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The relationship of conformity and general reasoning ability: its role in conclusion drawing

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THE RELATIONSHIP OF
CONFORMITY AND GENERAL REASONING ABILITY:
ITS ROLE IN CONCLUSION-DRAWING

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requirements for the degree of
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To Dr. Robert S. Albert and Dr.
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PART I

Much of the theory and research on the communications process has lately centered within those areas known as reference group theory and personal influence. The significance of reference group theory for communications theory is great, lying in the tendency of people to adjust their own opinions, attitudes, values, and subsequent behavior to those of a particular group or particular groups (cf. 6 for studies). This is, in part, an outgrowth and continuation of the socialization process which results in members of the same culture having many personality features and social values "shared by the bulk of the society's members"¹. The final result of this process in a person's behavior, as Fromm puts it, is to make him "want to do what he is required to do by the social system under which he lives"².

The particular functions of the social groups with which people associate in this way have been delineated into the normative and comparison functions. (17) The normative function operates when an individual's standards are set and enforced by the norms of a group of which he is a member. Because he is a member of a desired group, he is motivated to be accepted and treated as a member. When the group ceases

¹Linton, R. The psychological frontiers of society, Kardiner, A., (ed.). New York: Columbia Univer. Press, 1945, p. viii.

²Fromm, E. Man for himself. New York: Rinehart, 1947, p. 60.

to be a positive reference point, but rather becomes a negative one, it would seem that it is not truly a membership group, and the function in operation is comparative. The comparison function is in operation when an individual uses a group, not necessarily a membership group, as a standard or comparison point for judgment of an issue, or in evaluation of himself and others. In this sense, the group can serve either as a positive or negative point of reference along some dimension (12).

Personal influence as an area of investigation has assumed importance because it has been discovered that, although people are often directed in their thoughts and actions by the groups with which they identify, they are especially so directed by certain people within these groups with whom they come in personal contact. And this finding is more significant in light of the fact that often those who do the influencing are a minority in comparison with those upon whom their influence is shed. It is on this point that the concepts of "opinion leader" and "opinion transmitter" are based. Katz and Lazarsfeld (16, p. 99-115) have elaborated on these concepts by distinguishing three types of strategic individuals within the usual networks of influence transmission: first, the "initiators" who are capable of influencing because they have been nominated within their groups as leaders; secondly, the "transmitters", whose strategic social location within groups allows them to communicate information and influence; and thirdly, the "influentials", who by virtue of their

positions in a group, are sanctioned to influence within certain subject areas. Although this theory should offer the mass media some assurance that by these interpersonal networks a "two-step flow of communication" (5) is created which allows their communications, if indirectly, to reach their intended audiences; the assurance is not as great that their communications are not modified by the opinion leaders during this process.

Nevertheless, behind the concepts of reference groups, personal influence, and opinion leaders is an inherent factor not always given the amount of attention which it deserves. For any group or person which has a potential effect on another person's opinions, attitudes, or behavior will actually wield that effect only in relation to the degree to which the person is motivated to conform to the opinions, attitudes, or behavior of that group or person. In other words, the key to the influence of group norms, which may be enforced by personal influence, actually lies in the individual's predisposition to conformity to those norms.

It would seem that some behavior-mechanism must be in operation which underlies, and which can account for the adjustment of attitude or behavior to agree with that of the group, which results from such a predisposition. The motivation or predisposition which individuals often display to agree with group judgments is explained by what Katz and Lazarsfeld (16) term the benefits of conformity. If an individual wishes to identify positively with a group, he usually must be willing

to accept the standards and opinions of that group. Newcomb's (20) Bennington study has also illustrated that in belonging to a group, forming agreeing attitudes is an important mechanism. That the tendency or motivation toward conformity, as Doob has said, is a "prime determinant of group behavior" (11, p. 205) seems obvious from a consideration of studies (6) done in the area of group influence which indicate that many individuals tend to display a need to agree or conform to a group norm even if they have not chosen the group as a positive point of reference in their everyday lives.

Moore (2, p. 403), who dealt with such group influence in relation to suggestibility, found that pressures exerted by majority and expert opinions influenced individual subjects' judgments about diversified matters. And Thorndike (2, p. 407) enlarged upon this knowledge by an investigation of the role of authority and the group in matters of attitude and taste, which showed that attitudes and tastes can be taught to people, though not as easily, as facts and skills. Items with which an authority or the group agreed were evaluated more highly than other items; thus it seems that the principles of repetition and reward learning work not only in the objective areas of thought, but social ones as well.

The importance of the predisposition to conformity is further pointed out by Sherif and Sherif's (22) finding that conformity to the standards of a social influence persists even when an individual is placed alone in a judgmental situation. In their experiment it was found, oddly enough, that

the influence of a former partner was, on the whole, greater when the subject was alone. In other words, conformity to the standards established earlier was greater in the absence of the social influence. This finding has led Sherif and Sherif to speculate that people often dislike to take suggestions from a person when he is present (except when that person exerts strong prestige or strong needs are operating), but may be more open to suggestibility in the absence of that person. As Sherif and Sherif (22, p. 554) further speculate, yielding without hesitation is not a gratifying action unless it is necessary.

Moving from a general discussion of conformity to those studies where individual dynamics are more clearly investigated, we find Asch's (2, p. 451) study, which deals further with this phenomenon of yielding. In the experimental situation, subjects were put under pressure to conform or yield to a group opinion which was actually a false one. The design involved subjects' judging the length of a given line according to three other lines, none of which were equal to each other. In each situation, one subject was not coached by the experimenters, as were the majority, to give false answers for the purpose of the experiment; this subject was one of the last to give his judgment of the length of the line. Barron (3) has dealt with Asch's experimental situation in the investigation of independence of judgment, which here means resistance to yielding under group pressures. About twenty-five per cent of subjects proved to be "Independent"

of others, while twenty-five per cent at the opposite extreme of the distribution yielded to group pressures from eight to twelve times out of twelve times. The differentiation of these two groups allowed a more intensive personality study of two extremes. And it is one of the tests employed on these two groups which is of special interest here. It was found, as expected, that the so-called Independents scored higher on the variable of "Complexity".

Barron has described the dimension of complexity-simplicity as "a bipolar factor in perceptual preferences which opposes a preference for perceiving and dealing with complexity to a preference for perceiving and dealing with simplicity, when both of these alternatives are phenomenally present and a choice is made between them" (3, p. 171). The significance of this factor for the present experiment is that one of the phenomenal fields, among others, in which research on the factor was reported, is that of social conformity and the adherence to tradition.

It was shown that the S who prefers complexity is socially non-conformist, by staff ratings and self ratings of Conformity which correlated $-.47$ and $-.53$ with Complexity. Moreover, staff ratings of Submissiveness, defined as "deference, willingness to be led, compliance, over-ready acceptance of authority" (3, p. 168) and Adjustment, or "getting along in the world as it is, adequate degree of social conformity, capacity to adapt to a wide range of conditions, ability to fit in" (3, p. 166) both correlated negatively with Complexity.

The fact that social conformity and, more generally, Adjustment are negatively related to Complexity coincides with the fact that Asch's Independents were more Complex than "Yielders". It seems fairly obvious that the Independents, who resisted yielding to group pressures, were displaying non-conformist, rather than conformist tendencies. The relationship of their independence to Adjustment, however, is not so clearly or easily defined. For, though their Independence may show a degree of social non-conformity, it is not so obvious whether or not this independence shows less of an ability to get along in the world as it really is and to fit in, as well as less of a capacity to adapt to a wide range of conditions. One may have this ability, but choose not to adapt to the particular conditions prevailing. It is a difficult problem to determine.

In their opposition to the group judgments, some of the independent subjects, as Barron (3, p. 169) points out, displayed enjoyment, others anxiety; while others, though slightly perturbed, remained confident, yet not overly positive in their positions. This third type of independence does not seem to be truly indicative of "Unadjustment" in terms of inability to get along in the world or incapacity to adapt to a wide range of conditions. For, in a sense, these Independents are fitting in to the prevailing social processes by attempting to get along in the world as they see it (perhaps quite realistically, too); while they are also, in a sense, showing

a capacity to adapt to a wide range of conditions by adapting to the way which they feel is appropriate.

Sherif and Sherif (22, p. 665) have cited studies which show that the genuine non-conformist is usually not a prejudiced person. However, the fact that he is not satisfied with the existing social norms does not necessarily imply that his attitude is a completely negative and deviant one, for his rejection of these norms may mean that he identifies with some smaller or other group within that society. As Cooley (9) pointed out, nonconformity to these broader social-distance norms is more indicative of conformity to another set of norms, than of rebellion against the accepted norms. However, one can say that the non-conformist is more independent of the existing social norms (makes up his own mind); and this should be reflected in cognitive processes in so far as the good reasoner is more flexible and can entertain more ideas and information than the poor reasoner, who is more rigid and often displays mechanisms of defensiveness and restraint, as McNemar (18) points out. This, too, is in agreement with Barron's (3, p. 172) observation that the factor of Complexity relates negatively to social conformity, ethnocentrism, and control of impulse by repression, but positively to independence of judgment.

