THE INTEGRATION OF MULTIPLE SETS INTO A NEW BELIEF SYSTEM

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ROBERT N. VIDULICH

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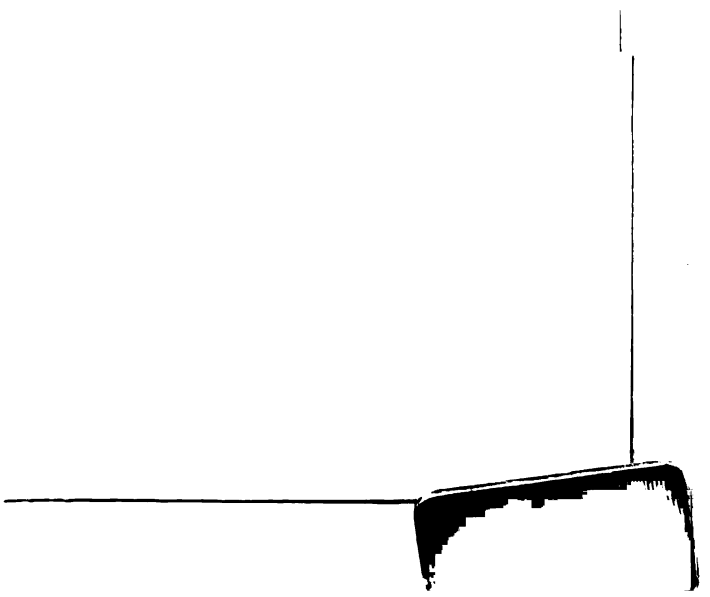

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By

Robert N. Vidulich

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INTRODUCTION

This study is part of a larger body of experimental research being conducted on the belief-thought model formulated by Dr. Milton Rokeach of Michigan State University (4,5,6,7,8). It was an attempt to investigate, by means of a specially devised problem, some of the cognitive processes of the dogmatic individual.

As employed by Rokeach (4,5,6,7,8), dogmatism refers to (a) a relatively closed cognitive organization of beliefs and disbeliefs about reality, (b) organized around a central set of beliefs about absolute authority which, in turn, (c) provide a framework for patterns of intolerance and qualified tolerance toward others.

Perhaps the best and simplest way to define the construct of dogmatism is to distinguish it from rigidity. "Both dogmatism and rigidity refer to forms of resistance to change, but dogmatism is conceived to represent a relatively more intellectualized and abstract form than rigidity" (5). Whereas rigidity refers to the resistance to change of single ideas, sets, beliefs, or expectancies, dogmatism refers to the resistance to change of

systems of ideas, sets, beliefs or expectancies. These systems or networks of beliefs, by virtue of their being organized together in a closed manner, are altogether resistant to change. Thus, dogmatism is seen by Rokeach as a higher-order and more complexly organized form of resistance to change. Furthermore, rigidity refers to individual-to-thing relationships, while dogmatism necessarily requires situations involving human interaction and person-to-person communication.

An example from Rokeach (5) should suffice to illustrate the differentiation between the two constucts. A rat or a person may be said to approach a problem situation rigidly, but it would be inappropriate to say that the animal or person behaves dogmatically in this individual-to-thing situation. We may, however, speak of a person expressing himself to others dogmatically on a scientific, religious, or any other belief system which he espouses.

This distinction between dogmatism and rigidity has received some experimental support in a recent study by Rokeach, McGovney and Denny (6). In this experiment, the subjects were presented with a new cognitive task, the solution of which required

(1) the overcoming of three separate sets or beliefs, and then (2) the integration of these sets or beliefs into the problem situation. Persons high in rigidity, as determined by the Sanford-Gough Rigidity Scale were found to be slower than persons low in rigidity in overcoming each of the individual sets, but there was no difference between the high and low dogmatic subjects in this respect. On the other hand, subjects scoring high on the Rokeach Dogmatism Scale (8) were found to be significantly slower than those low in dogmatism in integrating the three new sets once they had overcome the three older sets. The high and low rigid groups did not differ with respect to the integration process. These authors conclude, on the basis of these findings, that the greater difficulty shown by the highly dogmatic subjects in integrating the new beliefs into a new system is a function of the stronger operation of systems of older beliefs which are organized into a relatively closed network.

The present study was an attempt to indicate experimentally what it is about the cognitive process of the highly dogmatic individual which leads him to have difficulty in integrating new beliefs into a new system. From the theoretical model, it was hypothesized that the reason why the highly dogmatic

person finds the integration process more difficult than an individual low in dogmatism is because fundamentally such an individual is unwilling to accept or entertain new systems of thinking and reject old systems of thinking. In other words, he is prevented from accepting a new system or pattern of thinking or believing because his older, habitual thought patterns are firmly rooted in authority and are highly resistant to change. As a consequence of this inability to accept new belief systems, he has relatively greater difficulty in remembering new beliefs which are in contradiction to his older belief system. It is this failure of memory which in turn leads to the greater inability of the highly dogmatic individual to integrate new beliefs into a new system, and consequently to gain a solution to a new problem. To put it quite briefly, a lack of acceptance of new beliefs results in a failure of memory, which in turn leads to a difficulty with integration.

The cognitive task to be employed here is the same as that used by Rokeach, McGovney and Denny in their previously cited study (6) with modifications. It is called the Denny Doodlebug Problem, after M. Ray Denny, who devised it in 1945. The problem is presented to the subjects on a typed sheet

of paper as follows:

THE CONDITIONS:

Joe Doodlebug is a strange sort of imaginary bug. He can and cannot do the following things:

1. He can jump in only four directions - north, south, east or west, not diagonally. (Not southeast, northwest, etc.)
2. Once he starts in any direction, that is, north, south, east or west, he must jump four times in that same direction before he can switch to another direction.
3. He can only jump, not crawl, fly or walk.
4. He can jump very large distances or very small distances, but not less than one inch per jump.
5. Joe cannot turn around.

THE SITUATION:

Joe has been jumping all over the place getting some exercise when his master places a pile of food three feet directly west of him. Joe notices that the pile of food is a little larger than he. As soon as Joe sees all this food he stops dead in his tracks facing north. After all his exercise Joe is very hungry and wants to get to the food as quickly as he possibly can.

