all agree on that?"

"Do we agree that this is important?"

EXPLICIT--QUESTION (EQ)

"Have we decided to go or stay?"

"You want to start rating these things?"

"Where are we?"

"Have we given up on trying to find_____?"

"What do you think is more important--X or Y?"

"Shall we start at the top or bottom?"

EXPLICIT--DIRECTIVE (eD)

"Before we start and get into it too much, the question I had was-----."

"We should do the survival bit first."

"I want to think about that some." (Actor allocates role to self)

"I think we can almost put these things last."

"Put those things together."

"Let's see what's useless first."

"So, according to that, this goes next."

"Let me finish the point."

"I think we should defer to the person who offered a compromise solution."

"Why don't you read them off and I'll list them."

"Wait, let's see what we got."

"I was thinking that the best way to go about it is for each of us to say which we think is the most important."

"I'll volunteer to write them down as we go along."

"I think perhaps we need to decide-----."

"Maybe we could put them in clumps."

"Let's collect all the things that have to do with water."

"I think we've got this in groups and we should start writing them down."

"I think wherever we place any one of those, the other two ought to go."

EXPLICIT--RESIDUAL (eR)

"This is the tough part."

"We're assuming a whole scenario."

"Part of being a group is having different people share their experience."

"Everyone in the group has had their say and now the problem is coming to consensus."

"We'll just never come to any conclusion if we keep on going like this."

"We're arranging them according to how important it is."

"There's three of us that agree on that."

"That's a good question."

"We still don't know about most of them."

"I think that is one of the most important issues."

<div align="center">DO NOT CODE</div>

"Salt tablets are not as important in the desert as water."

"We could use the parachute for shelter."

"I don't know how to read an aerial map, do you?"

"Has anyone really been in a desert?"

"I read an article about X."

"Do they say in the instructions whether we're supposed to go or stay?"

Coding statements that fit more than one category:

If a statement can be coded in more than one category, code it only once, in its highest applicable position in the following hierarchy:

(1) Consensus

(2) eD

(3) eQ

(4) eR

(5) I

For example, if a statement is both eQ and C (Do we all agree that this item should go in the most important pile?), code it in the highest applicable category (here: C).

Coding notation:

    List the numbers representing speakers sequentially as the inter-

actions occur. For example:

Male & Female Work Groups Score Sheet

Group # and sex:_____   <u>Subjects</u>   Coder's name:_____

                      2   3

Total Time of tape:_____   1   4   sex:_____

C	I	Explicit		
		eD	eQ	eR
		2		
		4		
		1		
	3			
	2			
			4	

This will graphically display the movement of the discussion.

Learning to code these statements requires patience. After you have become familiar with selecting out voices in typical conversations and typical ways in which groups handle this task, as well as the distinctions we are making, the task becomes much easier.

DESCRIPTION OF THE SITUATION IN THE DESERT AND THE TASK

THE SITUATION

It is approximately 10:00 A.M. in mid-August and you have just crash-landed in the Sonora Desert in Southwestern United States. The light twin-engine plane, containing the bodies of the pilot and the co-pilot, has completely burned. Only the air frame remains. None of the rest of you has been injured.

The pilot was unable to notify anyone of your position before the crash. However, he had indicated before impact that you were 70 miles south-southwest from a mining camp which is the nearest known habitation, and that you were approximately 65 miles off the course that was filed in your VFR Flight Plan.

The immediate area is quite flat and except for occasional barrel and saguaro cacti appears to be rather barren. The last weather report indicated the temperature would reach 110 that day, which means that the temperature at ground level will be 130 degrees. You are dressed in light weight clothing--short sleeved tops, slacks, socks and street shoes. Everyone has a handkerchief. Collectively your pockets contain $2.83 in change, $85.00 in bills, a pack of cigarettes, and a ballpoint pen.

TASK

Before the plane caught fire your group was able to salvage the 15 items printed on the cards that will be handed out to you. Your task is to rank these items according to their importance to your survival, starting with "1" the most important, to "15" the least important. When you have decided on your ordering of the items, please fill in the list on the page accompanying the cards.

You may assume:

(1) There will be a four-person group of which you will be a member.
(2) The members of the group will have similar educational back-
     grounds to yourself.
(3) These four people will be the survivors of the crash landing.
(4) The group has agreed to stick together.
(5) All items are in good condition and no one is severely injured.