Coffin (8) has explored the factor of Complexity in a study dealing with the complexity or difficulty of the situation to which a subject is required to respond. It was found that suggestibility tends to increase with the difficulty of

problems (here, mathematical); also that suggestibility decreases with the increase of prior information or knowledge and training. Crutchfield's (10) data, by showing that conformity to a group increases, the more poorly structured the stimuli, makes basically the same point: as complexity is increased, so is suggestibility.

If the person who is able to handle complexity is less open to suggestibility, it would follow that he probably tends to be more productive of original thought. He would, in this sense, probably be, in Barron's (3) classification, "Independent", and as a result also generally more socially non-conformist. Furthermore, if as a person's knowledge in an area is increased, he becomes less open to suggestion (in that area), it would appear that some relationship might exist between the ability to handle complexity and knowledge. If any such a relationship exists, it probably lies within the realm of cognitive processes, and could conceivably hinge on some type of reasoning factor, which basic to some individuals might be developed further by increased training in using their knowledge as the basis of decision-making, i.e., conclusion-drawing.

Complexity is involved with the factor of general reasoning, with which the present experiment is also concerned. Guilford, Kettner, and Christensen (15), after numerous factor analyses, concluded that the factor of general reasoning might be an ability to define problems, that it might contain a trial-and-error aspect, and that it might involve the

complexity of the task, which seemed to suggest a "span concept". They felt that in thinking, individuals might possibly have differences in the levels of complexity with which they are capable of dealing, which seems highly plausible in light of the preceding discussion.

As a result of these findings, a factor analysis was made to determine which of the three conclusions was most related to the factor of general reasoning. Of four tests involving the complexity hypothesis, one test, the Ship Destination test (which was used in this experiment), had the highest loading on the factor of any test in the analysis. However, of the tests involving the definition of the problem, two of three had substantial loadings on the factor. Therefore, they feel that the most accurate definition of general reasoning is that it "has something to do with comprehending or structuring problems of certain kinds in preparation for solving them" (15, p. 171). The loading of the Ship Destination test would seem to indicate, however, that complexity and the "span-concept" should not be eliminated as components of some aspect of the factor of general reasoning.

Guilford, Kettner, and Christensen further speculate that even though the range of problems with which general reasoning is concerned is not known, the factor may not only be an ability to solve problems, but a more general one to "formulate complex conceptions of many kinds" (15, p. 172). If this speculation proves true, it is very plausible that an ability to draw conclusions independently might be included in this more general ability.

The relationship between reasoning and conformity has been explored by Crutchfield (10). It is interesting that conformity correlates negatively with a staff rating of "intellectual competence", as well as with a test designed to measure superior mental functioning (-.63 and -.51). Also, a staff rating on "leadership ability" and Barron's "ego strength" scale correlate negatively with conformity score (-.30 and -.33). One ego function is reasoning (23); therefore these findings fit in with the earlier observations of other psychoanalytic writers.

Although Crutchfield showed that conformity can operate in matters of opinion and attitude, such as social issues, as well as in matters of fact, as did Thorndike (2, p. 407); an increase in the power of the group by means of a correction method did not increase group influence in the less objective areas of thought. Because yielding to group pressures is not always the same phenomenon in matters differing in degree of objectivity, it would seem that the tendency toward conformity must, in part, be determined by rational processes of the individual.

The relationship between conformity and reasoning is one which can be considered in more general terms of socialization and cognitive processes. If one were to rely on Freudian theory and concepts, the discussion would lead into one of the ego and super-ego, in that the ego is said to be composed of cognitive processes and the super-ego of those normative

processes which help determine and structure behavior within certain social prescriptions of "good-badness" (14).

But regardless of the type of interpretation made of these normative and cognitive processes, the exact relationship which does exist between them still remains in rather indefinite terms. It can be seen quite easily that socialization of the child requires conformity of him to certain standards set by his parents, who are important sources of succor, and others who assert similar authority. Through socialization, the child passes from what Piaget (21) called the autistic phase of thinking through an egocentric one and on to the adaptive and socialized phase. Freud, Piaget, and Mead (14, 21, 19) agree that the thought processes become partly altered by day-to-day contact with people, which contact allows the child to consider himself in the role of others. In Freud's theory, the main outgrowth of this change is not only the more socialized thought processes, but the acquisition of a greater degree of proficiency in inhibiting the primary (autistic) impulses. Asch's broad hypothesis that "individual immunity to distortion by group pressure is a function of the person's relation to himself and others" (2, p. 498) seems related to this concept of alteration of thought processes.

Albert (1) says that "socialization and thought processes become intimately involved, theoretically and behaviorally, when one recalls that the super-ego acts as a normative factor through the ego-ideal and ego by means of manifest anxiety".

Pertinent here, is Crutchfield's (10) finding that anxiety was revealed by extreme conformists. Albert (1) also points out that Freud (14) has also stated that anxiety is primarily the root of thinking, for the ego, in trying to mediate between primary impulse (autistic needs) and socialized conscience, attempts to resolve by means of the cognitive processes any and all conflicts, thus minimizing anxiety. In this sense, then, we can say that the nature and development of the super-ego, in part, determines the nature of the thought processes. It seems fairly obvious that thought processes will be based on past experiences, mainly by means of memory; for it is past experiences which give us models of problem solving techniques, as well as many of the materials we use in solving problems. It is also past experiences which determine the individual's self-attitude and the degree to which he conforms to the standards to which he is exposed.

However, the relationship between such cognitive and normative processes, as we have said, still remains somewhat indefinite. A major question unresolved is whether it is the content or subject matter of the thought processes and behavior; or, the strategies, techniques, and processes themselves that become determined and/or structured within the socialization process.

It would seem, from the previous discussion, that the degree of conformity which an individual displays as a result of the socialization process must be a major factor in determining the effectiveness of social communications. It is also

fairly obvious that many areas of thought and behavior call upon the reasoning abilities of individuals; and this, too, is a consideration which is of no little import within the field of communications. The reasoning ability specifically dealt with here is that known as general reasoning, which has previously been discussed (p. 9-10) and defined as related to "comprehending or structuring problems of certain kinds in preparation for solving them" (15, p. 171).

The conducting of the present experiment was based upon certain premises about the factors of conformity and general reasoning; first, that individuals may be graded according to their general reasoning abilities. The individual who is a "high" reasoner is capable of interpreting and arranging items within an ordered schematic framework, and should therefore be capable of deducing his own conclusions where none are offered him. The "low" reasoner is not as capable of thus interpreting and arranging items logically of his own accord, and therefore is often dependent upon given information and structure for his conclusions.

Secondly, the "high" reasoner reasons this way because he is more motivated than the "low" reasoner to structure his world in as orderly and controlled a manner as possible, i.e. resolve ambiguities. This motivation results in his greater practice in general reasoning than the "low" reasoner. Furthermore, a part of this desire or need will be related to the "high" reasoner's need to conform in a socially acceptable manner to the society about him.

On the basis of these premises, it seems logical to assume that the factor of general reasoning will play an important role in the effectiveness of a communication which requires an individual to independently draw his own conclusions. It is also assumed that the degree of conformity to group standards which an individual displays influences his general reasoning, by creating a need, which in part determines the amount of practice at these thought processes. Thus, it is felt that there is some kind of interacting relationship between the factors of conformity and general reasoning which is basic to the exercise of independent conclusion-drawing ability. It is the main purpose of this experiment to determine the importance of this relationship to such an ability.

In view of this general discussion, the following four specific hypotheses are made:

1. With general reasoning ability held constant, as the degree to which an individual conforms to society decreases, so increases his ability at drawing conclusions independently of given information. Thus, the highest ability at independent conclusion-drawing will be displayed by the low conformists-high reasoners³, with the high conformists-high reasoners, low conformists-low reasoners, and high conformists-low reasoners following in that order.

2. The largest amount of "correct" opinion change about the main issue of the communication will be displayed by the low

³See Grouping of subjects, in Procedure, for explanation of these categories.

conformists-high reasoners, with the high conformists-high reasoners, low conformists-low reasoners, and high conformists-low reasoners following in that order. This hypothesizes a relationship between opinion change and independent conclusion drawing ability.

3. High conformists will be more concerned initially than the low conformists with the message's topic, which has a high potentiality of anxiety arousal, with no reliable differences on the basis of reasoning ability.

a) Of the high conformists, the high reasoners will show greater post-message reduction in their concern about the topic than the low reasoners.

b) Of the low conformists, the high reasoners will show greater post-message reduction in their concern about the topic than the low reasoners, although the difference will not be reliable.

