Factors in misconception

W. J. Paul

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FACTORS IN MISCONCEPTION

by

WILLIAM J. PAUL, JR.

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Chairman, Board of Examiners

Dean, Graduate School

AUG 23 1963

Date
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WJP
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INTRODUCTION

Studies of misconception, superstition, pseudopsychological beliefs, and cognitive distortion, which Levitt (1952) defines as a "misconceived belief or opinion", have been aimed at determining only which misconceptions were held, to what extent they were held, and what their sources were (Gustav, 1960; Valentine, 1936; Dudycha, 1938; etc.). Nixon (1925) investigating superstitious beliefs, and Patterson (1923), investigating pseudopsychological beliefs in an effort to determine to what extent these beliefs were held by college students, found the mean per cent of students believing in each item to be 30.1 and 38 per cent respectively. Longstaff (1947) repeated Patterson's study in 1946 and found the mean per cent of belief in each item to be only 11 per cent. Levitt, using Nixon's questionnaire, found the mean per cent of belief in each superstition to be 6.1 per cent. Levitt suggested that this does not mean that cognitive distortion or superstition no longer exist, but that "the nature of the unfounded beliefs, however, has undergone alteration with the years." This would seem to be borne out by a study done by Hergenhahn (1961) in which he presented an inventory of current misconceptions and found the mean per cent of belief in each item to be 34.2 per cent. A comparison of Hergenhahn's results with those of Levitt and Longstaff suggests, that while misconceptions are prevalent to roughly the same extent as they were in the mid-1920s, the content of today's misconceptions is different from that of the mid-1920s. Thus it would appear that such results are consistent with Levitt's speculation that neither content nor time are relevant factors or determinants in the continued
existence of misconception. Although this may be complicated by geographical factors (Levitt and Nixon's studies were done at New York University, Patterson and Longstaff's at the University of Minnesota, and Hergenhahn's and the present study at Montana State University), a determination of their influence is beyond the scope of this study. It also may be noted that Hergenhahn's results need verification. This will be attempted in the present study.

In an investigation to determine what factors are involved, Emme (1940) found home to be the major source of these beliefs; that emotional maladjustment had a low correlation with superstitious beliefs, and that intelligence had a negative correlation ($r = -0.400$ to $-0.470$) with superstition. Zapf (1945) concluded that age, intelligence, socioeconomic status and semesters of science, "while having a bearing on belief in superstition are none of them determining or influential factors." She proposed that suggestibility, as measured by the number of items never heard before and believed in, was one of the determining factors. Zapf's findings indicated that "Pupils who accept uncritically items which they have never heard before are those who accept and continue to believe items which they have heard before. Belief in superstition thus becomes a special case of uncritical acceptance of verbal propositions," or, in a word, credulousness.

Suggestibility, or credulousness as defined by this quotation from Zapf, may be considered a result of the structural characteristics of the belief system of those individuals who accept and continue to hold misconceptions. This suggests that a relevant factor in the continued acceptance of misconception may be the structural characteristics of the individual's belief system and the personality traits
from which these structural characteristics result.

A major attempt at describing the structure of belief systems was carried out by Rokeach (1960) in *The Open and Closed Mind*. Rokeach suggested that the basic distinction between the open and closed mind is "the extent to which the person can receive, evaluate, and act on relevant information received from the outside on its own intrinsic merits, unencumbered by irrelevant factors in the situation from within the person or from the outside." The individual's ability to do this, according to Rokeach, is a function of the structure of his belief system. The structure of the belief system of the individual with a closed mind is characterized by isolation of beliefs within the system, greater differentiation of the belief system than the disbelief system, and narrowness of the system. One interpretation of why this type of structure should result is provided by Frenkel-Brunswik (1949) who suggested that, as a result of early parent-child relations, there emerges differential abilities to tolerate emotional ambivalence toward parents which spills over into the social and cognitive spheres as well. Frenkel-Brunswik indicates that this results in such tendencies as "jumping to generalizations on the basis of certain specific and external aspects," to "arrive at premature closure as to valutative aspects, often at the neglect of reality" and the "carrying over of old sets" (1949). Rokeach further suggested that if a closed person is threatened or anxious he will become "highly attuned to irrelevant, internal and external pressures, and accordingly, be unable to evaluate information independent of source." He stated that the closed person over-relied on authority and that power of the authority is not dependent on cognitive correctness. Given a
Thus it seems possible that credulousness is a result of this type of structure; that premature closure, isolation of beliefs within the system, jumping to generalizations, over-reliance on authority, attention to irrelevant internal and external aspects when threatened or anxious, and the carrying over of old sets, are the prerequisites for a consistent belief in and the acceptance of misconceptions. If correct, this would suggest that measures developed to measure dogmatism would also tend to serve as a measure of credulousness.