Each person is to individually rank each item. Delay discussion of the situation or problem until you have been grouped as a team.

APPENDIX I-a

SCORING SHEET FOR GAIN SCORES FOR DESERT SURVIVAL TASK

ITEMS	Step 1 Your Individual Ranking	Step 2 The Team's Ranking	Step 3 Survival Expert's Ranking	Step 4 Difference Between Step 1 & Step 3	Step 5 Difference Between Step 2 & Step 3
flashlight(4 battery size)					
jack knife					
sectional air map of the area					
plastic raincoat(large size)					
magnetic compass					
compress kit with gauze					
.45 caliber pistol(loaded)					
parachute(red and white)					
bottle of salt tablets (1000 tablets)					
1 quart of water per person					
a book entitled, Edible Animals of the Desert					
a pair of sunglasses per person					
2 quarts of 180 proof Vodka					
1 top coat per person					
a cosmetic mirror					
			TOTALS (the lower the score the better)	Your Score Step 4	Team Score Step 5

Please complete the following
steps and insert the scores
under your team's number.

	TEAM NUMBER					
	1	2	3	4	5	6
Step 6 AVERAGE INDIVIDUAL SCORE Add up all the individual scores (Step 4) on the team and divide by the number on the team.						
Step 7 TEAM SCORE						
Step 8 GAIN SCORE The difference between the team score and the Average Individual Score. If the team score is lower than Avg. Ind. Score then gain is "-".						
Step 9 LOWEST INDIVIDUAL SCORE on the team						
Step 10 NUMBER OF INDIVIDUAL SCORES lower than the team score.						

APPENDIX I-b

TASK AND PROCESS STATEMENTS

GROUP # _____   SCORER _____

PERSON ONE		PERSON TWO		PERSON THREE		PERSON FOUR	
task	process	task	process	task	process	task	process
TotS____	TotS____	TotS____	TotS____	TotS____	TotS____	TotS____	TotS____
TotA____	TotA____	TotA____	TotA____	TotA____	TotA____	TotA____	TotA____
TotP____	TotP____	TotT____	TotP____	TotT____	TotP____	TotT____	TotP____

APPENDIX I-c

PROCEDURAL SCORING SHEET

Male & Female Work Groups Score Sheet

Group # and sex: _____   Subjects-   Coder's name: _____

Total Time of tape: _____   1   2   3   4   sex: _____

C	I	Explicit		
		eD	eQ	eR
		2		
		4		
		1		
	3			
	2		4	

This will graphically display the movement of the discussion.

APPENDIX I--d

CLAIMS OF EXPERTISE

GROUP # _____   SCORE _____

# one	# two	# three	# four

FREQUENCY EACH PERSON HANDLED CARD

# one	# two	# three	# four

STRATEGY

___1) never discussed strategy

___2) discussed strategy but did not refer to it in ranking objects

___3) discussed strategy and referred back to it when ranking objec

CONTENT OF STRATEGY

_____

_____

_____

_____

_____

APPENDIX I-e

FREQUENCY USES FOR EACH ITEM

GROUP # _____

ITEM	PERSON ONE	PERSON TWO	PERSON THREE	PERSON FOUR	TOTAL
PARACHUTE					
JACKET					
RAINCOAT					
MAP					
COMPASS					
KNIFE					
GUN					
FLASHLIGHT					
MIRROR					
SUNGLASSES					
FIRST AID KIT					
SALT TABLETS					
BOOK					
WATER					
VODKA					
TOTAL					

TIME DISCUSSION STARTED _____

TIME DISCUSSION ENDED _____

APPENDIX II-a

POST-SESSION QUESTIONNAIRE

Name_____

Identification Number_____

Date_____

1. Do you know anyone who participated in this study, either today or previously?

                                    Yes   No

    If yes, did you talk with him/her about the study at all?

                                    Yes   No

    If yes, what kinds of things did you talk about?_____

    _____

    _____

2. Please indicate what you understood to be the nature of your task:

    A. What details can you remember about the situation in the desert?

    _____

    _____

    _____

    B. Which of the items to be ranked do you remember?_____

    _____

    _____

    C. List anything that you can recall in the instructions about how

    your group was to proceed_____

    _____

    _____

3. Check the statement that best expresses your feelings about the group dis-

cussion:

_____A) The most important feature of the task was to get the best

possible answer.

