TECHNICAL REPORT

February 15, 1954

OFFICE OF NAVAL RESEARCH
Contract NR 170-176
(Nonr 660(00))

HUMAN DYNAMICS LABORATORY

University of Chicago

I.   General Objectives and Over-all Progress to Date

Since its inception, this project has had three related objectives: testing, expanding and elaborating a theory of small group operation; developing and testing specific research techniques; and applying both theory and methodology to specific problems of group operation and development.

The project has taken the work of W. R. Bion as its point of departure in theory. The interpretation and elaboration of this theoretical approach approach has been and is a continuing process. During the several years of the project's existence, we have prepared several statements of theory — each somewhat more concrete and orderly than the one preceding it. Our most recent statement of theory was prepared last Fall and will be included in a research monograph which is now ready for publication.

With regard to techniques and procedures, the project has developed six related techniques: a behavioral rating system, a minute-by-minute graphing procedure, a unitizing procedure, a work-emotionality field graph, a sentence completion test (The Reactions to Group Situations Test), and a group-oriented self-perceptual Q-sort. The work on basic research techniques has now been completed. All these procedures will be presented and illustrated in a monograph about to be published.

Up to the present year, work within the project has focussed on the development and testing of various methods for investigating group operation. With the basic work on methodology completed, the project has been able to turn its attention to the exploration of certain substantive problems. Last June, a series of specific studies was identified which were to investigate such problems as group composition, leader-member relations, etc. Part II of this report describes each of these in some detail and indicates the present status of each study.

II. The Status of Current Investigation

A. The Influence of Valency Composition on the Emotional and Work Characteristics of Small, Leaderless Groups.

(Ida Gradolph)

Purpose:

The concept of Valency can be used to think not only about how the individual will influence the group, but also how the group will control the individual. Thus a person whose dominant valency is Pairing would be expected to perform differently in a group composed of similar "Pairing people" as distinguished from one in which his pattern is unique.

This project, then, investigates the following hypotheses:

      i.   Individuals who can be characterized as having a particular valency will exhibit proportionately more behavior associated with that valency type than other behaviors.

      ii.   For valency types which are mutually supportive (e.g., Pairing) members will operate more efficiently in homogeneous groups than in mixed groups. For valency types which are in competition (e.g., Counter-Dependent), members will operate more efficiently in mixed groups than in homogeneous groups.

      iii.   The range and intensity of emotionality expressed in a given meeting is greater for mixed groups than for pure groups.

A pilot study was completed this summer in which four experimentally composed groups performed two tasks in a controlled situation. The groups were composed as follows:
    a six member group homogeneous with regard to Flight
    a six member group homogeneous with regard to Work-Pairing
    two six member groups, each composed of three Flight members
        and three Work-Pairing members.
The pilot study was intended to test the procedures and to see if, in general, relationships seemed to obtain between valency composition and group characteristics. Tentative confirmation of the hypotheses has encouraged us to continue.

Design

Specifically, the experimental design to be used this Spring will involve comparing eight groups composed of (1) pure valency types and (2) mixed valency types. We will be concerned with two valency types (Valency type A and Valency type B*) and will vary the sequence of meetings as follows:

Sequence X: 1) Group composed entirely of people with Valency A.
2) Group composed entirely of people with Valency B.
3) Group composed of $\frac{1}{2}$ A people and $\frac{1}{2}$ B people.
4) Group composed of second $\frac{1}{2}$ A and second $\frac{1}{2}$ B.

Sequence Y: 1) Group composed of $\frac{1}{2}$ A people and $\frac{1}{2}$ B people.
2) Group composed of second $\frac{1}{2}$ A and second $\frac{1}{2}$ B.
3) Group composed entirely of people with Valency A.
4) Group composed entirely of people with Valency B.

Groups 3 and 4 in Sequence X are composed of the same individuals that were in 1 and 2; groups 1 and 2 in Sequence Y are composed of the same individuals that were involved in 3 and 4 in that sequence.

Size of groups: Each group is to have six members. There will be six people of Valency A and six people of Valency B in one sequence; as there are two sequences, the total population of subjects actually involved in the experimental situations will be twenty-four.