It was the purpose of this study to investigate these possibilities; that is, to determine whether or not belief in pseudopsychological statements is still evident and consistent with the degree of misconception found in earlier studies and whether credulousness, as measured by the number of items not heard before and falsely believed, is a factor in the continued belief in misconception. But the primary purpose of this study was to determine whether closed mindedness, and the underlying personality and cognitive features suggested by Rokeach and Frenkel-Brunswik, are determining or influential factors in the acceptance of and continued belief in misconception.

The specific hypotheses were:

1. The extent to which pseudopsychological beliefs are held will be consistent with previous findings by Nixon, Patterson, and Hergenhahn.

2. The extent to which a person continues to believe pseudopsychological statements will be a function of how many pseudopsychological statements the individual accepts that he has not heard before.
3. Scores obtained on an inventory of pseudopsychological beliefs will be highly correlated with Rokeach's dogmatism scale which measures closed mindedness.

4. There will be a negative relationship between the number of misconceptions held and critical thinking ability.

5. People who hold a large number of misconceptions will be more anxious than those who don't.

6. People who hold a large number of misconceptions will exhibit a greater wish for reliance on authority than those who don't.

METHOD

Subjects. The study was done in two phases. Ss in Phase 1 were 167 males and 89 females, who ranged in age from 17 to 49 (M = 19.6), enrolled in six introductory psychology sections at Montana State University. Ss in Phase 2 were selected from those Ss participating in Phase 1 on the basis of their scores on an inventory of pseudopsychological beliefs; 83 Ss (56 males and 27 females) from a sample of 100 were willing to participate in Phase 2.

Test Materials. The test materials employed in Phase 1 were the Dogmatism Scale Form E, described by Rokeach (1960), which measures the extent to which a person is open or closed minded and an inventory of pseudopsychological beliefs (IPB)(see Appendix A). The IPB is comprised of 84 items selected from introductory psychology texts and workbooks, (Munn, 1961; Ruch, 1958) and prior studies of pseudopsychological beliefs, (Gustav, 1960; Valentine, 1936). It was initially given to 49 students who ranged in age from 17 to 29 (M = 20.2) in an intermediate algebra class at Montana State University to determine
the currency and prevalence of the beliefs. Because all but one item was falsely believed or disbelieved by one or more Ss, it was decided to retain the entire 84 items. The response options during this pre-testing were true and false, but for this study were changed to "Heard before and believe it is true; Heard before and believe it is false; Not heard before and believe it is true; and Not heard before and believe it is false," when given to the psychology sections. The instructions for the IPB were:

Some of the following statements are true and some are false. You will have heard some of the statements previously and some you will not have heard. When marking an answer, you are to indicate in the following manner whether you feel an item is true or false and whether or not you have previously heard the statement. Fill in the space on your answer sheet under:

A- If you Have Heard the item before and believe it is true.
B- If you Have Heard the item before and believe it is false.
C- If you Have Not Heard the item before and believe it is true.
D- If you Have Not Heard the item before and believe it is false.

Be sure that all your answer marks are black and that they completely fill the answer boxes. Do not make any stray marks on your answer sheet. If you erase, do so completely. Do not omit any items.

A score on the IPB consisted of the number of items falsely believed disregarding whether or not the item had been heard before. Thus a high scoring individual would be one who held a large number of pseudopsychological beliefs.