_____B) The most important feature of the task was the way we went

about making the decision.

4. We would like you to think back to the final period in your group discus-

sion - say the last few minutes. Please rate the following factors as to their

order of importance at that time:

to the group as a whole   to yourself

_____   _____   presenting own ideas

_____   _____   listening to other's ideas

_____   _____   getting agreement

_____   _____   bringing the discussion to close

_____   _____   winding up with the best possible
                                      ordering of the items

("1" = most important, "5" = least important)

5. Please rate the following factors as to their importance in determining

the final ranking your group reached.

_____ the way in which the discussion proceeded

_____ the amount of relevant knowledge of group members

_____ the decision to walk out or stay with the plane

_____ the personal characteristics or manner of group members

("1" = most important, "4" = least important)

6. Please compare how your group behaved with how you think other groups might behave in terms of: 1) interpersonal interaction; 2) the ranking achieved.

        A. comparing your group with other same-sex groups_____

        _____

        _____

        B. comparing your group with opposite-sex groups_____

   _____

        _____

        C comparing your group with mixed-sex groups_____

        _____

        _____

7. Please compare the way you behaved in the discussion today with the way you usually act in a small group - in terms of how much you talked, the kinds of things you said, and how much you listened.

        A. comparing your behavior in this group with your behavior in other same-sex groups_____

        _____

        _____

        B. comparing your behavior in this group with your behavior in mixed-sex groups_____

        _____

        _____

Here is a picture of where each of you sat during the discussion:

_____2   3_____

_____1   4_____
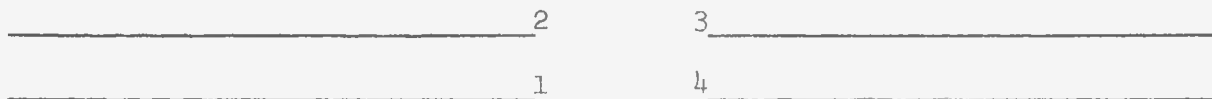
8. Who contributed the best ideas in the discussion (i.e. who showed the best understanding and grasp of the problem, the keenest insight, the most reasoning ability.) Please rate all the members of the group excluding yourself. ("1" = highest)

     1. Seating Position_____

     2. Seating Position_____

     3. Seating Position_____

9. Who did the most to guide the discussion and keep it moving effectively? (i.e. who kept the group on the task, tied together contributions of other members, suggested procedures for the group to follow, acted as moderator, provided compromise solutions.) Please rate all the members of the group excluding yourself.

     1. Seating Position_____

     2. Seating Position_____

     3. Seating Position_____

10. Who had the most knowledge relevant to desert survival? Please rate all members of the group excluding yourself.

     1. Seating Position_____

     2. Seating Position_____

     3. Seating Position_____

11. What in your personal experience would make you knowledgeable about desert survival?_____

_____

12. Please indicate your group's final ranking of the items, as you remember it._____

_____

13. You are probably more confident in the ranking of some of the items than in others.

     A.   Which ones are you most sure of, and which least?_____

         _____

     B.   Do you think the other members of your group were more or less confident of the final ranking than you?_____

         _____

     C.   Are there any changes you would make now?_____

         _____

14. If you would want to change anything about the study today, what would it be?_____

_____

15. Do you think anything about your experience here today would be of any use to you if you were really faced with the problem of surviving in the desert?_____

_____

16. What do you think we might learn from this study?_____

_____

_____

APPENDIX II-b

POST-SESSION INTERVIEW SCHEDULE

Subject Name _____   Date _____

Identification Number _____

Interviewer Name _____

We've arranged these interviews so that we would have a chance to discuss some of your reactions to the study so far. We will be running several sessions and we plan to talk to all of the people who partici-pate in our discussion groups. Since this is an exploratory study, we would like to know what you think and how you feel about the time that you spend here. This interview is not for the purpose of collecting data and we don't have any hypotheses about people's reactions. We hope that talking to all of the participants will help us to refine our procedures and better understand our results.

After some questions, I'll explain the study some more, and try to answer any questions you may have.

1. What did you understand to be the purpose of the study?

    (If answer is incorrect - Do you remember when we explained to

    you that we were interested in the differences between all-male

    groups and all-female groups in dealing with problem-solving tasks?)