4. The highest degree of information from the message will be gained by the high conformists-high reasoners, with the low conformists-high reasoners, high conformists-low reasoners, and the low conformists-low reasoners following in that order. This hypothesizes an interaction between reasoning ability and conformity in terms of the importance of the topic to the subject and his ability to understand the message.

PART II

METHOD

SUBJECTS

The subjects were two classes at Boston University, one a sophomore class of Introduction to Communications, and the other a social psychology class composed of juniors, seniors, and graduate students. After incomplete scores and absences were taken into account, the subjects in the first class numbered forty-eight (thirty-eight males, ten females) and those in the second class numbered nineteen (fourteen males, five females), making the total number of subjects for the experiment sixty-seven.

PROCEDURE

By exposing the Ss to a communication message on tape, the study of the factors under investigation was carried out in the following way:

Ss were first tested on degrees of conformity and general reasoning abilities.

Before exposure to the critical message, Ss were tested for their opinions about and concern for the communicated topic.

After exposure to the message, Ss were again tested for opinions about and concern for the topic and also for their

conclusion-drawing and information level in connection with the message.

Because the experiment involved before and after tests, and because the time factor was defined by class periods, it was necessary that the experimental procedure be divided into two separate segments. Accordingly, a discussion of the measures taken will follow the order of administration.

1) At the first session, the respondents were tested for degrees of conformity and general reasoning ability.

A) Degrees of conformity were determined by means of a test devised by Bernberg (4), which is administered under the title of a Human Relations Inventory. (cf. Appendix A for copy)

The type of attitude measurement used in the Bernberg social conformity scale is known as "direction of perception", an indirect or projective technique. This is based on the subject's tendency to deviate toward one extreme or the other when faced with a choice of quantitative answers for a judgmental item. That this technique is a reliable one for measuring degree of social conformity was shown by the administration of two forms (which differed in the range of numerical percentages given as answer choices) of the scale to a split-half sample of two groups of high school seniors. The correlation of Allport's index of institutionalization was .66 for the same item on the two forms. Furthermore, differences in intelligence, socio-economic status, and cultural background between the two groups were proved insignificant.

After the thirty-seven items which compose the Bernberg scale had been weighted according to empirical distribution of responses on them by a non-conforming group of youth prison inmates, as well as by the standard population referred to, a comparison of mean scores showed the mean of a standard population group of college students to be 12.5 and that of the non-conforming group 18.6, a significant difference (p more than .001). A previous analysis on another group of college students revealed that sex, religion, and age up to thirty-five years created no significant differences. Measures were taken with additional groups that further pointed out validity, reliability, and cross-validation of the scale (4).

B) General reasoning ability, which has been discussed on pages nine and ten, was tested by means of the Ship Destination Test, a disguised arithmetical reasoning test, devised by Christensen and Guilford (7). (cf. Appendix B for copy) Although the types of problems which require use of the ability are not definitely known, it is hypothesized that problems which do are somewhat similar to those involving arithmetical reasoning, which "probably means problems that can be comprehended in terms of interrelated variables" (7, p. 1). Actually, the Ship Destination test involves little number work and therefore measures general reasoning rather than numerical facility.

Reliability for the test has not been fully satisfactorily estimated "since there is some speeding involved in the

test, and since there are no comparable or parallel parts" (7, p. 1). In male populations, estimates have ranged from .86 to .95, with the male college population estimate .92, and a female college population estimate .93. The validity of the scores has been shown by two factor analyses in which the test led all others with loadings of .51 and .56 in general reasoning.

2) At the second session, the respondents were tested on the other factors which the experiment involved. In order to better convey the nature and purposes of these measures which concerned the message, it would be well to briefly summarize the nature and purposes of the message itself. (cf. Appendix C for copy)

The message.

The message was well suited to the purposes of the experiment because it was neutral, i.e. unbiased, and left the conclusions up to the subjects. The main purpose of the message, which was on tape, as given at the outset was to discuss biological warfare and to try to determine whether or not we in the United States should regard it as a "super" weapon. Thus, it was that the main conclusion that should be expected to be drawn by the subjects, as a result of exposure to the tape, was that biological warfare should not be considered a "super" weapon in the United States.

If this conclusion were drawn by certain subjects, it was, for the purposes of the experiment, necessary to know whether

this conclusion was already held as an opinion by those subjects before exposure to the tape. If this "before" opinion was held on the basis of facts, such as those provided by the tape, was impossible to determine. However, conclusion-drawing abilities could be measured because it was possible to determine whether those opinions were maintained or modified according to the facts presented by the message, by means of the before and after tests devised. Furthermore, these tests allowed an opinion change index to be computed.

A) To prevent sensitizing the subjects to the topic or creating suspicion on their part of the specific purposes of the questionnaire or what was to follow, the subjects' opinions of the "super" weapon potentialities of biological warfare were determined by means of four questions scattered throughout a general opinion questionnaire composed of fifteen questions. (cf. Appendix D for copy)

Also included in the opinion questionnaire was a question which measured the amount of concern the subjects felt for the topic of biological warfare. Although not essential to the original major purposes of the experiment, it was felt that a before and after measure of this factor might provide some interesting and possibly related implications.

B) After the administration of this questionnaire, the subjects listened to the taped message.

C) The third and final step at the second session of the experiment was the testing of subjects on their opinions and

concern previously measured, and conclusion-drawing abilities and information level on the basis of the facts presented in the tape. First, Ss were provided a sheet on which they were asked to record the conclusions that they themselves could draw from the tape. A conclusion previously mentioned, and probably the main one, is that biological warfare should not be considered a "super" weapon as far as the United States is concerned. However, there are other inferences that could be made on the basis of the information given. Thus, conclusions were evaluated by three independent judges⁴ as correct or incorrect; a "correct" conclusion being one that was inferred, and justifiably so, from the facts presented.

The subjects' opinions of the "super" weapon potentialities of biological warfare and their concern about biological warfare were tested by the same five questions used in the before-test, which were included in a questionnaire that also tested, by seven questions, their information level of the facts given in the tape. (cf. Appendix E for copy)

The before and after testing of opinion and concern plus the score of specific information retained and conclusions drawn from the tape allowed a broad set of data with which to work.

Grouping of subjects.

Because the time and effort that could be expended on the experiment were limited, the ~~num~~ber of subjects were necessarily

⁴Drs. R. S. Albert, B. J. Fine, and the writer.

limited. Thus, to permit any generalizing of results, it was advisable to deal with the subjects in a certain way. Separating the subjects into groups graded on the basis of conformity and general reasoning ability made it possible to consider the significance and interaction of these factors in relation to the independent conclusion-drawing abilities, opinion change, concern reduction, and information level of the groups. Hence, the total number of subjects was divided into five groups, those whose scores showed:

- 1- a high degree of conformity and high general reasoning ability,
- 2- a high degree of conformity and low general reasoning ability,
- 3- a low degree of conformity and low general reasoning ability,
- 4- a low degree of conformity and high general reasoning ability,
- 5- a degree of conformity and general reasoning ability that was intermediate in relation to the established extremes of high and low (the so called "middle" group).

The criterion for a score on the factors being considered "high" or "low" was determined in the following way.

A score of eleven or below on the Bernberg Conformity Scale constituted a "low" score, a score of eighteen or above a "high" score, and all scores in between eleven and eighteen a "middle" score.

Because the means of the general reasoning ability scores of college men and women populations differed, Christensen and Guilford (7) provided a table of centile norms. This allowed conversion of the raw scores to a centile rank, so that male

and female subjects could be included in the same groupings. Accordingly, a score of thirty-five (centile rank of fifty-two) or above for the men, and thirty (centile rank of fifty-four)^{or above}/ for the women constituted a "high" score; a score of twenty-eight (centile rank of eighteen)^{or below}/for the men, and eighteen (centile rank of nineteen)^{or below}/for the women constituted a "low" score; and the scores in between for men and women respectively, a "middle" score.

A score of either "high" or "low" on both factors warranted a subject's placement in a corresponding group.

PART III

RESULTS

That the groups did differ on the factors of conformity and general reasoning significantly enough to justify the separation of the subjects in the manner devised, is shown by Tables 1 and 2.

Table 1.
A TEST OF THE SIGNIFICANCE OF DIFFERENCES IN SUBJECTS' CONFORMITY SCORES

Group	t	df	1-tail p value
Low conformists-low reasoners High conformists-high reasoners	11.888	20	.001
Low conformists-low reasoners High conformists-low reasoners	12.705	20	.001
High conformists-high reasoners High conformists-low reasoners	1.043	20	<.2 >.15
Low conformists-low reasoners Low conformists-high reasoners	.436	15	<.35 >.3
Low conformists-high reasoners High conformists-high reasoners	14.195	15	.001
Low conformists-high reasoners High conformists-low reasoners	14.821	15	.001

Table 2.