An odd-even reliability corrected by the Spearman Brown formula was obtained for the IPB ($r_{tt} = .775$) from the data obtained in the initial testing of the six sections of introductory psychology. It was
felt that this was sufficient reliability for the purpose of making the
group comparisons to be used in this study.

No plans were made to determine the validity of the IPB as a
measure of credulousness. Rather it was proposed at that time only to
investigate some correlates of this pattern of responding to verbal
stimuli.

The test materials used in Phase 2 were the 31 items from the
Minnesota Multiphasic Personality Inventory (MMPI) used by Welch (1952)
as a measure of anxiety; the Watson-Glaser Critical Thinking Appraisal,
Form Am (Watson & Glaser, 1952); and the Deference Scale of the Edwards

Procedure. The study was conducted in two parts (Phase 1 and
Phase 2): the primary purpose of the first part being to select Ss for
the second part.

Phase 1. Testing in Phase 1 was on the first day of class of
Spring Quarter, 1963. It involved the administration of the IPB and
the Dogmatism Scale to six sections of introductory psychology. Ss
were told only that the tests were part of a research project aimed
at determining what beliefs and opinions were common among college
students. Ss were divided into two groups on the basis of their scores
on the IPB. Group L consisted of those Ss whose scores were among the
lowest 50 in the distribution of scores obtained by all Ss in Phase 1.
Group H consisted of those Ss whose scores were among the highest 50.

Phase 2. All Ss were administered the Deference Scale of the EPPS,
the Watson-Glaser Critical Thinking Appraisal, and the anxiety items
from the MMPI, in that order. They were told only that the tests were
another part of the research on the beliefs and opinions of college students.
RESULTS

Hypothesis 1. The per cent of Ss indicating incorrect belief or disbelief in each item was determined. The values were averaged to obtain a mean per cent of belief ($M = 37.9$). These data are presented in Table 1 along with the values obtained by Nixon, Patterson, and Hergenhahn. It may be noted that the values are relatively consistent, all falling between 30 and 40 per cent. The data available from these earlier studies were not sufficient to permit tests of statistical significance.

Hypothesis 2. To determine to what extent continued belief in misconceptions heard previously is a function of belief in items not heard previously, the IPB was scored separately for items heard before and items not heard before. These two sets of scores were correlated using the Pearson $r$ ($r = -0.457$).

Hypothesis 3. Total scores obtained on the IPB and scores obtained on the Dogmatism Scale were correlated for all Ss in Phase 1 using the Pearson $r$ in order to determine the relationship between dogmatism and the acceptance of and the belief in pseudopsychological statements ($r = 0.370$, $p < 0.01$). The significance of the correlation was determined with the Wallace-Snedecor Table (Guilford, 1956). A comparison of the S. D. of scores obtained in the present study on the Dogmatism Scale and those reported by Rokeach (S. D. vary from 22.1

Insert Table 1 here

Insert Table 2 here

8
to 28.2) on college students indicates that Rokeach's are nearly twice as large as the S. D. reported here. This suggested that the range of scores obtained in the present study was sufficiently restricted to warrant the use of Pearson's correction for curtailment (Thorndike, 1949). The corrected r was .584.

Hypothesis 4. A one-tailed t test was used to evaluate the difference between Group L and Group H on the Watson-Glaser Critical Thinking Appraisal ($t = 4.013$, $df = 40$, $p < .0005$). The one-tailed test was used because a significant difference would support our hypothesis only if Group L did significantly better on the Critical Thinking Appraisal than Group H. Negative results of any magnitude would have led to rejection of our hypothesis. It was felt that no correction for intelligence need be made in view of the rather surprising finding that there was no relationship between scores on the IPB and the ACT, a college entrance test for which scores were available in the University records for all Ss (Pearson $r = .008$).

Hypothesis 5. A one-tailed t test was used to evaluate the difference between Group H and Group L on the anxiety items ($t = .048$, $df = 40$). The t value indicates that there was no significant difference between the two groups.