These independent variables will be examined for their influence upon two major dependent variables:
1. Work level -- as measured by the amount of work involved, as scored by means of a rating system, (The Behavioral Rating System) and the Observers' Q-sorts.

2. Emotionality-- quantity and quality of each of the four emotional categories as measured by the Behavioral Rating System and Observers' Q-sorts.

Observation of the Experimental Groups

1. Two observers rate the meeting for the quality of work and the affect contained in each statement (by means of the Bionic Behavioral Rating System).

2. Two observers characterize the group by sorting a set of Q cards in such a way as to describe the group. (This test was constructed during the summer by Ida and Philip Gradolph).

This design, in addition to systematically varying the two major experimental variables has the following advantages:
1. It controls the learning effect from the first group to the second group which might obscure changes (in, for example, work level) due to the differences in group structure.

*A and B simply represent any two of the Bionic categories.

2. As a result of identification with the first group of
    which the subject was a part it is possible that the
    subject might exhibit loyalty to this first group which
    might change or influence his behavior in the second
    group. Variation in sequence should help us determine
    the extent of this phenomenon.

3. The use of two sequences with two groups of the same
    valency patterns constitutes essentially a replication
    of the experiment and adds support to such conclusions
    as may be drawn from the results.

Work to be completed by July 15: The design for each unit of this
study has been described above. One major unit of the study will
be completed by June. The specific valency patterns which will be
utilized in the study have not yet been decided upon. (Large numbers
of subjects must be pretested in order to find individuals sufficient-
ly like each other to warrant placing them in the same group. The
specific valency construction of the experimental groups will depend
on the subjects available.) At this point subjects are being tested--
they are given a balanced Bionic sentence completion (The Group
Sentence Completion Test, devised by Ida Gradolph) and an interview
scorable in the Bionic categories (devised by Ida Gradolph) in an
attempt to get "pure" or extreme types. The experimental situations
should be completed by June 15 and preliminary results available.

B. An Investigation of the Relationships between Individual
    Valency-behavior patterns predicted from the Self-Perceptual
    Q Sort, the Reactions to Group Situations Test, and the
    Communality with factor-analyzed Subgroups.

(Philip C. Gradolph)

Introduction:

The Self-perceptual Q sort (Q sort) and the Reactions to Group
Situations Test (RGST) have both been used as the basis for pre-
diction of individual behaviors in group situations. These in-
struments derive their data from different sources. The Q sort
describes how the individual perceives himself as acting in
group situations, whereas the RGST, a projective instrument, as-
certains his responses to imagined group-relevant situations.
The latter test must be interpreted by a trained clinician. Al-
though the types of data and means of analysis with the two in-
struments are quite different, both yield similar information
about the modality-related behaviors of individuals in actual groups.

A third basis of prediction comes from factor analysis of Q sorts
By this means, subgroups composed of people sharing similar patterns
of factor loadings can be identified. The fact of "membership" in
such subgroups gives a further basis for prediction of individual
behavior. We are interested in finding how adequate this basis is.

Purposes

One purpose of the project is to compare the RGST with analysis of
individual Q sorts in an effort to understand more precisely the
differences between descriptions obtained from clinical analysis
of projections as compared to self-descriptions by the subject
himself. Comparisons are being made with respect to two aspects:
     1.   The patterns of modalities projected or selected by
the individuals.

     2.   The behaviors (keyed to emotional modalities) that he
is predicted to show in the group. (The valency-behavioral
description).

A further purpose is to ascertain to what extent knowledge of the
subgroup communalities shared by an individual enables prediction
to be made of his behavior in the group. Accordingly, the valency-
behavioral pattern based on subgroup "membership" will be compared
with the patterns obtained from RGST and Q sort analysis.

Design

The basic design of this study is to correlate descriptions of
Subjects' valency-behavior patterns based on RGST protocols with
similar descriptions derived from the Self-Perceptual Q-Sort.
These descriptions of an individual's valency-behavior pattern
will also be correlated with the valency-behavior pattern of his
phenomenological sub-group to investigate the degree to which pre-
dictions about individuals can be made on the basis of sub-group
information.

