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SOCIAL PERCEPTION AND GROUP EFFECTIVENESS

ANNUAL STATUS REPORT

February 15, 1953

Contract N6ori-07135, Project NR 170-106

University of Illinois

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I. General Nature of the Program

- A. History. This is the second year during which the project has been in operation. During this year we have been primarily concerned with testing and extending hypotheses which emerged from the first year of our study.
- B. Purpose. The research of this project aims to determine why some groups of men work together more effectively than others. While we recognize the skill and ability of individual team members as important components of team effectiveness, we regard team effectiveness as depending to some degree on the way the team members perceive each other, i.e., their interpersonal perceptions. Interpersonal perception can be measured in many ways. We have here been particularly concerned with studying the tendency on the part of the perceiver to assume similarity among others, as measured by Assumed Similarity (AS) scores which are described below. Instead of studying an individual's perception of particular other individuals, we have recently found it more profitable to concentrate on a person's generalized attitude toward others.

II. Measurement of Assumed Similarity.

1. An Assumed Similarity (AS) score is obtained by (a) asking a person to describe himself and (b) asking him to predict the self-description given by another person. The similarity of the two sets of responses shows this person's tendency to assume that the other person is similar. We have obtained three main scores. Assumed

Similarity to a preferred person (ASp); Assumed Similarity to a not-preferred person (ASn); and Assumed Similarity between predictions made for the preferred and the not-preferred person (ASo). The latter score has proved particularly important.

2. It was found, in analysis of the instrument used with surveying teams described below, that AS measures possess substantial internal consistency, ( $r > .80$  for a test of 60 items). It was established that the tendency to assume similarity is a generalized set used in describing others, virtually without regard to the content of the items constituting the test. The degree to which a person differentiates others appears to be important as a personality trait.

3. It was established that ASn and ASo have a sufficiently high inter-correlation so that they need not be studied independently. Furthermore, scores based on an "ideal" description ("what I would like to be") add no information to that gained from the self-description, for samples like the surveyor group. While the ASp score is substantially intercorrelated with ASo, it contains sufficient independent variance that it may be worth studying separately. (See TR 7).

4. A method of measuring Assumed Similarity in terms of trait clusters was compared with the method of measuring AS item by item, previously used. We concluded that comparing two descriptions item-by-item was superior for measurement of Assumed Similarity, but not for the measurement of Real Similarity (which compares descriptions given by two different persons).

5. Scattered indications in studies of Assumed Similarity suggest that the person who assumes similarity is a warmer, less critical, person, who prefers informal, personalized work relationships. The person with low AS is, on the other hand, more analytic, task-centered, and formal. It would be consistent with much current thought in social psychology, then, if we found AS to be a desirable quality in leaders. Our results presented below contradict this expectation. Further work to establish the psychological meaning of Assumed Similarity is required.

### III. Prediction of Group Effectiveness

#### A. Studies on basketball teams

1. Our previous annual report described a study of two independent samples of basketball teams. It led to the tentative conclusion that effective teams differ from ineffective teams according to the type of persons chosen as preferred co-workers by team members. Members of effective teams tended to prefer a person with low ASn and ASo. Members of ineffective teams preferred team members with relatively high ASn and ASo. (TR 3.)
2. Erratum. In Table 2 of Technical Report 3, as well as the last Annual Technical Report, it was reported that ASo of the preferred co-worker correlated  $-.78$  with team standing on December 15 (first sample). This figure should have been  $-.53$ .
3. The original analysis was based on team standings early in the season. The basketball data have been analyzed further in order to determine how well AS scores predicted criteria based on later standings. The additional analyses generally yield lower correlations than those based on early standings. Four correlations for ASo are  $-.69$ ,  $-.44$ ,  $-.38$ , and  $-.35$ . Correlations of the team standing with the preferred player's ASo and ASn are negative in all analyses. (A supplementary report giving these results will be distributed with TR 6 and 7.)
4. It was demonstrated that ASo of the top-rated man and second-rated man in a team are positively correlated ( $.68$  for sample 1,  $.27$  for sample 2). That is, a team apparently has a consistent preference for one type of man. The AS of the top man is therefore a reflection of a team attitude.

#### B. Study of surveyor teams

1. The basketball studies led to the hypothesis that teams who select as preferred co-worker someone with low AS, will be more effective than those who prefer a high AS person. This hypothesis

was tested on civil engineering students who were enrolled in a field course in surveying:

2. A new instrument was designed to provide more reliable measures of Assumed Similarity and actual ("Real") Similarity between persons. It is based on methodological studies of this and the preceding year. (TR 2, 4.) Test statements were pretested on 200 subjects. Those statements having high variance were selected.

3. The primary criterion of effectiveness was instructor ratings of team accuracy in surveying. More accurate surveying teams chose co-workers with low ASo and ASn. Poorer teams chose persons with high ASn and ASo. Correlations with the criterion were approximately .60. The relationship was significant at the .025 level.

Secondary criteria were obtained by asking instructors to rate the teams in terms of their speed and in terms of the congeniality among team members. Students also rated teams. Finally, we obtained an Intrateam Preference Index (IPI) based on students' tendency to choose friends within and without their team.

Instructors' ratings of accuracy are negatively correlated with IPI. But student ratings correlate positively with IPI. Evidently, the effective teams tend to be less congenial than ineffective teams. The fact that student ratings reflect congeniality warns against dependency on a group's estimate of its own effectiveness. (TR 6.)