A TEST OF THE SIGNIFICANCE OF DIFFERENCES IN SUBJECTS' GENERAL REASONING ABILITY SCORES

Group	t	df	1-tail p value
Low conformists-low reasoners High conformists-high reasoners	9.975	20	.001
Low conformists-low reasoners High conformists-low reasoners	.465	20	<.35>.3
High conformists-high reasoners High conformists-low reasoners	10.568	20	.001
Low conformists-low reasoners Low conformists-high reasoners	4.299	15	.001
Low conformists-high reasoners High conformists-high reasoners	3.153	15	.001
Low conformists-high reasoners High conformists-low reasoners	5.913	15	.001

1) Conclusion-drawing.

Tables 3 and 4 define the groups' conclusion-drawing abilities by showing the number of subjects within the groups who drew conclusions all correct, all incorrect, and of both kinds; and the number of conclusions correct and incorrect drawn by subjects within those groups.

Table 3.

NUMBER OF SUBJECTS, BY GROUPS, WITH ALL CORRECT, ALL INCORRECT, AND BOTH CORRECT AND INCORRECT CONCLUSIONS

Group	Number of subjects with conclusions		
	Correct	Both	Incorrect
Low conformists-high reasoners	6	0	0
High conformists-high reasoners	3	5	3
Low conformists-low reasoners	3	4	4
High conformists-low reasoners	2	2	7

Table 4.
NUMBER OF SUBJECTS' CORRECT AND INCORRECT AND INCORRECT CONCLUSIONS, BY GROUPS

Group	Number of conclusions drawn	
	Correct	Incorrect
Low conformists-high reasoners	8	0
High conformists-high reasoners	9	14
Low conformists-low reasoners	9	14
High conformists-low reasoners	7	15

Table 5 shows the results of a test of significance which proved that the only group which was significantly different from the others was the low conformists-high reasoners. Thus, in the first hypothesis, only the prediction that the low conformists-high reasoners would rank first in independent conclusion-drawing was confirmed.

Table 5.
A TEST OF THE SIGNIFICANCE OF DIFFERENCES IN GROUPS' NUMBERS OF CORRECT AND INCORRECT CONCLUSIONS

Group	χ^2	df	1-tail p value
Low conformists-low reasoners High conformists-high reasoners	.000	1	.5
Low conformists-low reasoners High conformists-low reasoners	.261	1	<.35>.25
Low conformists-low reasoners Low conformists-high reasoners	8.870	1	<.001

2) Opinion change.

The before and after test of the subjects' opinions of the "super" weapon potentialities of biological warfare allowed

a measure of the amount of opinion change after exposure to the communication. Since the opinion being measured concerned the main issue of the message, and the communication provided the subjects with no conclusions about this issue of the message, or any other for that matter; a change in the direction of the opinion that biological warfare should not be considered a super weapon in the United States, was to an extent a measure of the subjects' independent conclusion-drawing abilities.

The opinion change scores of the four groups are displayed in Table 6, (with a minus indicating an opinion change in the "correct" direction, on the basis of the communication). Note that the first and fourth groups rank as predicted, viz. the less anxious and better reasoners get the message's implicit optimistic "conclusion", while the more anxious and poorer reasoners seem to fail in this respect.

Table 6.

OPINION CHANGE OF SUBJECTS, BY GROUPS, ON THE MAIN ISSUE OF THE COMMUNICATION, THE "SUPER" WEAPON POTENTIALITIES OF BIOLOGICAL WARFARE

Group	Mean c hange
Low conformists-high reasoners	-2.833
Low conformists-low reasoners	-2.628
High conformists-high reasoners	- .800
High conformists-low reasoners	+ .363

Table 7 shows the results of tests of the significance of differences in the groups' opinion change scores on this issue. The difference between the low conformists-high

reasoners and high conformists-low reasoners is significant, thus the prediction that they would rank at the two extremes is confirmed.

Table 7.

A TEST OF THE SIGNIFICANCE OF DIFFERENCES IN SUBJECTS' AMOUNT OF OPINION CHANGE ON MAIN ISSUE OF THE COMMUNICATION, THE "SUPER" WEAPON POTENTIALITIES OF BIOLOGICAL WARFARE

Group	t	df	1-tail p value
Low conformists-low reasoners High conformists-high reasoners	1.529	19	<.1 >.05
Low conformists-low reasoners High conformists-low reasoners	3.181	20	<.001
High conformists-high reasoners High conformists-low reasoners	1.186	19	<.15>.1
Low conformists-high reasoners Low conformists-low reasoners	.109	15	.5
Low conformists-high reasoners High conformists-high reasoners	1.167	14	<.15>.1
Low conformists-high reasoners High conformists-low reasoners	2.326	15	<.025>.01

3) Concern.

Although the high conformists scored **lower** in initial concern than the low conformists, a test of significance showed that the difference was not significant. Thus, in the third hypothesis, the prediction about initial concern was not confirmed. (See Table 8)

Table 8.

A TEST OF THE SIGNIFICANCE OF DIFFERENCE IN INITIAL CONCERN

Group	\bar{x}	t	df	1-tail p value
High conformists	1.7			
Low conformists	1.588	.9491	35	<.2>.15

The differences between the four groups on amount of post-message reduction in concern are shown by Table 9 (with a plus indicating a reduction in concern).

Table 9.
POST-MESSAGE REDUCTION IN AMOUNT OF CONCERN, BY GROUPS

Group	\bar{x}
High conformists-high reasoners	+ .336
Low conformists-high reasoners	+ .333
Low conformists-low reasoners	+ .182
High conformists-low reasoners	- .118

As predicted, of the high conformists, the high reasoners show greater reduction than the low reasoners; the same distinction shown by the low conformists.

However, none of the differences in amount of concern reduction were significant (see Table 10), thus only part b of the third hypothesis, which predicted no reliable difference, was confirmed.

Table 10.
A TEST OF THE SIGNIFICANCE OF DIFFERENCES IN SUBJECTS' AMOUNT OF POST-MESSAGE REDUCTION IN CONCERN

Group	t	df	1-tail p value
Low conformists-low reasoners High conformists-high reasoners	.466	19	<.35>.3
Low conformists-low reasoners High conformists-low reasoners	.377	19	<.4>.35
High conformists-high reasoners High conformists-low reasoners	1.213	18	<.15>.1
Low conformists-low reasoners Low conformists-high reasoners	.088	15	.5
Low conformists-high reasoners High conformists-high reasoners	.009	14	.5
Low conformists-high reasoners High conformists-low reasoners	1.063	14	<.2>.15

4) Information level.

From Table 11 it can be seen that the highest average score on specific details of the message, as tested by seven questions, was made by the low conformists-high reasoners. The only trend in the scores which resembles the predicted ranking is that the low conformists-low reasoners retained the lowest degree of information.

Table 11.
AVERAGE SCORES OF GROUPS ON 7 QUESTIONS TESTING INFORMATION

Group	\bar{x}
Low conformists-high reasoners	5.583
High conformists-low reasoners	4.750
High conformists-high reasoners	4.500
Low conformists-low reasoners	4.500

Table 12 shows that the low conformists-low reasoners were significantly different from the low conformists-high reasoners; however, the fourth hypothesis was only partially confirmed.

Table 12.
A TEST OF SIGNIFICANCE OF DIFFERENCES IN SUBJECTS' INFORMATION

Group	t	df	1-tail p value
Low conformists-low reasoners High conformists-high reasoners	0	19	.5
Low conformists-low reasoners High conformists-low reasoners	.3	19	<.4 >.35
High conformists-high reasoners High conformists-low reasoners	.285	18	<.4 >.35
Low conformists-low reasoners Low conformists-high reasoners	2.67	15	<.01 >.005
Low conformists-high reasoners High conformists-high reasoners	2.392	14	<.025 >.01
Low conformists-high reasoners High conformists-low reasoners	1.652	14	<.1 >.05

PART IV
DISCUSSION

A close examination of the over-all results of the experiment suggests some interesting implications. It was previously speculated that a change in the direction of the opinion that biological warfare should not be considered a super weapon was to an extent a measure of the subjects' independent conclusion-drawing abilities, because the acquiring of this opinion would seem to require the inference of an implicit message. Although the data showed that the only significant difference in the predicted directions in conclusion-drawing was between the low conformists-high reasoners and the rest of the groups, and in opinion change between the low conformists-high reasoners and the high conformists-low reasoners (the low conformists-low reasoners were also different from the latter group, but did not rank as predicted); the trends of the rankings on these two measures are quite similar. There seemed to be little difference in both cases in the order of the two groups which fell in the middle, but despite this, the low conformists-high reasoners placed first and the high conformists-low reasoners last on each measure. Furthermore, the trends indicated that conformity differentiated general reasoning ability in this way: when general reasoning

ability is held constant, the lower the degree of conformity, the more evidence of an ability to comprehend the implicit message of the communication.

The trend of these two measures also indicates that when conformity is held constant, the high reasoners prove better than the low reasoners at comprehending the implicit message. This is in direct agreement with the trend shown in post-message reduction in concern. Thus it seems, as would be expected, that understanding the implicit optimistic message about a topic with a high potential of anxiety arousal results in a reduction in concern about that topic.