Hypothesis 6. A one-tailed t test between Group H and Group L on the Deference Scale showed no significant differences ($t = .713$, $df = 40$). However, it may be noted in Table 2 that this difference as well as that for the anxiety items is in the expected direction.

No significant difference was found between sexes on the IPB ($t = .870$, $df = 254$). This suggests that there is no relationship between sex and the number of pseudopsychological beliefs held.
DISCUSSION

The results of this study supported our hypothesis that the extent to which pseudopsychological beliefs are held would be consistent with the findings of Nixon, Patterson, and Hergenhahn. This relative consistency in the mean per cent of belief suggests that misconception is still prevalent to the same extent it was in the mid-1920s. These results, when compared with those of Levitt and Longstaff (6.1 and 11 per cent), who used the same items as Nixon and Patterson, support Levitt's speculation that cognitive distortion still exists and that only its nature, i.e., the content has changed. Thus it would appear that neither content nor time are relevant factors or determinants in the continued existence of misconception.

The negative correlation found between items not heard before and falsely believed or disbelieved and items heard before and falsely believed or disbelieved, is the converse of Zapf's findings and contrary to our hypothesis. These results need further verification because of their diametrical opposition to those of Zapf's. Similar results could only have been obtained if we had correlated the items not heard before with the total score. The results obtained do suggest, however, that it is not the uncritical acceptance of any verbal proposition which is a determinant of the continued belief in misconception, but more specifically the maintenance of verbal propositions previously heard and accepted. It is as if having heard the proposition before in itself lends validity to the proposition. The maintenance of belief in misconception implies isolation of beliefs within the system and greater differentiation of the belief system than the disbelief
system, which are characteristics of the closed mind. The correlation also suggests that Ss who uncritically accept misconceptions do not maintain them. This might be interpreted as open mindedness or a willingness to accept the proposition until evidence can be found for or against it.

The correlation between the IPB and the Dogmatism Scale was not as high as expected, but does indicate a substantial relationship between dogmatism and the belief in misconception. This indicates that the structure of the belief system, as defined by Rokeach, is an important factor in the belief in misconception. Although its relative weight is hard to assess because of the limited scope of the IPB, and because whatever other variables may be involved are at present unknown, these results suggest that the variables involved in dogmatism are those which are determining or influential in the continued adherence to misconception.

The significant difference found between Group L and Group H on the Watson-Glaser Critical Thinking Appraisal supports our hypothesis that there would be a relationship between critical thinking ability and the number of misconceptions held. The Watson-Glaser, which derives only a total score, measures S's ability to discriminate between degrees of truth or falsity or probability of certain inferences drawn from given facts or data; his ability to recognize unstated assumptions; to recognize the relation of implication between propositions; to weigh evidence and to distinguish between unwarranted generalizations and probable inferences; to distinguish between arguments which are strong and important to the question at issue, and those which are weak and unimportant or irrelevant. These are largely the same cognitive features suggested by Frenkel-Brunswik and Rokeach which result in open or closed mindedness. The fact that a significant difference was found
between Group H and Group L on a measure of these cognitive features would seem to support the existence of a relationship between closed mindedness and the number of misconceptions held.

A significant difference was not found between Group H and L for the anxiety test or the Deference Scale. These findings, coupled with the significant difference found between the two groups on the Watson-Glaser, suggest that it is not these particular personality traits of the closed-minded person which distinguish between people who hold a large number of pseudopsychological beliefs, but rather the cognitive traits.

In view of these findings it would seem that further investigation of the relationship between misconception and the structural characteristics of the belief system is warranted. Future studies should include measures of misconception which are wider in scope and take in other areas of misconception and other measures of the underlying personality and cognitive features suggested by Frenkel-Brunswick and Rokeach as those which result in open and closed mindedness.