    (If answer is vague - Can you tell me more about the kinds of things

    you think we're studying?)

    Did you ever think we were studying anything else?

2. Have you ever participated in a study that reminds you of this one?
(Probe: Have you ever been in any other studies?)

    (If Yes) What about it reminds you of this one?

3. Now think back to the time when all the participants were together
in the first room, before you met with your group. What was your ini-
tial reaction at that time?

    Was there anything you were confused about or didn't understand?
    (If Yes) Are you still confused?

4. Think back to the first time you ranked the items, when you had your personal deck of cards. What did you understand to be the purpose of that activity?

> Do you still think that? (If No) What do you think now and when did you change?

> Do you remember what kinds of things you were thinking about when you first ranked the items?

> How do you think other people were feeling?

5. Did anything anyone else contributed really start you thinking in a different way?

6. Naturally, any group working on a task like this will have some dis-agreements. How would you say your group handled any disagreements which arose?

7. Was there any time during the study that you felt uncomfortable?
(If Yes) When was that? Could you pinpoint your feelings a little
more?

8. Did you feel angry or irritated with either one of us or someone in
the group at any time?

    (If Yes) When was that? What was it about_____that made you
    ` feel that way?

9. If you could change anything about your group, what would you change?
    (probe for overall strategy adopted, method of reaching group de-
    cision)

10. Do you have any other reactions or impressions about the study that
we haven't covered yet? Has there been anything unpleasant about it for
you?

APPENDIX III

THE EXPERT RANKING AND RATIONALE

The expert: Alonzo W. Pond, M.A., is the desert survival expert who has contributed the basis for the item ranking. He is the former Chief of the Desert Branch of the Arctic, Desert, Tropic Information Center of the Air Force University at Maxwell Air Force Base.

Two of the several books Mr. Pond has written are "Survival", an excellent reference if you would like to do more reading on this subject and "Peoples of the Desert", written after Mr. Pond had spent years living with people of every desert in the world except the Australian.

During World War II Mr. Pond spent much of his time working with the Allied Forces in the Sahara on desert survival problems. While there and as Chief of the Desert Branch, he encountered the countless survival cases which serve as a basis of the rationale for these rankings.

. Cosmetic Mirror

'f all the items the mirror is absolutely critical. It is the most powerful tool you .ave for communicating your presence. In sunlight a simple mirror can generate 5 to 7 million candle power of light. The reflected sunbeam can even be seen beyond the horizon. If you had no other items you would still have better than an 80% chance of being spotted and picked up within the first 24 hours.

2. 1 Top Coat Per Person
Once you have a communication system to tell people where you are your next problem is to slow down dehydration. Forty percent of the body moisture that is lost through dehydration is lost through respiration and perspiration. Moisture lost through respiration can be cut significantly by remaining calm. Moisture lost through perspiration can be cut by preventing the hot, dry air from circulating next to the skin. The top coats, ironic as it may seem, are the best available means for doing this. Without them survival time would be cut by at least a day.

3. 1 Quart of Water Per Person
You could probably survive 3 days with just the first 2 items. Although the quart of water would not significantly xtend the survival time, it would help

to hold off the effects of dehydration. It would be best to drink the water as yo become thirsty, so that you can remain as clear-headed as possible during the first day when important decisions have to be made and a shelter erected. Once dehydra tion begins it would be impossible to reverse it with the amount of water available in this situation. Therefore, rationing it would do no good at all.

4. Flashlight (4 Battery Size)
The only quick, reliable night signalling device is the flashlight. With it and the mirror you have a 24 hour signalling capability. It is also a multiple use item during the day. The reflector and lens could be used as an auxiliary signal device or for starting a fire. The battery container could be used for digging or as a water container in the distillati process (see plastic raincoat).

5. Parachute (Red and White)
The parachute can serve as both shelter and signalling device. The saguaro cactu could serve as a tent pole and the parachute shrouds as tent ropes. Double or triple folding the parachute would give shade dark enough to reduce the temperature underneath it by as much as 20%.

6. Jackknife
Although not as crucial as the first 5 items, the jackknife would be useful for rigging the shelter and for cutting up the very tough barrel cactus for moisture. Its innumerable other uses gives it the high ranking.