In order to make these valency-behavioral descriptions statistic-
ally comparable, a Descriptive Q-Sort (not to be confused with the
Self-Perceptual Q-Sort under study) has been designed in terms of
an elaboration of the Bionic modalities. Several Clinicians will
each throw these Descriptive Q-cards about each Subject, first on
the basis of the RGST and then from the Self-Perceptual Q protocol.
Each type of protocol will, of course, be coded separately so that
the two descriptions of each Subject's valency-behavior pattern will
be entirely independent. Descriptive Q-Sorts will also be used to
describe the phenomenological sub-groups composing a 15 member
group. These will then be correlated with the valency-behavior
patterns of members of these groups based on the individual protocols.

Hypotheses

This study should yield evidence on the following hypotheses:
   A.   There is a high degree of agreement between the
        valency-behavioral pattern of an individual derived
        from the RGST and a similar valency description based
        on the Self-Perceptual Q-Sort.

   B.   Valency-behavioral patterns derived entirely from
        information concerning an individual's sub-group
        membership are a reasonably close approximation to
        those based on members' individual protocols (both
        RGST and Self-Perceptual Q).

Two further technical hypotheses:
   C.   The Self-Perceptual Q-Sort is an objective instrument.
        That is, different Clinicians will arrive at approxi-
        mately the same description of valency-behavior pattern
        from the same Q-Sort protocol.

   D.   The RGST is an objective instrument. (See "C" above.)

Work Completed before February 15, 1954.

The Subjects are 15 members of a Training Group at the Chicago Work-
shop on Community Human Relations last summer and the necessary
RGST and Self-Perceptual Q-Sort data were collected then. A
factor-analysis of the Q-Sort data has been performed and the
phenomenological sub-group structure of the group determined.
A Descriptive Q-Sort designed to allow adequate description of
a Subject's valency-behavior pattern has been devised and pre-
tested. At present, three staff members acting as Clinicians
are analyzing the Subjects' RGST protocols and recording their
valency-behavioral patterns by throwing Descriptive Q-Sorts.

Work to be Completed before July 15, 1954.

Three Clinicians will analyze the Subjects' individual Self-
Perceptual Q-Sorts and record their valency-behavioral patterns
by throwing Descriptive Q-Sorts. A measure of the objectivity
of the Self-Perceptual Q will be obtained by inter-correlating
the valency descriptions of the three Clinicians derived from
these protocols. The objectivity of the RGST will be determined
in a similar manner. If these objectivity figures are high enough
$(r > .70)$, the Descriptive Q-Sorts of the Clinicians based on
each instrument will be averaged to give two "averaged" sorts
for each Subject, one from the RGST and one from the Self-Percept-
ual Q. These "averaged" sorts will then be correlated to determine
the degree of relationship between valency-behavior patterns de-
rived from these two independent instruments. Finally, each of
these averaged sorts will be correlated with Descriptive Q-Sorts
thrown to describe the valency-behavior pattern of the various
phenomenological sub-groups of the group. The correlation be-
tween the valency-behavior pattern of the individual member and
that of his sub-group will indicate the degree to which an in-
dividual's valency is defined by his sub-group membership.

C. The Analysis of Dimensions of Interaction

(Saul Ben-Zeev)

This study investigates some characteristics of the natural unit as a basic unit of interaction in the group. By definition the natural unit consists of a period of time, ordinarily 3 - 20 minutes long, which is homogeneous with regard to participants and which is different with respect to participation pattern from the patterns immediately preceding and following it.

The valency concept as applied to actual group behavior implies that members of the group tend to co-participate in accordance with their modality preferences. The fact that succeeding units differ with respect to their participation patterns suggests therefore that they would also differ with respect to the modalities that would be expressed in them. It is toward the exploration of these implications that the study of the natural unit is now directed.

The inquiries undertaken in this project are: (1) to study individual and situational factors which influence the extent of relationship between co-participation and sociometric choice; (2) to analyze the modalities expressed in each unit for the purpose of ascertaining the extent to which the units may be diffirentiated by characteristic emotional dynamics; and (3) to discover the extent to which the kinds of sequences of shifts in dominant modalities from unit to unit can be used to differentiate among entire meetings or among different groups.

Work Completed to Iate.