Joe examines the situation and then says, "Darn it, I'll have to jump four times to get the food!"

THE PROBLEM:

Joe Doodlebug was a smart bug and he was dead right in his conclusion. Why do you suppose that Joe Doodlebug had to take four jumps, no more and no less, to reach the food?

The correct solution to the problem is that Joe had to take exactly four jumps because at the moment the food was presented he had already taken one jump to the east. Therefore, it was necessary for him to first take three more jumps to the east to meet the requirement of taking four jumps before changing direction. He then takes one jump to the west and lands on top of the food, thus making a total of four jumps.

The subject must first overcome three discrete sets or beliefs to solve the Doodlebug Problem: (1) the facing set: Joe does not have to face the food in order to eat it - he can land on top of it; (2) the direction set: Joe can jump sideways and backwards as well as forwards; and (3) the movement set: Joe could have been in the middle of a sequence of jumps as well as at the beginning of a sequence

when the food was presented. But overcoming these three beliefs does not automatically lead to the solution. What the subject must do after overcoming the beliefs is to integrate them into a new system to gain a solution to the problem.

Hypothetically, it was thought that experimentally assisting the highly dogmatic individual while he is working on this cognitive task should (1) increase the acceptance of the problem situation and the new belief system inherent in the task, (2) aid the subject in remembering the new beliefs, i.e., facilitating the recall process, which in turn should lead to (3) a facilitation of the integration process and consequently a more rapid solution of the problem.

The Doodlebug Problem was modified from the earlier usage in accordance with these hypothetical considerations as follows: The three new beliefs - the facing, direction and movement sets - were typed on 3X5 cards. As each subject overcame one or more of these sets by himself, the appropriate card was placed before him. In case the subject did not overcome the individual sets by himself within specified time intervals, the cards bearing the new beliefs were placed before him in the form of "hints".

From one-half of each of the high and low dogmatic groups, these cards were then taken away immediately after the contents were read. This group was designated the Take Card Away Condition. The other one-half of each of the high and low dogmatic groups was allowed to retain the cards before them until the solution of the problem had been gained. This was termed the Keep Card Condition.

More specifically, the following sets of interrelated hypotheses were tested:

A. Concerning the total time taken to solve the problem, which involves both the overcoming of sets and their integration:
   1. Persons high in dogmatism, under both sets of experimental conditions, should take longer to solve the problem than persons low in dogmatism.
   2. Persons high in dogmatism, when allowed to keep the new beliefs ("hints") before them, should solve the problem more rapidly than persons high in dogmatism from whom the hints are taken away.
   3. Persons low in dogmatism, when allowed to keep the new beliefs ("hints") before them, should solve the problem more rapidly than

persons low in dogmatism from whom the hints are taken away, but this difference in performance should not be as extreme as in A2.

B. Concerning the overcoming of specific sets or beliefs:

1. Persons high in dogmatism should take no more time in overcoming the sets than those low in dogmatism regardless of experimental condition.

C. Concerning the recall of sets at the conclusion of the problem solving task:

1. Persons high in dogmatism, under both sets of experimental conditions, should manifest a poorer incidental recall for the new beliefs than those persons low in dogmatism.
2. Persons high in dogmatism, when allowed to keep the new beliefs before them, should manifest a higher incidental recall for these beliefs than should those persons high in dogmatism from whom the new beliefs are taken away.
3. Persons low in dogmatism, when allowed to keep the new beliefs before them, should manifest a higher incidental recall for these new beliefs than those persons low in dog-

matism from whom the beliefs are taken away, but this difference should not be as extreme as in C2.

D. Concerning reaction to the problem:

1. Persons high in dogmatism should show more rejection of the problem than persons low in dogmatism on a questionnaire designed to measure rejection.
2. Persons high in dogmatism should make more qualitative remarks during the experiment showing rejection of the problem than persons low in dogmatism.

SUBJECTS AND PROCEDURE

Two hundred forty-nine students, mainly Sophomores, enrolled in an introductory psychology course at Michigan State University during the Spring of 1955, were used as the original group of subjects from which the experimental subjects were chosen. These students were mainly white and non-Jewish, but there were two foreign-born, six negro, and seven Jewish individuals in this group.

These individuals were given, under classroom conditions, a questionnaire composed of 137 items. Forty of these items represented the "Dogmatism Scale" devised by Rokeach (8). The remaining items were "filler" items interspersed among the dogmatism items.

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

Mark each statement in the left margin according to how much you agree or disagree with it. Please mark every one. Write +1, +2, +3, or -1, -2,

-3, depending on how you feel in each case.

+1	I AGREE A LITTLE	-1	I DISAGREE A LITTLE
+2	I AGREE PRETTY MUCH	-2	I DISAGREE PRETTY MUCH
+3	I AGREE VERY MUCH	-3	I DISAGREE VERY MUCH

The 40 items employed were as follows:

1. A person who thinks primarily of his own happiness is beneath contempt.

2. The main thing in life is for a person to want to do something important.

3. In a discussion I often find it necessary to repeat myself several times to make sure I am being understood.

4. Most people just don't know what's good for them.

5. In times like these, a person must be pretty selfish if he considers his own happiness primarily.

6. A man who does not believe in some great cause has not really lived.

7. I'd like it if I should find someone who would tell me how to solve my personal problems.

8. Of all the different philosophies which have existed in this world, there is probably only one which is correct.

9. It is when a person devotes himself to an ideal or cause that his life becomes meaningful.

10. In this complicated world of ours the only way we can know what is going on is to rely upon leaders or experts who can be trusted.

11. There are a number of persons I have come to hate because of the things they stand for.

12. There is so much to be done and so little time to do it in.

13. It is better to be a dead hero than a live coward.

14. A group which tolerates too much difference of opinion among its own members cannot exist for long.

15. It is only natural that a person should have a much better acquaintance with ideas he believes in than with ideas he opposes.