#### C. Other validity extensions.

A major problem for this year has been to determine whether the relationship between ASo and group effectiveness has general validity. This involves substantiating the initial indications that it has validity for some teams, and also determining the limits of types of teams to which the phenomenon applies. Considerable

time has been spent in identifying team situations where tests can be given and compared with appropriate criteria of effectiveness. Such situations have been difficult to find. Arrangements have been made to collect data for two major studies on air crews and tank crews.

1. Data are being gathered currently for a study conducted jointly under this contract and a project under the Human Resources Research Center, USAF. We are testing approximately 72 bomber crews. We shall test whether Assumed Similarity in hierarchically structured groups will be related to team effectiveness as before. Analysis will be made both for the crew as a whole and for subteams.

The study utilizes an instrument based on trait clusters somewhat like those used in Thurstone's temperament schedule.

2. Through the cooperation of the Human Resources Research Organization and Army Field Forces, we have obtained permission to test tank crews during March. 25 tank crews are engaged in a rotated-group experiment on the effectiveness of various tanks. Our project will utilize the same design for testing the effectiveness of the crews as a function of Assumed Similarity.

#### IV. Methodological Studies

##### A. Theory of measurement of profile similarity.

1. Technical Report 2, presenting a general theory of measurement of profile similarity, was issued. This report has been extended, and submitted for journal publication. The journal manuscript contains further discussion of implications of the theory for psychological studies, and some additional findings beyond those in TR 2.

It was demonstrated that the D measure has definite significance when applied to correlated variates, even though as discussed in the earlier report, it is based on a model implying uncorrelated variates. The principal components of the variates are weighted in the D measure in proportion to the square root of their latent roots. That is to say, factors having substantial loadings in the

original variates will be weighted heavily in the D measure.

2. Warrington completed an empirical study with hypothetical data which confirmed the general conclusions of TR 2 and provided estimates of the degree to which assumptions underlying Q-correlation techniques discard information from the data under varying conditions. It was established that under these conditions, and with moderately unreliable items, Q-correlations are likely to be highly unreliable. Warrington also provided preliminary evidence that the usual design of forced-choice instruments, where each item has about equal scale value, may be inferior to a design in which items, grouped together, differ in scale value. Further work on this point is needed. No technical report has been prepared on Warrington's study, but microfilm copies of his thesis have been made and will be supplied on request.

B. Analysis of sociometric data.

A mathematical study has been completed which presents a method for deriving an hierarchy index (h) from sociometric ratings. The index is designed to express the degree to which group members are similar or different in status. The measure, h, can possibly be used in four ways in analyzing sociometric matrices.

1. As an index of hierarchy within the group.
2. As a measure of internal reliability of the sociometric ratings.
3. As a measure of the extent to which persons constitute a Guttman scale in the quality being measured.
4. As a measure of communality of thinking among judges. (TR 5.)

Methods of treating sociometric matrices to determine the similarity of ratings given by one person to the modal rating given by the group were described in the 1952 annual report. These have since been applied by Anderhalter, Wilkins and Rigby at St. Louis University. Their results suggest that measures of this character are related to success of Marine Officer Candidates. (See their TR 2, ONR Project N7ori-40802 (NR 151-092.)

VI. Technical Reports Issued.

- No. 1 Fiedler, F. E., Warrington, W. G., and Blaisdell, F. J. Unconscious attitudes as correlates of sociometric choice in a social group. J. abnorm. soc. Psychol., 1952, 47, 790-796.
- No. 2 Cronbach, L. J., and Gleser, Goldine C. Similarity between persons and related problems of profile analysis.
- No. 3 Fiedler, F. E., Hartmann, W., and Rudin, S. A. The relationship of interpersonal perception to effectiveness in basketball teams.
- No. 4 Rudin, S. A., Lazar, I., Ehart, Mary E., and Cronbach, L. J. Some empirical studies of the reliability of social perception scores.
- No. 5\* Hohn, F. E. The comparison of sociometric matrices. With a discussion by L. J. Cronbach.
- No. 6\* Fiedler, F. E. Assumed similarity measures as predictors of team effectiveness in surveying.
- No. 7\* Cronbach, L. J., Hartmann, W., and Ehart, M. An investigation of the character and properties of assumed similarity measures.
- Supplemental Report No. 3\* Fiedler, F. E., Hartmann, W., and Rudin, S. A. Correction and Extension of "The relationship of interpersonal perception to effectiveness in basketball teams".

\* Prepared but not yet distributed.

Dissertations completed.

Warrington, W. G. The Efficiency of the Q-sort and other test designs for measuring the similarity between persons.

VII. Personnel

Members of the project staff this year have been as follows:

Lee J. Cronbach, Professor of Education,  
Principal Investigator

Fred E. Fiedler, Research Assistant Professor,  
Principal Investigator

Franz Hohn, Assistant Professor of Mathematics

Irving Lazar, Instructor in Education

Walter Hartmann, Research Associate

George S. Leavitt, Research Associate

Vivian McCraven, Research Associate

Willard G. Warrington, Research Associate

Mary Elizabeth Ehart, Research Assistant

Stanley A. Rudin, Research Assistant

Ralph Smith, Junior Personnel Assistant

Consultants

N. L. Gage, Associate Professor of Education

Walter Lifton, Assistant Professor of Education

Eugene Burdock, Research Associate

Goldine C. Gleser, Instructor in Neuropsychiatry,  
Washington University

Lee J. Cronbach      Fred E. Fiedler  
Principal Investigators

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