1. Co-participation and Sociometric Choice: Here co-participation and sociometric relationships have been represented in matrix form. In the sociometric matrix are tabulated the accumulated results of each group member's answers to two questions he was asked at the end of each meeting. These questions asked each group member to indicate which other members most represented him, and which other members accepted his ideas to the greatest extent during the preceding meeting. The co-participation matrix consists of four-fold point correlations of co-participation in natural units for each member of the group paired off with each other member. The co-participation matrix has been compared with the sociometric matrix of the same group.

The results of the comparison between the two matrices show that for some individuals there is a very close correspondence between co-participation and sociometric choice. For other individuals there was no such correspondence. This indicates that there were some group members who tended to participate in the same units with those they later chose as having the same"point of view" and that others tended to participate with people whom they did not recognize as having the same point of view. This comparison enables, then, the identification of these two types of participants, and the possibility is now open to compare these two types of participants with respect to their valency patterns as shown on the RGST and Q-Sort, and with respect to their characteristic expression of affect and work as shown on the behavioral ratings during the meeting.

2. Differentiation of Units by Characteristic Emotionality: The attempt to characterize the units by means of the emotional modalities has been successfully carried out by summation of the statement by statement emotionality ratings for each unit. This has been done for the units within ten meetings of one group, and in 95% of the units one or two modalities had values that were significantly greater than those of the remaining modalities. Such modalities are termed the dominant modalities for that unit.

When one or both of the dominant modalities drop off or change between succeeding units this change is taken as a shift of emotionality. Such shifts occurred between succeeding units in 75% of the cases.

The facts that each unit can be characterized by dominant emotional modalities and that emotional shifts do occur between units in a large majority of the cases contribute further to the validation and usefulness of the unitizing method. This enables further exploration of group process utilizing the natural unit as the basic unit of investigation.

3. Characterization of Groups and Group Development:

(a) A study of the natural units for those ten meetings whose units were characterized by dominant emotional modalities shows that there are regular tendencies within meetings.

One type of tendency can be expressed numerically. An example of this is from the first meeting of the group. The number of shifts from each modality to each other modality was counted and tabulated in a matrix. The shifts that were most numerous during that meeting were from F to F, which occurred ten times, and from F to D, which occurred eight times (the next largest shift is from F to P which occurs two times). The meeting can therefore be characterized by these two shifts.

Another type of tendency can be expressed by means of a pattern.
An example of this is the second meeting of the group. Here the
units shifted from units in which one dominant modality was found
to units where two dominant modalities were found. The sequence
of modality units for that meeting was as follows:

$F \rightarrow FP \rightarrow F \rightarrow FM* \rightarrow F \rightarrow FF1 \rightarrow F$.

Different meetings have different structural tendencies and differ-
ent characteristic shifts, and this can serve for comparison of
different meetings of the same group and corresponding meetings
of different groups.

(b) The data have also been set up to enable inter-
relation of the various other dimensions of group interaction,
so that the dominant emotionalities for every unit can be re-
lated to the work-emotionality characteristics and a variety of
situational factors.

Work to be Continued till July 15, 1954.

Work till July 15 will be concentrated mainly on (3b) above. This
would require classification of the various situational factors,
such as, clarity of definition of goals, level of abstraction,
group oriented remarks, etc. The units would then be assorted
accordingly, and the interrelations between these classifications
and the other dimensions (dominant modality and the position in
the work-emotionality field) would be studied.

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*M = mixed modalities. In this case F was dominant but there was
a large amount of other modalities, none of which was predominant
enough to be called the second dominant modality. The sum of
these modalities is, however, large enough to be noted.

D.   Shifts in Sub-group Structure Occurring During the
     Course of a Training Group.

(Dorothy Stock)

Purpose

This study will explore the kinds of changes which occur in sub-
group structure during the course of a training group and will
relate these changes to two factors: the character of the leader-
ship and the composition of the group. Group structure is defined
in terms of the number, distribution and character of the phenomen-
ological sub-types in the group. The following kinds of changes in
structure will be identified: number of sub-types, membership in the
sub-types, and emotional character of the sub-types. These changes
will be related to the leadership, the character of the initial group
structure, the members' perceptions of the experience, and to socio-
metric relationships.