16. While I don't like to admit this even to myself, I sometimes have the ambition to become a great man, like Einstein, or Beethoven, or Shakespeare.

17. Even though freedom of speech for all groups is a worthwhile goal, it is unfortunately necessary at times to restrict the freedom of certain political groups.

18. If a man is to accomplish his mission in life, it is sometimes necessary to gamble "all or nothing at all."

19. Most people just don't give a "damn" about others.

20. Any person who gets enthusiastic about a number of causes is likely to be a pretty wishy-washy sort of person.

21. To compromise with our political opponents is dangerous because it usually leads to the betrayal of our own side.

22. If given the chance, I would do something that would be of great benefit to the world.

23. In times like these it is often necessary to be more on guard against ideas put out by certain people or groups in one's own camp than by those in the opposing camp.

24. In a heated discussion I usually become so absorbed in what I am going to say that I forget to listen to what the others are saying.

25. Once I get wound up in a heated discussion,

I just can't stop.

26. There are two kinds of people in this world; those who are on the side of truth, and those who are against it.

27. Man on his own is a helpless and miserable creature.

28. The United States and Russia have just about nothing in common.

29. In the history of mankind there have probably been just a handful of really great thinkers.

30. The highest form of government is a democracy and the highest form of democracy is a government run by those who are most intelligent.

31. The present is all too often full of unhappiness. It is the future that counts.

32. Unfortunately, a good many people with whom I have discussed important social and moral problems don't really understand what is going on.

33. Fundamentally, the world we live in is a pretty lonely place.

34. It is often desirable to reserve judgement about what's going on until one has had a chance to hear the opinions of those one respects.

35. The worst crime a person can commit is to attack publicly the people who believe in the same thing he does.

36. In the long run the best way to live is to pick friends and associates whose tastes and beliefs are the same as one's own.

37. Most of the ideas that get published nowadays aren't worth the paper they are printed on.

38. It is only natural for a person to be rather

fearful of the future.

39. My blood boils whenever a person stubbornly refuses to admit he's wrong.

40. When it comes to differences of opinion in religion we must be careful not to compromise with those who believe differently from the way we do.

The subjects were allowed, as can be seen, the same six choices of response for each item (+3 to -3, with no neutral response), and the responses were converted into scores in the same way (-3 = 1 point, -2 = 2 points, etc., up to +3 = 7 points). For the forty items, then, the total scores can range between 40 points (1 point on each item, low dogmatism extreme) and 280 points (7 points on each item, high dogmatism extreme).

Two sections of students (N = 89) were utilized in computing the reliability of the Dogmatism Scale in the present study. The split-half reliability of .78 corrected by the Spearman-Brown Formula, is comparable to reliabilities previously reported by Rokeach.[1]

From this preliminary group of 249 students who took the Dogmatism scale, 30 subjects were

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1; Rokeach (8) reports reliabilities for the 40 item Dogmatism scale of .78 and .81.

chosen on the basis of extremely high scores, and 30 subjects were chosen on the basis of extremely low scores, a total of 60 subjects in all.[2] These subjects were then randomly assigned to experimental groups, by an acquaintance of the writer, so that he would not know whether a given subject was high or low in dogmatism when conducting the experiment. The experimental groups are as follows:

I. EXPERIMENTAL GROUP

A. High dogmatic - keep card condition: Fifteen subjects (11 male and 4 female) who scored extremely high on the Dogmatism Scale. This group was allowed to keep each of the three cards, on each of which was written one of the three beliefs. Each card was placed before the subject as soon as the subject overcame the set by himself, or failing this, at a specified time interval during the experimental session.

B. Low dogmatic - keep card condition: Fifteen subjects (10 males and 5 females) who scored

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[2] Of the original 60 subjects asked to appear for individual experimentation, 55 appeared for the two individual sessions held a week apart. Five additional subjects were obtained (3 Highs and 2 Lows) from the larger pool to bring the number to 60.

low on the Dogmatism Scale. This group followed the same procedure as in Group A.

II. CONTROL GROUP

C. High dogmatic - remove card condition: Fifteen subjects (9 male and 6 female) who scored High on the Dogmatism Scale. This group was shown a card containing each new belief for about ten seconds after the subject himself overcame the belief, or after a specified interval if the belief was not overcome by the individual.

D. Low dogmatic - remove card condition: Fifteen subjects (7 male and 8 female) who scored low on the Dogmatism Scale. This group followed the same procedure as Group C.

The subjects were told that they had been selected randomly, and were asked to appear for individual experimentation. Each session required approximately one hour, and the sixty experimental sessions were conducted over a four week period within one school quarter (April-May, 1955). The experimenter did not know the individual subject's score on the Dogmatism Scale until the testing of the subject on the problem had been completed. There were no non-white subjects, two subjects were Jewish,

and one subject was foreign-born.

Each interview was standardized. Timing was with a stop watch, calibrated for seconds. As the subject sat down, the experimenter said:

> "Today you are going to be given a newly devised test of general intelligence. The problem is not a simple one but the solution can be reached by good logical analysis. Here is the problem. Read it over carefully."

The mimeographed problem was handed to the subject. After he had read the problem, the experimenter continued:

> "I'd like to ask you to think out loud as you work the problem so I can let you know whether you are correct or not. You may ask questions as you go along and you may refer to the problem at any time. You may use the scratch paper in any way you wish. Now let's read the problem over together."

The total time allowed for solution of the problem was forty minutes. For the first ten minutes the subject worked continuously regardless of whether he overcame any of the three sets by himself. If he did overcome any of the three sets by

himself, the time it took to do so was recorded by the experimenter. At the end of the ten minutes, the experimenter asked:

"Have you figured it out yet?"

If the subject had not, the experimenter gave a hint designed to overcome one of the three sets. Which hint was given depended on which set(s) the subject had already overcome by himself. If the subject had not overcome any of the three sets, the first hint was designed to overcome the facing set. The subject was then told that he would be given an additional five minutes. If no solution was forthcoming at the end of this time, the subject was given a second hint to overcome the direction set, and was given an additional five minutes. If there was still no solution at the end of this time, the subject was given a third hint designed to overcome the movement set.