The average scores of the groups in information retained are so similar, except for that of the low conformists-high reasoners (who again rank first as in conclusion-drawing and opinion change), that their differences are practically negligible. By the ranking shown, however, it can be seen that of the high reasoners, the low conformists rank ahead of the high conformists as before; but of the low reasoners, the high conformists retain the greater amount of information. It seems logical that high conformity would operate this way in the low reasoner with regard to a topic with a high potentiality of anxiety arousal.

A difference in amount of initial concern between high and low conformists was not found; but of high reasoners, high conformists underwent a greater amount of post-message reduction in concern than low conformists, while of low reasoners,

the low conformists did. Inasmuch as the high conformists-low reasoners retained more information than the low conformists-low reasoners, yet showed less reduction in concern, conformity would seem to be operating as an anxiety mechanism.

Fine (13) has done a study in which subjects read the same non-explicit message used here; other subjects, an explicit version of the same message. Higher concern and less opinion change was displayed in the non-explicit condition than in the explicit condition, as would be expected; subjects who showed high post-message concern with the topic underwent significantly less opinion change than those showing low concern, a difference which was evident even at delayed-after testing. Although it has been said differences in concern reduction were not significant here, the trend still shows that this phenomenon mentioned above is, on the whole, observed less with non-conforming subjects than with conforming subjects. Thus, conformity would appear to be a factor in determining the individual's ability to cope with a relatively uncertain and unstructured situation.

A brief synopsis of the findings and speculations given in Part I of this paper offers some valuable implications here. It was shown that the non-conformist displays independence of judgment and a preference for, as well as superior ability at, dealing with complexity, which renders him less open to suggestibility than the conformist. This suggests that when general reasoning ability is held constant, the low

conformists would be more capable than the high conformists of dealing with unstructured information, i.e. a non-explicit message, which is necessarily more complex than structured information, i.e. an explicit message. And furthermore, this superior ability of the low-conformists in dealing with a non-explicit message should manifest itself in less concern with such a message about a potentially anxiety-arousing topic.

It was hypothesized that there is some kind of interacting relationship between the factors of conformity and general reasoning, which is basic to the exercise of independent conclusion-drawing ability, i.e. comprehending the message of a non-explicit communication. This experiment points to agreement with that speculation. Although this interacting relationship bears further investigation, the key role that conformity can play in the reasoning processes, as shown here, cannot be overlooked.

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APPENDIX A

Name.....	Birth date						Male.....
FIRST	MIDDLE	LAST	MONTH	DAY	YEAR	Female.....	
						Frsh.....	
						oph.....	

DIRECTIONS

The following questionnaire which you are requested to answer is based upon knowledge of facts known about human relations. The questions cover many aspects of life situations in which people are involved. It is not expected that you know the correct answer to these questions. You are requested to choose what you believe is the right answer and go on quickly to the next question.

At the extreme right of each item below, ENCIRCLE the initial that is the same as the initial of the answer you believe to be correct. Here is an example:

1. Of all babies born, what proportion do you think are boys?

a) 31% b) 41% c) 51% d) 61% e) 71%

a b c d e

1. Surveys conducted in the armed forces during World War II indicate what percentage of service men maintained steady correspondence with their families?
a) 45% b) 55% c) 65% d) 75% e) 85%
a b c d e
2. Army studies have shown that if it means another drink and more freedom, what percentage of men are willing to go A.W.O.L. from camp during training?
a) 27% b) 40% c) 53% d) 66% e) 79%
a b c d e
3. Statistics show that what percent of people who borrow money from friends repay it as soon as possible?
a) 25% b) 38% c) 51% d) 64% e) 77%
a b c d e
4. Social studies recently unearthed the fact that the average American boy of pre-high school age is likely to run away from home -
a) 4 times, b) 5 times, c) 6 times, d) 7 times, e) 8 times.
a b c d e
5. According to a well-known report, what percentage of unmarried American males would attempt sexual intercourse if they were sure of not being caught?
a) 15% b) 24% c) 33% d) 42% e) 51%
a b c d e
6. It has been found that the following percentage of people who find lost articles return them to their owners:
a) 27% b) 40% c) 53% d) 66% e) 79%
a b c d e
7. Public Opinion polls show that the following percentage of men think it is stupid to keep promises:
a) 10% b) 20% c) 30% d) 40% e) 79%
a b c d e
8. Studies have shown what percentage of men who think it is all right to carve initials and write their names in public buildings?
a) 45% b) 55% c) 65% d) 75% e) 85%
a b c d e

9. Statistics show what percentage of men like to write things on the walls in men's rooms?
a) 27% b) 40% c) 53% d) 66% e) 79%
a b c d e
10. Statistics show what percentage of people in this country are actually glad of the prospect of war because it promises more opportunity for personal gain?
a) 25% b) 38% c) 51% d) 64% e) 77%
a b c d e
11. Numerous studies have shown that out of all men receiving unemployment checks, what percentage consider this enough to prevent them from looking for a job?
a) 30% b) 40% c) 50% d) 60% e) 70%
a b c d e
12. Recent opinion polling has indicated what percentage of our population feel it is silly to save for the future?
a) 39% b) ~~49%~~ c) ^{49%} 59% d) 69% e) 79%
a b c d e
13. The number of job changes annually attributed to the average American as calculated by the U.S. Employment Service is :
a) 2 b) 3 c) 4 d) 5 e) 6
a b c d e
14. Statistics show that workers who change jobs often are happy-
a) all of the time, b) most of the time, c) part of the time,
d) small amount of the time, e) none of the time.
a b c d e
15. Research has shown that by 30 years of age, most men have had the following number of jobs:
a) 2 b) 4 c) 6 d) 8 e) 10
a b c d e
16. Public opinion polls show what percentage of people feel it is silly to make close friendships because few people can really understand you?
a) 30% b) 40% c) 50% d) 60% e) 70%
a b c d e

17. Statistics indicate that the length of the average boyhood friendship is:
a) 1yr. b) 1½ yrs. c) 2 yrs. d) 2½ yrs. e) 3yrs.
a b c d e
18. Records of the American Tourist, Inc. show what percentage of tourists send or bring home souvenirs for loved ones while vacationing?
a) 45% b) 55% c) 65% d) 75% e) 85 85%
a b c d e
19. A recent survey has shown that a man retains what percentage of his high school friends, five years after graduation?
a) 26% b) 39% c) 52% d) 65% e) 78%
a b c d e
20. Social studies reveal what percentage of young men feel women are inferior and dirty?
a) 10% b) 20% c) 30% d) 40% e) 50%
a b c d e
21. Family relation studies show what percentage of young men prefer life but marry because society demands it?
a) 42% b) 52% c) 62% d) 72% e) 82%
a b c d e
22. Opinion polls show what percentage of men believe that they had a definite place in life and that they were to just wait until the right time came along?
a) 67% b) 72% c) 77% d) 82% e) 87%
a b c d e
23. Reports of marriage statistics show what percentage of men married more than 3 times because they believed that "one of these times I'll get the right one?"
a) 28% b) 41% c) 54% d) 67% e) 80%
a b c d e
24. Statistics released by the F.B.I. show that what percentage of American men would not hesitate to kill a petty thief trespassing on their property?
a) 32% b) 44% c) 56% d) 68% e) 80%
a b c d e

25. The view that people can't be held responsible for what they do is held by what percentage of social scientists, as determined in a recent convention
a)27% b)31% c)35% d)42% e)49%
a b c d e
26. Statistics released by a local Detective Bureau show what percentage of men will offer strong resistance to petty robbery even if they are faced with a gun?
a)21% b)28% c)35% d)42% e)49%
a b c d e
27. The Harvard Research Bureau found what percentage of hit-and-run drivers were concerned only with the extent of damage to their cars?
a)18% b)21% c)24% d)27% e)30%
a b c d e
28. Social Studies show what percentage of people feel that being present at the deathbed of a close relative is just being morbid?
a)28% b)33% c)38% d)43% e)48%
a b c d e
29. Careful studies by the Institute of Human Relations show what percentage of men feel it is a sign of weakness to feel guilty just because we have injured someone?
a)26% b)39% c)52% d)65% e)78%
a b c d e
30. Research by the Institute of Family Relations show what percentage of men felt that their immediate family's troubles were not their own?
a)30% b)40% c)50% d)60% e)70%
a b c d e
31. In a recent study, the following percentage of men who have younger sisters stated they did not care what happened to them on dates?
a)27% b)31% c)35% d)39% e)43%
a b c d e
32. Army enlistment reports what percentage enlisted merely for the satisfaction of sporting a uniform?
a)31% b)41% c)51% d)61% e)71%
a b c d e

33. What percentage of men who enlist in a police reserve force do so merely for the satisfaction of wearing a uniform and carrying a gun?
a)42% b)52% c)62% d)72% e)82%
a b c d e
34. Statistical reports show what percentage of men who are unconcerned with the emotions of their girl friends?
a)29% b)40% c)51% d)62% e)73%
a b c d e
35. Studies have shown what percentage of soldiers, used to killing quickly, who find themselves having this urge after being discharged?
a)10% b)20% c)30% d)25 40% e)50%
a b c d e
36. According to traffic records, what percentage of people being chased by a policeman for a traffic offense try and get away?
a)10% b)15% c)20% d)25% e)30%
a b c d e
37. Studies in human relations indicate what percentage of persons do not heed a sign "private door" and barge right in?
a)42% b)52% c)62% d)72% e)82%
a b c d e

APPENDIX B

SHIP DESTINATION TEST * Form A
by Paul R. Christensen and J. P. Guilford

You will have five minutes to do the problems on this page. When you have finished the nine items, stop and wait for the signal to turn the page. Begin on this page immediately.