Design

     1.   Identification of the sub-group structure of several
training groups. The sub-group structure of a group is identified
in the following manner: Each member of the group describes the
group he most prefers by throwing a Q-sort (i.e., by sorting a
set of descriptive statements into a forced frequency distribution
in which one end represents "characteristics of the group I prefer"
while the other represents "characteristics of the group I do not
prefer.") The population of sorts thus produced is factor analyzed
and rotated in order to identify the communalities existing in the
population. This procedure typically identifies four to six sub-
groups existing within the total group. Each sub-group contains
several members who are similar with regard to the kind of group
they prefer. By "sub-group structure" is meant the number of such
sub-groups, the number of persons belonging to each, and their mean-
ing in modality terms.

     2.   Comparison of initial group structure among several train-
ing groups. The pre-structures of these groups will be analyzed
and compared for: number of sub-groups, pattern of sub-groups, valency
characteristics of sub-groups, the relation of the leader to the
various sub-groups and to his associate.

3.   Identification and comparison of structural changes. The
pre and post structures of the experimental groups will be compared
for changes in the number, pattern and content of the sub-groups,
and for changes representing convergence or divergence, losing or
assimilating stragglers, extent to which the leader is "in" the
group, etc.

4.   Relation of structural characteristics to other group
factors.
   (a) member's perceptions of the group experience.
        Structural characteristics will be related to
        members' perceptions of togetherness. satisfaction,
        feelings about the leader, etc.

   (b) members' feelings about each other.

Statement of Progress

Pre and post Q sorts were collected from all the members of eight
training groups at the National Training Laboratory in Group
Development at Bethel, Maine, during the summer of 1953.

In order to select from among this population a more limited number
of groups for intensive study, all pre-sorts of leaders were inter-
correlated and analyzed in order to determine the range and pattern
of leadership available in the data. This analysis indicated that
two of the leaders were very similar to each other while a third
was different from the first two and opposed to them along several
important dimensions. Specifically: Leaders 4 and 5 encouraged
counterdependence in the membership (immediately place full respon-
sibility for steering in the hands of bhe members) and place few
limits on the expression of pairing and fight. At the same time
both exhibit some anxiety and inability to deal with fight. The
expression of pairing in the group is pleasing and rewarding to them.
Leader 1 retains control of the group and consistently maintains a
more central, directing role. He also encourages the expression
of pairing and fight but feels the need for some limits. He shows
no disturbance over the expression of fight but seems to discourage
pairing among the members and has some need to keep the group ex-
perience non-intimate.

These three were the groups selected for intensive study. In order
to identify the pre and post structures for these groups, factor
analysis of a total of 6 populations of Q sorts was required. This
statistical work is currently being done. All 6 factor analyses
have been completed, and three of the six have been rotated.

The results so far (on two pre-sorts and the post sorts of one of these) indicate that pre patterns may be generally comparable from group to group and that some identifiable changes occur from pre to post.

Additional work on this project requires the completion of the statistical work and the identification of the content of the factor sub-groups, pre and post, for all groups. Analysis, as indicated under Design, above, will be completed by July 15, 1954.

E. Leader-Member Compatibility, as a Factor in Member-Change and Satisfaction with the Group Experience.

(Dorothy Stock)

(This is a new study, not previously described in the proposal. It is closely related to D, above.)

Purpose:

This study investigates a series of two-person relationships within the group: the relation between the leader and each member. It will explore such questions as: "Can a leader be said to be more compatible with some members than others?" "Are members more available or more resistant to some leaders than to others?" "Is leader-member compatibility a factor in change, satisfaction?"

Leader-member relationships will be defined in terms of the valency patterns characteristic of each individual, as determined from the Q sort. Specific assessments of relationship (in terms of reward-threat) will be made for each leader-member pair, and predictions will be made to member satisfaction, change, etc. The general hypotheses to be tested are the following:

1. Member growth, satisfaction with the group, and attitude toward the leader are related to the character of the threat-reward relationship with the leader. (e.g., if the relation with the leader rewards the individual, there will be more growth, greater satisfaction, and more positive attitudes.)