**SUMMARY.**

The purpose of this study was to determine whether or not pseudopsychological beliefs are still evident and consistent with previous findings; whether or not credulousness, as defined by the number of items not heard before and falsely believed, was a determining factor, and the relationship between pseudopsychological beliefs and dogmatism and its underlying cognitive and personality features. Six Montana State University introductory psychology sections were given the Inventory of Pseudopsychological Beliefs (IPB) and the Dogmatism Scale. From this group, 50 of the highest and 50 of the lowest scorers were
selected to participate in Phase 2. Of these, 83 returned and were given the Watson-Glaser Critical Thinking Appraisal, the Deference Scale of the Edwards Personal Preference Schedule and 31 items measuring anxiety from the MMPI. The mean per cent of belief in pseudopsychological items was consistent with previous findings. A substantial relationship was found between the Dogmatism Scale and the IPB. Of the three scales given in Phase 2, a significant difference was found between the two groups only on the test of critical thinking. It was felt that these results supported the hypothesis that determining or influential factors in the continued maintenance of misconception were a result of the structure of the belief system.
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Emme, E. E. Modification and origin of certain beliefs in superstition among 96 college students. J. Psychol., 1940, 10, 279-291.


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Table 1

Mean Per Cent Of Belief In Misconceptions
In The Mid-1920 And 1960s.

<table>
<thead>
<tr>
<th>Source</th>
<th>1920s</th>
<th>1960s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nixon</td>
<td>30.1</td>
<td></td>
</tr>
<tr>
<td>Patterson</td>
<td>38.0</td>
<td></td>
</tr>
<tr>
<td>Hergenhahn</td>
<td></td>
<td>34.2</td>
</tr>
<tr>
<td>Present Study</td>
<td></td>
<td>37.9</td>
</tr>
<tr>
<td>Scales</td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td><strong>IPB</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>31.41</td>
<td>6.19</td>
</tr>
<tr>
<td>Females</td>
<td>32.70</td>
<td>5.56</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>31.87</td>
<td>6.80</td>
</tr>
<tr>
<td><strong>Dogmatism</strong></td>
<td>156.05</td>
<td>12.24</td>
</tr>
<tr>
<td><strong>Critical Thinking</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group H</td>
<td>63.52</td>
<td>8.26</td>
</tr>
<tr>
<td>Group L</td>
<td>71.39</td>
<td>9.34</td>
</tr>
<tr>
<td><strong>Deference</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group H</td>
<td>9.57</td>
<td>3.84</td>
</tr>
<tr>
<td>Group L</td>
<td>8.89</td>
<td>3.66</td>
</tr>
<tr>
<td><strong>Anxiety</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group H</td>
<td>6.69</td>
<td>3.76</td>
</tr>
<tr>
<td>Group L</td>
<td>6.73</td>
<td>4.03</td>
</tr>
</tbody>
</table>
1. It is unnecessary for a mother bird to teach her young to fly. They fly without instruction.

2. Modern civilization is almost wholly a product of the white race.

3. Fast workers in school or in industry make more mistakes than slow workers.

4. Human nature is not entirely determined by heredity.

5. A blond and a brunette are more likely to have a happy married life than two persons of like complexions.

6. Unfavorable attitudes toward people will be removed if personal contact can be arranged.

7. A person who is easily hypnotized is likely to be weak minded.

8. Spirits do not cling to old houses, causing them to be haunted.

9. Slightly retarded children eventually reach the same level of mental brightness as the slightly precocious. They just mature somewhat slowly.

10. Savages do not have keener senses than civilized people.

11. The nerve fibers in a nervous person are not so strong as those in a healthy person.

12. Scientists have shown that the porpoise rather than the chimp most nearly approaches man in intelligence.

13. People do not do unusual things in a crowd because a group mind takes over control of their actions.

14. A child comes into the world with a knowledge of good and evil which is his inborn conscience.

15. Dogs make good pets because over a period of years domesticity has been bred into them.

16. Men and boys are more often color blind than women or girls.

17. Most great men are not born of poor but honest parents.

18. It has been shown that criminals are of a characteristic physical type.

19. Man came from monkey, according to Darwin.

20. Groups affect a person primarily through his emotions.

21. A slow learner does not remember what he has learned better than a fast learner.
22. Any physical or mental disease can be contracted by thinking hard about it.