Each circle in the diagram above represents a point on the ocean. Consider the distance along a line from one point to the next to be TWO miles. That is, point L is two miles from point H. Point M is four miles from point H. The ~~only~~ only pathways are along the lines.

Consider that you are the captain of a ship that is located at one of the points on the diagram. Other points represent possible ports to which the ship can go. In each of the items below, you will be given the location of your ship and the location of a port. Your task is to figure the distance from your ship to the port. For item 1 below, how many miles is the journey from ship N to port O? For item 1 on your answer sheet blacken the "2" space to indicate that port O is 2 miles from ship N. Next indicate on your answer sheet the number of miles from the ship to the port for item 2 and for item 3.

1. Ship N - Port O
2. Ship J - Port G
3. Ship U - Port M

For the situations below, the wind direction must be considered in figuring the number of miles from ship to port. If your ship must travel against the wind for any part of the journey, this will have the effect of increasing the distance to the port. For every two miles traveled against the wind, add one mile. For every two miles your ship travels with the wind, subtract one mile. For example, if your ship travels with the wind for six of the eight miles to a port, the total distance to the port becomes eight minus three, or five miles. That part of the journey in which the wind strikes your ship from the side is not affected by the wind.

The arrow shows the wind direction for each set of three items. Mark on your answer sheet the number of miles from ship to port for items 4, 5, and 6; then for items 7, 8, and 9.

- | | | |
|--|--|--|
| <p>4. Ship F - Port J</p> <p>Winds: ↑ 5. Ship J - Port O</p> <p>6. Ship P - Port L</p> | | <p>7. Ship R - Port U</p> <p>Winds: → 8. Ship L - Port G</p> <p>9. Ship Q - Port M</p> |
|--|--|--|

Your answer sheet should have been marked as follows: Item 4. -3; 5.-5; 6.-1; 7.-3; 8.-5; and 9.-2. When you get the signal- not yet -turn the page and continue working the problems in order. Work carefully, but do not waste time. You will have 15 minutes to work on this test. Work until told to stop.

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.



Work the following items in the same way as you did items 4 to 9. Remember to consider the effects of the wind direction, which is the same for each set of three items.

Wind: ↓

10. Ship F - Port H
11. Ship O - Port S
12. Ship T - Port P

Wind: ↑

16. Ship N - Port K
17. Ship L - Port Q
18. Ship I - Port H

Wind: ←

13. Ship G - Port F
14. Ship M - Port K
15. Ship S - Port P

Wind: →

19. Ship R - Port P
20. Ship S - Port N
21. Ship P - Port Q

The rules for wind direction will continue to hold for the remainder of the test. In the following items the direction of the ocean current must be considered in addition to wind direction. For every two miles traveled against the current, add one mile. For every two miles your ship travels with the current, subtract one mile. That part of the journey in which the current strikes your ship from the side is not affected by the current. One arrow will show the wind direction; the other arrow will show the current direction.

Wind: ↑
Current: ↑

22. Ship T - Port I
23. Ship O - Port S
24. Ship J - Port G

Wind: →
Current: ↓

28. Ship K - Port O
29. Ship U - Port Q
30. Ship G - Port J

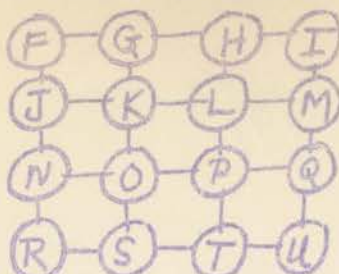
Wind: ↓
Current: ←

25. Ship H - Port Q
26. Ship M - Port G
27. Ship R - Port N

Wind: ↑
Current: →

31. Ship K - Port P
32. Ship I - Port M
33. Ship F - Port L

CONTINUE ON NEXT PAGE



For the following items the rules for wind direction and current direction continue to hold. In addition, the strength of the wind and current must be considered. If there is a double arrow given instead of a single arrow, this means that the effect is doubled: Two miles must be added for every two miles traveled against a double arrow; two miles must be subtracted from every two miles traveled with the double arrow.

Winds:

34. Ship F - Port O

Currents:

35. Ship L - Port G

36. Ship Q - Port S

Winds:

40. Ship P - Port G

Currents:

41. Ship S - Port K

42. Ship M - Port P

Winds:

37. Ship P - Port J

Currents:

38. Ship L - Port I

39. Ship N - Port K

Winds:

43. Ship H - Port M

Currents:

44. Ship K - Port I

45. Ship U - Port H

In the following items there is an additional consideration. You must consider the direction in which your ship is headed at the time the decision is made to proceed to a particular port. If the journey to a port requires your ship to turn completely around (180°), the total distance to that port is increased by two miles. If two right turns or two left turns are made, the total distance is also increased by two miles. If only one right or left turn (90°) is required somewhere along the way, the total distance is increased by one mile. Where the journey to a port permits you to continue in the direction you were already going the distance remains unchanged. Remember that all previous rules must also be taken into consideration.

Winds:

46. Ship I - Port H

Currents:

47. Ship L - Port G

Headings:

48. Ship S - Port R

Winds:

52. Ship K - Port J

Currents:

53. Ship G - Port J

Headings:

54. Ship Q - Port L

Winds:

49. Ship O - Port H

Currents:

50. Ship N - Port T

Headings:

51. Ship L - Port P

Winds:

55. Ship I - Port M

Currents:

56. Ship J - Port I

Heading:

57. Ship O - Port U

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

APPENDIX C

We are interested in obtaining your opinions concerning the following article which appeared in a recent edition of the New York Times, one of the most widely read newspapers in the United States. Read the article carefully. You will be asked questions about it when you have finished.

Is Biological Warfare A Super Weapon ?

Military authorities, politicians, educators, the clergy and the population in general are currently devoting much time to discussing the horrors of atomic warfare and the necessity of preventing its use lest "all humanity perish from the face of the earth". This great concern with atomic weapons is due to the fact that these weapons cannot be defended against. They are truly "super" weapons, and according to most authorities their use would result in the destruction of our civilization.

Neglected in all this discussion has been a consideration of other weapons of war which might possibly be used in the event of another conflict, and which, like atomic warfare, have also been referred to as "super" weapons. It is my purpose here to discuss one such weapon... biological warfare... and to try to determine whether or not we in the United States should regard biological warfare as a "super" weapon. Remember, a "super" weapon is one which cannot be defended against. If strong, sound defenses can be prepared to drastically reduce the destructive potential of a weapon, then that weapon is not a "super" weapon. If adequate protection is not possible, then the weapon must be classed as "super".

Let us first familiarize ourselves with biological warfare.

Scientists tell us that there are two main kinds.

First, there are attacks with "living" agents. These are different kinds of small living things which sometimes cause sickness or death in people, animals or plants. You no doubt have seen plant-killing insects at work and you no doubt have heard of bacteria, viruses and other disease-causing things.

The second kind of biological warfare is that which deals with special kinds of poisons called "toxins". Toxins are poisons produced by some living things. The kinds of toxins most likely to be used in biological warfare come from plant germs called bacteria.

We will only consider the first type of biological warfare in this article since scientific experts generally acknowledge that the second type (toxins) has been proven to be generally impractical. It must be remembered that a toxin is a poison and that it cannot spread itself but must be administered directly in food or drink or by injection. This is in and of itself a defense against widespread effectiveness of the toxin as a weapon, for although we might romantically picture sinister-looking enemy agents sneaking around putting poison in people's food, this method of biological attack would be impractical since it would affect only very limited numbers of people.

Our main concern is with the spreading of diseases, viruses and bacteria either against man or against the resources of man such as his food supplies.

Since no one has ever carried out a biological attack against any country, much of what we say here will be in the form of speculation. However, we are in a good position to speculate because in actuality there is little difference between having a disease "planted" in

a country by an enemy or having the same disease "naturally" arise without having been "planted". The disease is the same disease no matter how it started and the same methods must be used to combat it. It can be seen, then, that if we can get a good picture of how a country ordinarily handles diseases, we will have an accurate indication of how well that country could resist a biological attack.