These hints designed to assist the subject in overcoming the various sets (beliefs) were presented to the subject typed on 3x5 cards. For conditions A and B in the Experimental Group, the subjects were allowed to keep the cards before them. For conditions C and D in the Control Group, the subjects were allowed to read the hints for ten

seconds and the cards were taken away by the experimenter.

In the cases where the subjects overcame one set on his own within the first ten minutes, he was given the second set at the end of ten minutes and the third set at the end of fifteen minutes. In the cases where the subject overcame two sets within the first ten minutes by himself, he was given the third set at the end of ten minutes. This procedure was followed for all subjects without exception.

The hints were given as needed and as follows:

1. The facing set. "I'm going to give you a hint. It's on this card." (On card: "Joe does not have to face the food in order to eat it.") "O.K., I'll give you five minutes more."
2. The direction set. I'm going to give you another hint." (On card: "Joe can jump sideways and backwards as well as forwards.") "I'll give you five minutes more."
3. The movement set. "Here is one more hint." (On card: "Joe was moving east when the food was presented.") "You have five more minutes."

After the subject had solved the problem, or at the end of forty minutes, the subject was told the solution to the problem if he had not solved it, and was asked to read magazines "for a few minutes while I work on something." After ten minutes, the experimenter said:

> "Now I would like you to tell me what the three hints were that I gave you or that you figured out by yourself while you were trying to solve the problem. You have three minutes. Go ahead."

As soon as the subject had recalled the sets, or at the end of the three minutes if he had not recalled all of them, the experimenter asked the subject to fill out a short five-item questionnaire designed to test the subject's reaction to the problem situation, and his acceptance or rejection of it. This questionnaire, with instructions, is given below:

> Below are five questions which we would like you to answer. Indicate how you feel by circling the number which best reflects your true feelings. 1 means that you disagree very strongly; 2 means you disagree somewhat; 3 means

you have no feelings one way or the other; 4 means you agree somewhat; 5 means you agree very strongly.

The five questions to which responses were requested are:

1) Do you think the hints helped you to solve the problem?
2) Do you feel that you understood the hints?
3) Did you enjoy the problem?
4) Did you get angry with me or with the problem during the experiment?
5) Did you think that this experiment was worth your time and effort?

Is there anything else you want to say about the experiment? Please feel free to make any statements you wish below.

The questionnaire was scored by giving the same number of points for each question as to the number circled (1 = 1 point, 2 = 2 points, etc.), with the exception of question number 4, in which 1 = 5 points, 2 = 4 points...5 = 1 point. Thus, the lowest possible score on the questionnaire was 5 (1 point on each question, extreme rejection),

while the highest possible score was 25 (5 points on each question, extreme acceptance).

Following the questionnaire, the subject was asked to return for "a very few minutes" in seven days for "another part of the experiment." He was also requested not to discuss the problem with others. When the subject returned in seven days, he was again asked to recall the three hints used during the problem solving, again with a three minute time limit, and with the same instructions used previously. Following this, the subject was told that the problem was not a test of intelligence, was thanked for his cooperation, and was again asked not to discuss the problem with others.

The following quantitative measures were obtained by the experimenter for each subject:

A. Concerning the total time taken to solve the problem:
    1. Total time taken to solve the problem.
B. Concerning the overcoming of the individual sets:
    2. Time taken to overcome the first set.
    3. Time taken to overcome the first and second sets.

4. Time taken to overcome all three sets.
5. Number of sets overcome in the first five minutes.
6. Number of sets overcome in the first ten minutes.

C. Concerning the integration of the new sets after the older sets had been overcome:
7. Time taken to solve the problem after the first set was overcome.
8. Time taken to solve the problem after the first and second sets were overcome.
9. Time taken to solve the problem after all three sets were overcome.

D. Concerning the immediate recall of sets:
10. Mean recall time on immediate recall (after ten minutes).

E. Concerning the delayed recall of sets:
11. Mean recall time on delayed recall (after one week).

F. Concerning rejection of the experimental situation:
12. Post-experimental questionnaire score.

In addition to these quantitative measures, all comments made by a subject during or following the problem-solving situation were recorded by the experimenter.

RESULTS

In order to determine the relationship of intelligence, as measured by the American Council on Education Test, and the findings to be reported, a t-ratio and three correlation coefficients were computed for the various measures. Because of the truncated sample used in the experiment, it was necessary to use the t-ratio to ascertain the relationship between the ACE and the scores on the Dogmatism scale. For the High Dogmatic group, the mean ACE score was 5.59 with a standard deviation of 1.66; the mean ACE score for the Low Dogmatic group was 6.03, with a standard deviation of 1.71. The t-ratio of 1.0 indicates that there is no significant difference between the High and Low Dogmatics in intelligence. Correlation coefficients were computed between the ACE scores and the total time required to solve the problem, the time taken to overcome the first set, and the time taken to solve the problem after the second set was overcome. None of these correlations is significant. These results make it clear that whatever differences may be found between the High and Low Dogmatic groups cannot be attributed to dif-

TABLE 1

CORRELATIONS BETWEEN ACE AND OTHER VARIABLES

Variable	N*	r
Time taken to overcome first set	59	.16
Time taken to solve problem after second set was overcome	59	.22
Total time taken to solve problem	59	.08

* The ACE score for one of the 60 experimental subjects was unavailable.

ferences in intelligence between them.[3]

Because of the skewness of the various measures in this study, it was necessary to employ a distribution-free statistical technique to analyze all of the data except the measures of the time taken to overcome the various sets. These latter measures were analyzed by means of Chi-Square. The rank test for the significance of the difference between two groups described by White (9) was used throughout for uniformity of the remaining analysis. This statistic tests the null hypothesis that two sets of observations are from a common population without any assumption being made concerning the distribution of the measures in this population. A normal curve approximation with corrections for continuity and for ties (where necessary) was used. One-tailed tests of significance were utilized throughout since the direction of the differences was predicted in advance.