2. Members with similar valency patterns belonging to groups whose leaders exhibit different approaches (e.g., leaders 1 and 4) will show different growth, etc., depending on the threat-reward relationship.
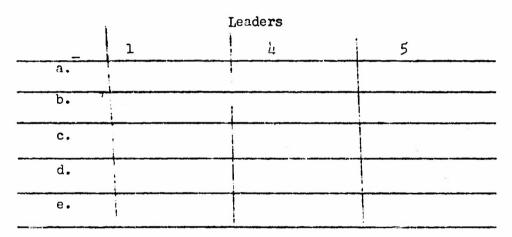
Procedure:

    1.   The pre Q sorts of leaders 1, 4 and 5 will be analyzed and interpreted for preferred modality, conflict area, defensive structure, modality areas he can deal with readily, modality situations he cannot deal with, and (a) the kinds of people he would threaten (b) the kinds of people he would reward, (c) the kinds of people who would threaten him (d) the kinds of people who would reward him.

The analysis will involve the following:
    quantitative analysis: m and sigma for each modality
    qualitative analysis: based on top and bottom statements in
        the sort (in order to specify the differences between
        the leaders, significant differences between the three
        sorts will be examined).

    2.   Pre member sorts will be analyzed in the same way.
(possibly some short cut can be devised).

    3.   Members for all groups can then be organized into the following kind of table:

	Leaders		
	1	4	5
a.			
b.			
c.			
d.			
e.			

    (category e is for members who can't fit into the other categories)

As a third dimension of this table, members showing similar modality preferences (e.g., FCD, etc.) will be so identified.

Members can appear more than once in this table -- in a. or b. and (but not necessarily) also in c. or d.

Position in this three-dimensional table then becomes the independent variable.

4.   The following will be determined for each member (these are the dependent variables).

> i.   Movement toward or away from the group. (greater or less communality on the Q)
>
> ii.   Degree of change in perception of the "good group". (pre-post r)
>
> iii. Change toward or away from the leader. (Cf pre r with leader and post r with leader)
>
> iv.   Change toward greater or less confusion in perception of a "good group" (Cf sigmas for each modality, pre and post).
>
> v.   Satisfaction with the group experience. (FMR--Q. 1)
>
> vi.   Attitude toward the leader. (Sociometric)
>
> vii. Attitude of leader toward the member. (Sociometric)

Specific hypotheses to be tested:

1.   Members threatened by the leader will evidence disturbance, immobilization, dissatisfaction, etc.
> -will show resistance on the post Q
> -will show confusion on the post Q
> -will show relatively greater dissatisfaction with the group
> -will negatively choose the leader

2.   Members rewarded by the leader will evidence more growth, ease, satisfaction, conformance with leader ideas
> -will show greater acceptance of the leader's approach
> -will show greater ease (less confusion) in relevant areas
> -will show relatively more satisfaction with the experience
> -will positively choose the leader

3.   Members who threaten the leader (i.e., whom leader is unable to handle)
> -will be perceived by the leader as disruptive.

Statement of Progress:

1. Intensive analyses of the three leaders have been completed. (See 1, under Procedure)

2. The FMR data has been summarized.

3. Factor analysis of all pre and post Q populations is partially completed.

The members' pre-sorts for all groups must be analyzed and the members categorized (steps 2 and 3 under Procedure). The socio-metric data must be summarized and the pre-post Q correlations computed. Results will then be organized as indicated under 4, above, and the specific hypotheses will be tested. It is estimated that this work can be completed by July 15, 1954.

F. The influence of Sub-groups on Participation in Human Relations Training Groups

(William F. Hill)

This study, described in the November 20, 1953 proposal under section B1, has been the responsibility of William F. Hill, and will constitute his Doctoral dissertation. Mr. Hill is no longer formally associated with the project, having left to take a full-time position at State Hospital South, Blackfoot, Idaho. He is, however, continuing work on the study and keeps the project informed of his progress. His latest communication indicates that the present emphasis in the study is methodological and is concerned with developing and testing a controlled procedure for interpreting the valency characteristics of sub-groups and for predicting the character of group operation in terms of the inter-action of these sub-groups.

III. Project Personnel

Herbert A. Thelen, Principal Investigator, part-time.

Dorothy Stock, Project Director, full-time.

Saul Ben-Zeev, research assistant, half-time.

Ida Heintz Gradolph, research assistant, half-time.

William F. Hill, research assistant, half-time,
                until September, 1953.

Philip C. Gradolph, research assistant, half-time,
                beginning September, 1953.

Pearl H. Bunton, Secretary, full-time.