In order to show which defenses are most effective against biological attacks, let us take two countries which, by strange coincidence, have a history of having had the same diseases occurring at about the same time. From the past experiences of these countries, Mexico and Australia, in handling the same diseases, viruses, etc., we should be able to infer just how well these countries would be able to defend themselves against biological attacks. By keeping in mind existing conditions in the United States, we should then be able to determine how well this country can defend against biological attacks.

One has only to look at the recent (1947) epidemic of the dread hoof-and-mouth disease in Mexico to see what a disease can do to a country's food supply. This fearful disease resulted in over 350,000 head of cattle lost either directly by death due to the disease or by destruction by authorities in an effort to control the spread of the disease. The terrible loss in potential meat and meat products made it necessary for Mexico to increase its beef imports to the tune of \$2,345,000 a year for the four years that it took to raise new cattle, placing a very severe strain on the economy of that country and adversely affecting the morale of its people.

There is no evidence that these epidemics were the work of "enemy" agents. But these could have been enemy attacks if Mexico had

been at war, and they would have been very successful attacks because the Mexicans were virtually unable to defend against the ravages of the disease.

On the other hand, this same hoof-and-mouth disease was discovered in Australia in 1948. In this case, however, authorities were able to "catch" the disease before it had spread very far. Appropriate steps were taken by Australian health officials to wipe out the disease and there was very little loss in valuable livestock. Had this been an enemy attack designed to wipe out Australia's food supply, it would have been virtually ineffective.

Destruction of a country's food crops may be a method employed by an enemy to reduce a country's food supply and make it less able to maintain itself. In Mexico, several years ago, a severe blight took an enormous toll in the grain crops of that country, making it necessary to import vast quantities of grains. This weakened the financial and morale structures of Mexico immeasurably. Here, too, there is no evidence that this was an enemy attack, but it could have been and as such it would have been extremely successful also.

Australia has had little or no trouble with crop diseases although instances of those diseases have been recorded many times. The Australians seemed to be able to "spot" disease sooner than did the Mexicans and were better able to prevent it from spreading. It seems quite likely that biological attacks against Australia's crops would not be very successful in view of that country's past record of dealing with crop diseases and blights.

So much for that aspect of biological warfare which is directed toward man's resources. What is of even greater concern is biological

warfare that is directed against man himself.

One kind of attack on man is that which is directed toward his water supply. In such attacks, an enemy might try to pollute a population's water supply in order to immobilize and demoralize that population by afflicting it with disease.

A major disease which seems to be passed on to people through contaminated water is cholera. An inquiry into the incidence of this disease in the two countries leads to the conclusion that Australia is much better able to defend against biological attacks against its water supplies than is Mexico. The death rate due to cholera in Mexico in a year, for the past four years, has been 13% per year; that is, of all deaths in Mexico in a year, 13 out of every 100 have been due to cholera. In Australia, the figure for a comparable period is .10% or one tenth of one percent.

All attacks on man using biological weapons rely on what is called the "natural spread" of disease. Natural spread simply means that some germs are easily spread from one person to another; if you infect some people with a disease, it will spread to others. Thus, in the case of attacks on man's water supplies, an enemy's idea would be to start the disease in some people by polluting the water that those people drink and then hope that the disease will spread from these people to others with whom they come in contact, resulting in widespread epidemics.

The implications of this natural spread of disease can be readily appreciated if we once again turn to the two countries we are using as examples. Cholera in Mexico wreaks havoc when an epidemic starts because of its fast spread. When the proper defenses are used, as in

Australia, it appears that the natural spread of this disease has little chance of success.

Natural spread also pertains to diseases of animals. We have already seen the terrible damage wrought in Mexico by the hoof-and-mouth disease. The tremendous loss of livestock attests to the effectiveness of the natural spread process when it is not adequately defended against.

It is important to remember that natural spread is the only way an enemy can hope to "blanket" a country with disease. There are no known ways of simultaneously hitting a whole population with a given disease.

We've seen that Australia seems to have a consistently better record of defending against diseases than does Mexico. Let us look into some of the reasons for this.

In Australia there exists an efficient system for inspecting and testing livestock throughout the country so that any incidence of disease or infection can be immediately determined. Also, meats are inspected after the animals have been slaughtered in order to prevent contaminated meat from reaching the consumer. Australia's medical researchers have been developing new "defenses" in the form of serums which render animals immune from infection with the various diseases an enemy might use. As soon as a disease is "spotted", all animals are inoculated with an appropriate serum. Also, an intensive program is devoted to the inoculation of livestock against possible diseases and the education of livestock breeders to the danger-signs of disease.

In Mexico, until very recently, there was little in the way of systematic inspecting and testing of livestock and no inspection of

meats before they reached the buying public. Little has been done in Mexico in the way of medical research to develop immunizing serums for use on livestock.

Insofar as food crops are concerned, the Australians have had for the past twenty years a program of crop inspection to determine when crops have been infected with a blight or disease. They also conduct regular crop spraying and dusting campaigns as well as educational campaigns designed to teach farmers to recognize and treat various crop diseases. The effectiveness of this system of defense is attested to by the low rate of crop disease in Australia.

Mexico, on the other hand, has done little in the way of crop inspection or spraying. For the first time, last year, it inaugurated an educational program for farmers regarding crop care and early reports this year indicate that the program is having favorable effects even at this early date.

To guard against contamination of their water supplies, the Australians have a rigorous inspection system whereby water is chemically analyzed and tested continuously before and after it is purified. Using the most modern methods known to science, the public health technicians in Australia can detect extremely minute changes in the chemical content of the water. Thus, they can detect any additive before the water reaches the consumer.

Mexico has no system of water purification other than in its capital city, Mexico City. Even here, however, there is not the rigorous inspection system that there is in Australia. That this inspection system makes a difference is seen by the previously mentioned figures of death rates due to cholera as well as comparable figures for other

diseases transmitted through unpurified water.

In regard to the natural spread method, the method which an enemy would hope would be most effective, research reveals that the Australians have a much more effective system of defense than do the Mexicans.

One of these defenses is simply the keeping of adequate records about the numbers of cases of the various communicable diseases in a community. By watching the records, it is possible to tell when disease is on the upswing, whereupon other defenses can be brought into action. These other defenses include inoculations against the particular disease, quarantine of individuals carrying the disease, and treatment of the disease victims with appropriate medication.

Australia excels in all of these defenses. Her public health officials keep elaborate records of communicable diseases and are able to tell immediately when there is an unusual incidence of disease. She has a sound program of inoculating children and adults against communicable diseases and her medical researchers are constantly developing new preventive medicines.

Mexico is just beginning to appreciate the value of public health systems like Australia's and is presently setting up the structure for a nation-wide system patterned somewhat after that of the U.S. She is also instituting a compulsory inoculation program against certain diseases and is developing modern water purification plants in an effort to rid herself of the scourge of cholera. Her medical technology is rapidly improving; e.g., she is sending medical technicians to the U.S. for training in the latest methods of medical science.

There are, in addition, two more general defenses against

biological attack which seem to place Australia in a much better position than Mexico. While these are not specific defenses against biological warfare, they are vital parts of the total defense network that a country can put up against biological attack. The two "defenses" of which we speak are the communication and distribution systems of a country. An effective communication system is necessary in order to be able to reach the population with vital information concerning the biological attack so that proper precautions and remedial measures can be taken by the population. An effective distribution system is needed in order to insure that everyone gets treated with the proper medication.

In general, then, the country with the most advanced technology, with the most effective communication system and with the most efficient distribution system is the one that is best able to resist biological attacks. Australia (while not as highly developed as the U.S. in these respects) greatly overshadows Mexico and should therefore be much more successful in resisting biological warfare directed against it.

Most authorities indicate that, in their opinions, most people think of biological warfare as a means of spreading new, fantastically loathsome and indefensible diseases. These attacks would take the form of lethal and hitherto unknown diseases which could not be defended against.

These same authorities emphatically argue that, contrary to popular opinion, the kinds and effects of biological agents that might be used by an enemy are well known. They point out that inventing a new disease is not as easy as it sounds to untrained, unscientific ears. The major problem, they say, is not in defending against new, mysterious diseases but in defending against already known diseases. In fact, Dr.

Geoffrey Rathbun of the Natural Science Research Council states that:

It is doubtful whether science will ever be able to "manufacture" new kinds of bacteria. It may be that new bacteria will be discovered in the same sense that new physical elements such as radium were discovered. But as for "mystery" germs, that is sheer nonsense.

Whether or not biological warfare is a "super" weapon depends solely on whether known diseases can be defended against when "planted" in a country by an enemy. We must not becloud the question with hysterical talk about mystery germs. It is time the cold facts were presented to the public.