In Table 2, the results on the total time to solve the problem are presented. This time score includes both the overcoming of the new beliefs and

3 Rokeach, McGovney and Denny (6) and Ehrlich (3) have also found no significant correlation between dogmatism and intelligence. The former writers report a correlation of -.02, while Ehrlich reports one of -.01.

TABLE 2

COMPARISON BETWEEN HIGH AND LOW DOGMATIC GROUPS UNDER TWO EXPERIMENTAL CONDITIONS ON THE TOTAL TIME TAKEN TO SOLVE THE DENNY DOODLEBUG PROBLEM

Group	N	Mean Time*	z	p
High Dogmatic	30	24.035	2.787	.003
Low Dogmatic	30	17.157		
Remove Cards Cond.	30	21.890	1.057	.15
Keep Cards Cond.	30	19.301		
High Dogmatic-Remove	15	25.677	.768	.22
High Dogmatic-Keep	15	22.392		
Low Dogmatic-Remove	15	18.103	.768	.22
Low Dogmatic-Keep	15	16.210		

*The mean times are presented for comparison purposes, and do not enter into the computation of the rank-order statistic utilized.

the ensuing integration process. One finds that the High and Low Dogmatic groups are significantly different from each other in the amount of time taken to solve the problem. The former takes a mean time of 24.04 minutes while the latter takes a mean time of 17.16 minutes. This difference is significant at the .003 level of confidence.

On this same measure, one finds that the experimental group which was allowed to keep the cards does not differ significantly from the group which was not allowed to keep the cards. The Remove Card condition takes a mean time of 21.89 minutes while the Keep Card condition takes 19.30 minutes. The results are in the expected direction, but the difference reaches only the .15 level of significance.

For the sub-group comparisons, i.e., High Dogmatism-Remove Card condition compared with High Dogmatism-Keep Card condition and Low Dogmatism-Remove Card condition compared with Low Dogmatism - Keep Card condition, the differences are again in the expected direction but do not reach the 5% level of confidence. Significance levels for both comparisons are .22.

That the Low Dogmatic group clearly solves

the problem faster than the High Dogmatic group, and that the Keep Card group tends to solve the problem faster than the Remove Card group supports the first group of hypotheses, namely, that persons high in dogmatism should take longer to solve the problem than persons low in dogmatism, and that those individuals receiving experimental assistance should solve the problem more rapidly than those not receiving this help. However, these results do not tell us much about the thought processes preceeding these end results. Let us now therefore consider more closely the relative performance of the several groups and the ease with which they (1) overcome the sets, and (2) then integrate these sets into the problem solution.

Hypothesis B1 states that persons high in dogmatism should take no more time to overcome the sets than those low in dogmatism regardless of experimental conditions. In Table 3 is presented the mean time taken by the several groups and sub-groups to overcome the first set, the second set and the third set. It will be noted by inspection of the means that the High and Low Dogmatic groups are very similar in time taken to overcome the first, second and third sets. However, it was not possible to as-

TABLE 3

COMPARISON BETWEEN HIGH AND LOW DOGMATIC GROUPS UNDER TWO EXPERIMENTAL CONDITIONS ON THE MEAN TIME TAKEN TO OVERCOME THE FIRST, SECOND AND THIRD SETS*

Group	N	First Set	Second Set	Third Set
High Dogmatic	30	4.909	9.775	14.633
Low Dogmatic	30	4.309	8.767	13.617
Remove Card Cond.	30	3.859	9.392	14.150
Keep Card Cond.	30	5.359	9.150	14.100
High Dogmatic-Remove	15	3.817	9.667	14.333
High Dogmatic-Keep	15	6.000	9.883	14.933
Low Dogmatic-Remove	15	3.900	9.117	13.967
Low Dogmatic-Keep	15	4.717	8.417	13.267

* Tests of significance of the differences presented here not computed because of the extreme skewness of the data and the large number of tied scores present.

TABLE 4

NUMBER OF SETS OVERCOME WITHIN THE FIRST FIVE MINUTES AND WITHIN THE FIRST TEN MINUTES BY HIGH AND LOW DOGMATIC GROUPS*

Group	N	0	1	2	3	Chi^2	df	p
I. Number of sets overcome within first 5 minutes.								
High Dogmatic	30	12	15	3	0	1.334	2	NS
Low Dogmatic	30	12	12	5	1			
II. Number of sets overcome within first 10 minutes.								
High Dogmatic	30	7	16	6	1	1.098	2	NS
Low Dogmatic	30	4	17	8	1			

* To eliminate small theoretical frequencies, the data for 2 and 3 sets have been combined on measures I and II above.

certain the significance level of these results either by parametric or non-parametric devices because (a) the distributions were highly skewed in a positive direction and (b) because of a large number of ties in scores. We therefore computed another measure which would be susceptible to statistical treatment by the Chi Square method, namely, the number of sets overcome within the first five minutes, and the number of sets overcome within the first ten minutes. These results are shown in Table 4. It will be seen that these results confirm the results shown in Table 3 and that the Chi Square values are not significant. The findings of no significant differences between the two groups on these measures support the presented hypothesis and further substantiate the results reported by Rokeach, McGovney and Denny (6), namely, that high and low scorers on dogmatism do not differ from each other in the speed of overcoming the individual sets.

Let us now consider the integration process as measured by the amount of time taken to solve the problem after the first set is overcome, after the first and second sets are overcome, and after all three sets are overcome. These data are presented in Table 5. The same method of interpretation

TABLE 5

COMPARISON BETWEEN HIGH AND LOW DOGMATIC GROUPS UNDER TWO EXPERIMENTAL CONDITIONS ON THE TIME TAKEN TO SOLVE THE PROBLEM AFTER THE FIRST, SECOND AND THIRD SETS ARE OVERCOME

Group	N	After First Set			After Second Set			After Third Set		
		Mean time*	z	p	Mean time*	z	p	Mean time*	z	p
High Dogmatic	30	19.132	2.82	.002	14.257	2.95	.002	9.404	2.86	.002
Low Dogmatic	30	12.855			8.396			3.546		
Remove Cards Cond.	30	18.038	1.94	.03	12.501	.64	.26	7.748	1.36	.09
Keep Cards Cond.	30	13.949			10.151			5.202		
High Dogmatic-Remove	15	21.871	1.66	.05	16.010	.69	.25	11.343	1.02	.15
High Dogmatic-Keep	15	16.392			12.503			7.465		
Low Dogmatic-Remove	15	14.205	1.47	.07	8.992	.56	.29	4.153	1.02	.15
Low Dogmatic-Keep	15	11.505			7.799			2.938		

* The mean times are presented for comparison purposes, and do not enter into the computation of the rank-order statistic utilized.

that was outlined for Table 2 may be used for all of the time measures in Table 5.