7. Plastic Raincoat (Large Size)
In recent years the development of plastic, nonporous materials have made it possible to build a solar still. By digging a hole and placing the raincoat over it the temperature differential will extract some moisture from urine-soaked sand and pieces of barrel cactus and produce condensation on the underside of the plastic. By placing a small stone in the center of the plastic a cone shape can be formed and cause moisture to drip into the flashlight container buried in the center of the hole. Up to a quart a day could be obtained in this way. This would be helpful, but not enough to make any significant difference. The physical activity required to extract the water is likely to use up about twice as much body water as could be gained.

8. .45 Caliber Pistol (Loaded)
By the end of the second day speech would be seriously impaired and you might be unable to walk (6 to 10% dehydration). The pistol would then be useful as a sound signalling device and the bullets as a quick fire starter. The international distress signal is three shots in rapid succession. There have been numerous cases of survivors going undetected because they couldn't make any loud sounds. The butt of the pistol might also be used as a hammer.

The pistol's advantages are counterbalanced by its very dangerous disadvantages. Impatience, irritability and irrationality would all occur as dehydration increases. This is why critical decisions should be made before dehydration sets in. Under the circumstances the availability of so lethal a tool constitutes a real danger to the team. Assuming it were not used against humans, it might be used for hunting, which would be a complete waste of effort. Even if someone were able to shoot an animal with it, which is very unlikely, eating the meat would increase dehydration enormously as the body uses its water to process the food.

9. A Pair of Sunglasses Per Person
In the intense sunlight of the desert photothalmia and solar retinitis (both similar to the effects of snow blindness could be serious problems especially by the second day. However, the dark shade of the parachute shelter would reduce th problem, as would darkening the area around the eyes with soot from the wrecl age. Using a handkerchief or compress material as a veil with eye slits cut i it would eliminate the vision problem, but sunglasses would make things more comfortable.

10. Compress Kit with Gauze
Because of the desert's low humidity, i is considered one of the healthiest (le infectious) places in the world. Due t the fact that the blood thickens with dehydration, there is little danger fro bleeding unless a vein is severed. In one well-documented case, a man, lost and without water, who had torn off all his clothes and fallen among sharp cactu and rocks until his body was covered wit cuts, didn't bleed until he was rescued and given water.

11. Magnetic Compass
Aside from the possibility of using its reflective surfaces as an auxiliary signalling device, the compass is of lit use. It could even be dangerous to have around once the effects of dehydration take hold. It might give someone the notion of walking out.

12. Sectional Air Map of the Area
Might be helpful for starting a fire, or for toilet paper. One man might use it for a head cover or eye shade. It might have entertainment value. But it is ess tially useless and perhaps dangerous because it too might encourage walking out

13. A Book Entitled: "Edible Animals of
    the Desert"

The problem confronting the group is de-
hydration, not starvation. Any energy ex-
pended in hunting would be costly in terms
of potential water loss. Desert animals,
while plentiful, are seldom seen. They
survive by laying low as should the sur-
vivors. If the hunt was successful, the
intake of protein would cause an increase
in the amount of water used to process the
protein in the body. General rule of
thumb—if you have lots of water, eat,
otherwise, don't consume anything. Although
the book might contain useful information,
it would be difficult to adjust your eyes
to reading and remain attentive as dehydra-
tion increases.

14. 2 Quarts of 180 Proof Vodka

When severe alcoholism kills someone, they
usually die of dehydration. Alcohol
absorbs water. They body loses an enormous
amount of water trying to throw off the
alcohol. We estimate a loss of 2 to 3 oz.

of water per oz. of alcohol The Vodka
consumed could be lethal in this situati
Its presence could cause someone in a
dehydrated state to increase his problem
The Vodka would be helpful for a fire or
as a temporary coolant for the body. Th
bottle might also be helpful. All in al
the Vodka represents more dangers than
help.

15. Bottle of Salt Tablets (1000 Tablet

Wide spread myths about salt tablets exi
The first problem is that with dehydrati
and loss of water blood salinity increas
Sweat contains less salt than extra-cell
lar fluids. Without lots of extra water
the salt tablets would require body
water to get rid of the increased salini
The effect would be like drinking sea
water. Even the man who developed salt
tablets now maintains they are of
questionable value except in geographic
areas where there are salt deficiencies