Here in this article, I have given you the "cold facts". On the basis of this information and the generally accepted fact that the U.S. is even further advanced than Australia in its technical, scientific and industrial development, a concerned public should now be able to arrive at the reasoned and sensible judgment that our country can defend itself very well against biological warfare; for us, therefore, it is not a "super" weapon.

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APPENDIX D

OPINION QUESTIONNAIRE

The worth of this project depends upon your giving sincere, honest answers to all questions. If you are in doubt about a particular question, select the answer that comes closest to expressing your true opinion.

Make sure that you answer every question and that you do not skip any pages.

The questions below pertain to your opinions on certain topics. Please answer them as frankly and honestly as possible. There are no right or wrong answers.

1. To what extent would you favor lowering the voting age limit so that persons eighteen, nineteen, and twenty years old could vote in elections? (circle one)
 - a. strongly favor
 - b. moderately favor
 - c. uncertain
 - d. moderately oppose
 - e. strongly oppose

2. How concerned are you about biological warfare? (circle one)
 - a. extremely concerned
 - b. very concerned
 - c. somewhat concerned
 - d. uncertain
 - e. somewhat unconcerned
 - f. very unconcerned
 - g. extremely unconcerned

3. Do you think religion is gaining or losing influence in the life of the nation? (circle one)
 - a. definitely gaining influence
 - b. probably gaining influence
 - c. uncertain
 - d. probably losing influence
 - e. definitely losing influence

4. In your opinion, what are the chances of a person surviving a biological attack on the United States? (circle one)
 - a. very good
 - b. good
 - c. fairly good
 - d. 50-50
 - e. fairly poor
 - f. poor
 - g. very poor

5. Would you favor a national sales tax as a means of balancing the national budget? (circle one)
 - A. definitely yes
 - b. probably yes
 - c. uncertain
 - d. probably not
 - e. definitely not

PLEASE GO ON TO NEXT PAGE

6. In your opinion, is biological warfare a "super" weapon as far as the United States is concerned? (circle one)
- a. definitely yes
 - b. probably yes
 - c. uncertain
 - d. probably not
 - e. definitely not
7. In Australia people are made to pay a fine if they do not vote on election day. Do you think the American government should make people pay a fine if they don't vote on election day? (circle one)
- a. definitely yes
 - b. probably yes
 - c. uncertain
 - d. probably not
 - e. definitely not
8. On the whole, which sex do you think is more even-tempered, men or women? (circle one)
- a. men, definitely
 - b. men, probably
 - c. uncertain
 - d. women, probably
 - e. women, definitely
9. How much protection can an individual have from germs and other products of biological warfare? (circle one)
- a. 100% protection
 - b. about 80%
 - c. about 60%
 - d. about 50%
 - e. about 40%
 - f. about 20%
 - g. no protection at all
10. Would you favor a national lottery as a means of balancing the national budget? (circle one)
- a. definitely yes
 - b. probably yes
 - c. uncertain
 - d. probably not
 - e. definitely not
11. On the average, how do you think that religious people compare with non-religious people insofar as being moral is concerned? (circle one)
- a. religious definitely more moral
 - b. religious probably more moral
 - c. uncertain
 - d. non-religious probably more moral
 - e. non-religious definitely more moral

12. On the whole, which sex do you think has more ability to create or invent new things, men or women? (circle one)
- a. men, definitely
 - b. men, probably
 - c. uncertain
 - d. women, probably
 - e. women, definitely
13. In your opinion, to what extent can biological warfare be defended against by the United States? (circle one)
- a. completely
 - b. to a very great extent
 - c. to a great extent
 - d. to a medium extent
 - e. to a small extent
 - f. to a very small extent
 - g. not at all
14. How does your attitude toward religion compare with that of your parents? (circle one)
- a. parents are more religious
 - b. parents and I are about equally religious
 - c. I am more religious
 - d. uncertain
15. On the whole, which sex do you think is more willing to accept new ideas, men or women? (circle one)
- a. men, definitely
 - b. men, probably
 - c. uncertain
 - d. women, probably
 - e. women, definitely

APPENDIX E

2. How obvious was the author in expressing his position? (circle one)
- a. extremely obvious
 - b. very obvious
 - c. somewhat obvious
 - d. not very obvious
 - e. not at all obvious
3. Do you think the author of the article was fair in his presentation of the facts, or did he write a one-sided report? (circle one)
- a. completely fair
 - b. mostly fair
 - c. half fair, half one-sided
 - d. mostly one-sided
 - e. completely one-sided
4. Did you learn anything from this article that you did not know before? (circle one)
- a. learned a great deal new
 - b. learned a number of new facts
 - c. learned very little new
 - d. learned nothing new
5. Did you find the article interesting or dull? (circle one)
- a. very interesting
 - b. fairly interesting
 - c. neither interesting or uninteresting
 - d. fairly dull
 - e. very dull
6. Do you think this article should be considered as a piece of "propaganda"? (circle one)
- a. yes
 - b. no
 - c. don't know

Now we would like your own opinions on the topic of biological warfare.

7. In your opinion what are the chances of a person surviving a biological attack on the United States? (circle one)
- a. very good
 - b. good
 - c. fairly good
 - d. 50-50
 - e. fairly poor
 - f. poor
 - g. very poor

PLEASE GO ON TO NEXT PAGE

8. How much protection can an individual have from germs and other products of biological warfare? (circle one)

- a. 100% protection
- b. about 80%
- c. about 60%
- d. about 50%
- e. about 40%
- f. about 20%
- g. no protection at all

9. In your opinion to what extent can biological warfare be defended against by the United States? (circle one)

- a. completely
- b. to a very great extent
- c. to a great extent
- d. to a medium extent
- e. to a small extent
- f. to a very small extent
- g. not at all

10. In your opinion is biological warfare a "super" weapon as far as the United States is concerned? (circle one)

- a. definitely yes
- b. probably yes
- c. uncertain
- d. probably not
- e. definitely not

Now we would like to find out how well you remember some of the specific details of the article you have just heard. Circle the one alternative which is correct according to the information presented.

11. How many kinds of biological warfare did the author say there are? (circle one)

- a. 1
- b. 2
- c. 3
- d. 4

12. What disease is passed on to people through contaminated water? (circle one)

- a. diphtheria
- b. malaria
- c. cholera
- d. scarlet fever

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13. Which one of the following conclusions did the author come to in his article? (Circle one)
- a. advanced technology and efficient communication and distribution systems are necessary to defend against biological warfare.
 - b. the United States should not regard biological warfare as a "super" weapon since it can defend itself against it.
 - c. Mexico cannot adequately defend itself against biological warfare, but Australia can do so effectively.
 - d. the author came to no definite conclusion; he left the conclusion up to the reader.
14. The author quoted Dr. Geoffrey Rathbun as saying which of the following statements? (circle one)
- a. science is constantly developing new kinds of germs.
 - b. it is doubtful whether science will ever be able to manufacture new kinds of bacteria.
 - c. what we have to fear most from biological attack is that it might be made with new kinds of germs unknown to our scientists.
 - d. it is impossible to develop vaccines for use against many of the germs that are known to man.
15. Which of the following did the author state as being his purpose in writing the article? (circle one)
- a. to try to determine whether or not we in the United States should regard biological warfare as a super weapon.
 - b. to compare two geographically diverse countries to see to what extent each could defend against biological warfare.
 - c. to show the necessity of preventing the use of biological warfare in the event of another war.
 - d. to define biological warfare and show the various ways it could be used against a country by an enemy.
16. Which of the following statements did the author make? (circle one)
- a. the country with the most diversified industry and the most plentiful natural resources is best able to resist biological attacks.
 - b. the country with the largest geographical area is best able to resist biological attacks.
 - c. the country with the most effective defenses against air attacks is best able to resist biological attacks.
 - d. the country with the most technical advancement and the most effective communication and distribution systems is best able to resist biological attacks.

17. Why did the author reject the use of toxins as a method of biological attack? (circle one)
- a. because toxins cannot spread themselves and would, therefore, affect only very limited numbers of people.
 - b. because toxins are not really biological; they are more appropriately classified as chemical warfare.
 - c. because toxins are so easily defended against that it is not necessary to devote any time to discussing them.
 - d. because toxins cannot be produced in large enough quantities to be used in large scale biological attacks.
18. How concerned are you about biological warfare? (circle one)
- a. extremely concerned
 - b. very concerned
 - c. somewhat concerned
 - d. uncertain
 - e. somewhat unconcerned
 - f. very unconcerned
 - g. extremely unconcerned
19. Do you worry quite a bit over the possibility of another war? (circle one)
- a. yes
 - b. no
20. How important is the topic of biological warfare to you? (circle one)
- a. extremely important
 - b. very important
 - c. somewhat important
 - d. uncertain
 - e. somewhat unimportant
 - f. very unimportant
 - g. extremely unimportant
21. Does the mere thought of large scale germ warfare make you uneasy? (circle one)
- a. yes
 - b. no
22. Have you recently seen, heard, or read anything about biological warfare?