With respect to the personality variable, we find that the High Dogmatic Group differs significantly from the Low Dogmatic Group on all three measures. The former takes longer to solve the problem after each set is overcome than does the latter group. These differences are all significant at the .002 level of confidence.

In the case of the experimental variable, the results are somewhat less decisive. After the first set is overcome, the Remove Card Condition and the Keep Card Condition differ significantly in the amount of time taken to solve the problem. The mean time of 18.04 for the Remove Card Condition differs from the mean time of 13.95 for the Keep Card Condition at the .03 level of confidence. After the second set is overcome, the two conditions again differ from each other in the expected direction but this reaches only the .26 level. After the third set is overcome, the two conditions differ from each other in the expected direction, but again the difference falls short of significance (.09 level). It is clear, however, from the overall data that the sub-

jects in the Keep Card Condition integrate more quickly than do the subjects in the Remove Card Condition.

Much the same pattern of results is revealed upon examination of the sub-group comparisons. For both the High Dogmatic Groups, Remove Card Condition compared with the Keep Card Condition, and for the Low Dogmatic Groups, Remove Card Condition, compared with Keep Card Condition, the subjects subjected to the Remove Card Condition are consistently slower than those in the Keep Card Condition in solving the problem after the first, the second, and the third sets are overcome. While most of these differences, considered alone, do not reach an acceptable level of significance, it is to be noted that each and every one of the differences under consideration are in the expected direction.

The findings thus far reported illustrate very emphatically two very important hypothesized aspects of the problem solving situation. The faster solving of the whole problem by the Low Dogmatic group as compared with the High Dogmatic group, and by the Keep Card group as compared with the Remove Card group, is definately <u>not</u> a function of the speed of overcoming the individual sets. What the data

clearly indicate is that those groups showing a superior integration facility are able to solve the whole problem more rapidly than those who have difficulty with the integration process.

Let us now turn to some findings which will shed further light on this issue. The results presented thus far with respect to the differences between High and Low Dogmatic groups are consistent with those found earlier by Rokeach, McGovney and Denny (6). One important suggestion regarding the explanation of these differences is to be found by looking at the data shown with respect to the experimental variable. That is, these data suggest that when the beliefs are clearly in the phenomenal field the integration process is facilitated.

It will be remembered that after the experiment was completed, the subjects were given a ten-minute rest and then asked to first recall the three sets and then to fill out a questionnaire pertaining to the problem. We will first deal with the questionnaire, the purpose of which was to measure the amount of rejection (and conversely, the amount of acceptance) of the problem by the subject. The pertinent results are presented in Table 6. In

TABLE 6

COMPARISON BETWEEN HIGH AND LOW DOGMATIC GROUPS UNDER TWO EXPERIMENTAL CONDITIONS ON THE SCORE ON A POST-EXPERIMENTAL QUESTIONNAIRE DESIGNED TO MEASURE REJECTION OF PROBLEM SITUATION

Group	N	Mean Score*	z	p
High Dogmatic	30	20.80	1.77	.04
Low Dogmatic	30	22.10		
Remove Card Cond.	30	20.67	2.08	.02
Keep Card Cond.	30	22.24		
High Dogmatic-Remove	15	20.00	1.13	.13
High Dogmatic-Keep	15	21.60		
Low Dogmatic-Remove	15	21.33	1.79	.04
Low Dogmatic-Keep	15	22.87		

* The lower the mean score, the greater indicated rejection of the problem. The mean times are presented for comparison purposes and do not enter into the computation of the rank-order statistic utilized.

the following analysis, the lower the mean score, the more the subjects' rejection of the problem.

The results substantiate Hypothesis D1 which states that persons high in dogmatism should show more rejection of the problem than persons low in dogmatism. As can be seen by Table 6, the Low Dogmatic group showed more acceptance of the problem than the HighDogmatic group. The mean score for the High Dogmatic group is 20.80, as compared to a mean score of 22.10 (out of a possible score of 25) for the Low Dogmatic group. This difference is significant at the .04 level of confidence.

On the same measure, the Keep Card Condition showed more acceptance than the Remove Card Condition. Here the difference between the respective means of 20.67 and 22.24 is significant at the .02 level.

In the case of the sub-groups, this questionnaire measures differentiates significantly between the Low Dogmatic, Remove Card Condition, and the Low Dogmatic, Keep Card Condition. The significance level here is .04. There is not a significant difference between the High Dogmatic, Remove Card Condition and the High Dogmatic, Keep Card Con-

dition on this measure, but the difference is again in the expected direction ($p = .13$).

Having found that the High Dogmatic groups reject the problem significantly more than the Low Dogmatic groups, it follows that those groups which reject the problem more should also manifest poorer memory for the new beliefs to be integrated. The findings for the recall process are presented in Table 7.

As shown in Table 7, the High Dogmatic group takes a mean of about 46 seconds to recall the three new beliefs while the Low Dogmatic group takes a mean of about 23 seconds to remember the beliefs on the immediate recall test given ten minutes after the problem was completed. This difference is significant at the .02 level of confidence, and corroborates Hypothesis C1, which states that persons high in dogmatism, under both sets of experimental conditions, should manifest a poorer incidental recall for the new beliefs than those persons low in dogmatism.