23. The people of each race have a unique mentality.

24. Dogs recognize the presence of death and give voice to their grief by howling.

25. It has been shown that last-born children in large families are less intelligent on the average than first-born children in the same family.

26. All men are not created equal in capacity for achievement.

27. Dreams are almost never of prophetic significance, foretelling future events.

28. Psychology can determine the specific job a man is best suited for.

29. A group typically selects as its leader the more vigorous and tallest member.

30. Fear of bugs and snakes is not instinctive in most people.

31. A feeble-minded person is one who has had no opportunity to learn.

32. Red-headed people are by nature no more tempermental than any other people.

33. It is easier for a person of German ancestry to learn German in college even if he has never heard it spoken at home.

34. Beavers and squirrels do not know whether an approaching winter is to be mild or severe and don't prepare themselves accordingly.

35. Chess playing will develop your powers of concentration.

36. There are more men than women in hospitals for the mentally deranged.

37. The majority of criminals are very low in intelligence.

38. Adults do not sometimes become feebleminded from overstudy.

39. Superior as well as inferior children are possible as a result of crosses between races, such as Japanese and Americans.

40. A person who is shifty eyed is likely to be dishonest.

41. Long, slender hands do not usually indicate an artistic nature.

42. Many people have an inborn urge to jump off high places.

43. The study of mathematics is not valuable because it gives us a logical mind.
44. The color red is not especially exciting to cattle.
45. Children always learn faster and better than adults.
46. Prejudiced people generally are more independent than unpred-
judiced people.
47. Man has more than five senses.
48. If you will stare at a person's back, you can make him turn around.
49. No animal is as intelligent as the average man.
50. In general, primitive and oriental peoples do not have many
mental disorders.
51. Children born to parents who are closely related, say uncle and
niece, are almost sure to have inferior intelligence.
52. A boy does not receive more of his personality from his father
than from his mother.
53. With minor exceptions, the ability to get along with, and control
people cannot be learned.
54. Women do not have a power of intuition that men do not have.
55. Under emotional stress man frequently displays extraordinary
strength and endurance.
56. Very intelligent children are likely to be weak physically.
57. The only taboo that all societies subscribe to is that against
mother-son incest.
58. Winters are less severe now than they were 40 or 50 years ago.
59. Great beauty and high intellectual ability seldom go together.
60. People of very superior intelligence, as a group, do not have
higher insanity and suicide rates than the general population.
61. A slow reader understands and retains what he has learned less
well than a fast reader.
62. An expectant mother is able to influence the character of her child
by her thoughts during pregnancy.
63. Man is not instinctively aggressive.
64. Environment is equally as important as heredity in determining an
individual's level of intelligence.
65. Whenever a person learns he improves.
66. Marriages in which there is an age difference of several years between husband and wife are more likely to fail than marriages between people whose ages are close together.

67. The tendency for certain types of mental disorders to run in families is not clear evidence that insanity is caused by bad heredity.

68. People tend to remember unpleasant experiences for a longer period of time than pleasant experiences.

69. If a man is completely deprived of both food and water for a period of days, his sensations of hunger will become more intense than those of thirst.

70. In learning a new and unfamiliar task, the individual usually makes greater gains in performance during early practice periods than during later ones.

71. Color blindness cannot usually be cured by exercises and diet.

72. Truth serum is often used in criminal investigation because suspects are unable to lie when under its influence.

73. Young babies have an instinctive fear of the dark.

74. Fears cannot be inherited from one's parents.

75. Cats cannot see in complete darkness.

76. Competition among people is an instinctive characteristic of human nature.

77. Once a person becomes mentally ill, he will never again be really normal.

78. The faster one learns the faster he forgets.

79. A blind person has a keener sense of touch and hearing because the strength normally in the eyes has gone to the other sense organs and made them more sensitive.

80. No reliable estimate of a person's character can be formed from a study of his facial characteristics.

81. No defect of mind or body can hold us back if we have enough willpower.

82. At birth not all children are of equal mentality.

83. Mental instability in parents tends to cause a similar condition in their offspring.

84. It has been shown that excessive tickling of a child will make him a stammerer.