In the case of the experimental variable, the Remove Card Condition takes a longer amount of time (mean time 50.01 seconds) to recall the sets

TABLE 7

COMPARISON BETWEEN HIGH AND LOW DOGMATIC GROUPS UNDER TWO EXPERIMENTAL CONDITIONS ON THE TIME TAKEN TO RECALL THE SETS

		I.After 10 min.			II.After 1 week			III.Comparison		
Group	N	Mean time*	z	p	Mean time*	z	p	Mean time	z	p
High Dogmatic	30	:45.93	2.11	.02	:24.99	1.69	.05	:20.94	1.66	.05
Low Dogmatic	30	:22.71			:22.36			:00.35	1.58	.06
Remove Cards Cond.	30	:50.01	2.59	.01	:32.14	1.06	.15	:17.87	1.89	.03
Keep Cards Cond.	30	:18.63			:15.21			:03.42	1.11	.13
High Dogmatic-Remove	15	:70.89	2.67	.004	:29.71	.17	.43	:41.18	2.14	.02
High Dogmatic-Keep	15	:20.96			:20.27			:00.69	.17	.43
Low Dogmatic-Remove	15	:29.13	.98	.16	:34.56	1.25	.11	:05.43	.71	.24
Low Dogmatic-Keep	15	:16.29			:10.15			:06.14	1.29	.10

* The mean times are presented for comparison purposes and do not enter into the computation of the rank-order statistic utilized.

than does the Keep Card Condition (mean time 18.63 seconds). This difference is significant at the .01 level of confidence.

From Table 7, we also see that the findings for the sub-group comparisons are in accordance with Hypotheses C2 and C3 which state that individuals high in dogmatism who are allowed to keep the hints before them should recall faster than those persons high in dogmatism from whom the hints are taken away, and that the same should be true for the low dogmatic groups, but to a lesser degree. For the High Dogmatic, Remove Card Condition -- High Dogmatic, Keep Card Condition comparison, the difference between a mean time of 70.89 seconds for the former and a mean time of 20.96 seconds for the latter is significant at the .004 level of confidence. The Low Dogmatic experimental groups again differ in the expected direction, but in this case the difference is not significant ($p = .16$).

It will be remembered also that a week after the experiment, the subjects were again tested for recall of the sets. These "delayed recall" data are shown in Table 7. Again, the High Dogmatics take longer than the Low Dogmatics, with the differ-

ence being significant at the 5% level of confidence. Also, the two experimental groups differ from each other in the expected direction, the Remove Card Condition taking a mean time of about 32 seconds with the Keep Card Condition requiring a mean of about 15 seconds. This difference, however, is not significant. Similarly, the sub-group comparisons do not reach the confidence level required for significance. Although not significant, these differences are all in the expected direction.

A comparison was also made of the differences between the times required for recall for the various groups and conditions on the immediate and delayed recall measures, with rather interesting results. This data is shown in column III of Table 7, and involves a comparison of the measures in columns I and II.

Significant decreases in the amount of time required to recall the sets from the immediate recall to the delayed recall tests are evident in three of the groups. The High Dogmatic group required a mean time of 45.93 seconds to recall the sets on the immediate recall test (ten minutes after the completion of the problem), while this same

group used 24.99 seconds on the delayed recall test (given one week after the original problem situation). This difference is significant at the 5% level. In the comparison of the two measures for the Remove Card Condition and for the High Dogmatic, Remove Card Condition, the differences are significant at .03 and .02 respectively.

In short significant decreases in the amount of time taken to recall the sets a week after the experiment was completed, as compared with the amount of time required ten minutes after the completion of the problem, are found in the High Dogmatic group and in the group where the cards are removed. No such differences are found in the Low Dogmatic group or in the group allowed to keep the cards.

DISCUSSION

The results are regarded as having substantiated all the hypotheses presented. The finding that there is no difference between the High and Low Dogmatic groups on the time taken to overcome the old beliefs lends further experimental verification to the findings of Rokeach, McGovney and Denny (6). These authors found an experimental distinction between rigidity and dogmatism, finding that High and Low Dogmatics could not be differentiated on a measure of time taken in overcoming the individual sets, but that High and Low Rigid groups could.

That the High Dogmatics do have more difficulty than the Low Dogmatics in integrating the new beliefs is evident from the data presented in Table 5. The results show that the former group takes significantly longer than the latter to solve the problem after the first, after the second, and after the third sets are overcome. This tells us little about where in the problem-solving process integration begins. However, for our purposes, it is not of crucial importance to localize the onset of the integration process. What is of importance here is that such a process is seen to take place in dis-

tinction to the process of the overcoming of sets in even clearer form than is evident in the Rokeach, McGovney and Denny study (6).

We now turn to consider the effects of the experimental manipulation of the sets. This manipulation, i.e., allowing the subjects to either keep the new beliefs in front of them or removing the beliefs from their perceptual field, clearly has an effect on the subjects' performance on the Doodlebug Problem. As Rokeach points out, "...when the new beliefs are all together 'pumped' into the phenomenal field by artificial-experimental means, the integration of these beliefs into a new system is clearly facilitated."

From the data we can conclude that what is referred to as "the integration process" has two distinct components, or causative factors, if you will. These factors, acceptance (conversely, rejection) and memory, will now be discussed.

As measured by the questionnaire given at the finish of the problem situation, the Low Dogmatic group showed more acceptance of the problem than the High Dogmatic group. The new beliefs inherent in the Doodlebug Problem are a threat to the closed

system of the latter group, and their resistance to change is later manifested by a rejection of the problem on the questionnaire. Interestingly enough, The Keep Card Condition groups indicated significantly more acceptance of the problem than the Remove Card Condition groups. This seems to be an ad hoc demonstration of the perceived value of the assistance while the personality variable is held constant.

Rejection of the problem by the High Dogmatic group, as measured by a structured questionnaire given at the end of the experiment, is also evident in the nature of their remarks and comments during the test situation. A record of the comments of all subjects was kept by the experimenter and these remarks were later analyzed in the following manner: Three judges, familiar with the theoretical framework in which the study was conducted, were asked to individually sort these comments into High and Low Dogmatic groupings, i.e., they were to try to judge which comments were made by high dogmatics and which were made by low dogmatics. The basis for this classification was the degree of rejection or acceptance implied in the individual remarks. The sorting was, of course, "blind." That is, the raters

did not know whether the comment had been made by a high or low dogmatic subjects.

Typical of the comments made by the individuals judged to be indicative of rejection of the problem situation are the following:

"Are you sure he wants to eat the food?"

"That's illogical!"

"He could have died of hunger when he stopped dead."

"If he's so smart, why doesn't he do it in one jump?"

"Maybe he really doesn't want to eat the food."

"He can starve for all I care!"

"Jeez, what a screwball of an outfit!"

"This is impossible!"

"All those hints seem to go in one ear and out the other."

"I know there's a tricky answer to this!"

"There's no solution! How in hell can he change directions if he can't turn around?"

From the total pool of 87 comments made by the subjects, 41 were selected by two of the three judges or by all of the three judges as indicating rejection of the problem. Of these, 30 had been made by high dogmatic individuals, while 11 had been

voiced by individuals low in dogmatism. A chi-square analysis revealed that the selection by the judges on the basis of rejection of the problem significantly differentiated the two personality groups (Chi-square = 4.38).

Thus we find that rejection of the problem, as measured by the two methods, one quantitative, the other qualitative, is indeed an important aspect of the closed cognitive system of the high dogmatic individual. Let us now turn to a discussion of the effects of this rejection on the memory and integration process.

With regard to the incidental memory process, the high dogmatics remember fewer of the new beliefs and take longer doing this than the low dogmatics. In theoretical terms, this is a function of the closed nature of the cognitive system of the highly dogmatic individuals, and it is because they do not remember these beliefs that they do not integrate more rapidly than they do. It seems probable that the greater the difficulty in remembering the beliefs, the less the likelihood that there is anything to remember.

Why, one may ask, do the High Dogmatic

individuals remember the sets less well than the Low Dogmatics? The findings on the questionnaire discussed above point clearly to the answer to this question. They do not recall because they have not really accepted either the beliefs or the basic tenets of the problem to begin with. The beliefs are abandoned once the task has been completed. The high dogmatic "goes along" with the problem, so to speak, but never really accepts it as true or as something intimately pertaining to him. As one member of the High Dogmatic group succintly phrased it, "The hints just seemed to go in one ear and out the other."

That the high dogmatics are affected by the problem, however, is clearly pointed out by the fact that their performance on the delayed recall test is significantly better than their performance on the test of immediate recall given one week earlier. Evidently, the subjects with closed systems mulled over the problem <u>after</u> the experiment was over, when they were alone and when they were not threatened by the experimental situation. From the data, it appears that these individuals made a strong attempt to further <u>reintegrate</u> the new ideas into their own cognitive frameworks. It has been

suggested by Rokeach that dogmatism requires a social or interpersonal situation for its elaboration -- one cannot be dogmatic when alone.

In light of this great improvement found for the high dogmatics from immediate to delayed recall, with the hypothesized "post-problem reintegration", a test of the diminution of rejection would be interesting. If, as speculated, an individual with a closed system makes apparently successful attempts to accept and integrate the new beliefs after rejecting them to some degree, it would seem that the rejection process is not of a final nature. Its strength may be, rather, inversely related to the length of time and degree to which the individual has been attempting to "work through" the new beliefs encountered in the problem.

SUMMARY AND CONCLUSION

The purpose of this study was to investigate, by means of a new cognitive task, certain cognitive aspects of the phenomenon of dogmatism, especially the integration process which has been shown to be a major factor in the dogmatic thought process.

It was hypothesized that the greater difficulty in integration shown by highly dogmatic subjects is a function of two factors: (a) greater rejection of the problem situation, and, consequently, (b) poorer memory for the individual beliefs (sets) which must be integrated if there is to be a solution.

It was further hypothesized that permitting the subjects to keep the new sets before them (as hints typed on cards) should (a) increase the acceptance of the problem situation and the beliefs, (b) facilitate the memory for the individual sets to be integrated, and (c) facilitate the integration process because of this increased acceptance and improved recall.

249 subjects were given the Dogmatism Scale. From this group, 60 experimental subjects were chosen, such that 30 were high in dogmatism and

30 were low; also 15 subjects from each of these groups were allowed to keep the new beliefs, in the form of hints typed on card, in front of them, while 15 subjects from each group had the hints removed after ten seconds. These subjects were all confronted with a cognitive task -- the Denny Doodlebug Problem - which contains three separate beliefs which first must be overcome and then integrated if the correct solution is to be reached.

Five types of measures were obtained: (a) total time taken to solve the problem; (b) time taken to overcome the beliefs and number of beliefs overcome within given periods of time; (c) time taken to solve the problem after the sets were overcome; (d) measures of immediate (10 minutes) and delayed (one week) recall of the beliefs; (e) questionnaire scores indicating rejection (or acceptance) of the problem.

The results show that the High Dogmatic groups took a significantly longer total amount of time to solve the problem. No significant differences were found between High and Low Dogmatics on the time taken to overcome the beliefs or in the number of beliefs overcome within specified time

periods, indicating that the relative slowness of the High Dogmatics cannot be attributed to this factor. The High Dogmatics did take significantly longer to solve the problem after the beliefs were overcome than the Low Dogmatics, indicating that the relative difficulty of problem solution is a function of the integration process. The questionnaire measure indicated that the Low Dogmatics accepted the problem and beliefs significantly more than the High Dogmatics. The High Dogmatics also took significantly longer to recall the beliefs than the Low Dogmatics, both on the immediate and delayed recall tests. A significant decrease in the amount of time taken by the High Dogmatics to recall the beliefs was found in comparing the immediate and delayed recall measures. For all measures, the subjects who were allowed to keep the beliefs did consistently better than those from whom the beliefs were taken away, with the High Dogmatics showing more gain from the experimental assistance than the Low Dogmatics. Qualitative data were found to lend further support to the above findings.

These findings are in accord with the hypotheses posed and lend further experimental support to the validity of the construct of dogmatism, and

also demonstrate that personality variables play an important role in problem-solving behavior. In addition, the findings show that the determinants of a closed cognitive system in problem-solving activity can be experimentally verified and quantitatively measured.

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