

REVISED SCALE FOR AMBIGUITY TOLERANCE: RELIABILITY AND VALIDITY

A. P. MAC DONALD, JR.

Rehabilitation Research & Training Center, West Virginia University

Summary.—Increasing the 16-item Rydell-Rosen Ambiguity Tolerance Scale to 20 items raised the reliability from .64 to .86 (split-half, corrected by Spearman-Brown). The 20-item scale (AT-20) was cross-validated on a sample of 789 undergraduate students. Retest reliability was estimated at .63 ($p < .01$) for a 6-mo. interval. As predicted, AT-20 related to (a) performance in a complex task, (b) the F Scale, (c) dogmatism, (d) rigidity, and (e) church attendance. The AT-20 was not affected by social desirability response bias as measured by the Marlowe-Crowne.

Interest in the concept of tolerance of ambiguity derives chiefly from the work of Adorno, Frenkel-Brunswik, Levinson, and Sanford (1950). Frenkel-Brunswik contributed the greater part of this research, which attempted to relate intolerance of ambiguity to the authoritarian syndrome (1949, 1951). Similar efforts were made by Rokeach (1948) who later developed the related concept of dogmatism (1960).

Apart from the interest in the relationship between ambiguity tolerance and authoritarianism and ethnocentrism, there has been some interest in the variable of ambiguity tolerance in its own right. It is to that more general interest that this paper is addressed.

Intolerance of ambiguity may be viewed as a general tendency to perceive ambiguous material or situations as threatening (Budner, 1962). Conversely, tolerance of ambiguity implies that contact with ambiguity is desirable. Though definitions overlap considerably, no common definition has been accepted. For example, English and English (1958) define ambiguity tolerance as ". . . willingness to accept a state of affairs capable of alternate interpretations, or of alternate outcomes: e.g., feeling comfortable (or at least not feeling uncomfortable) when faced by a complex social issue in which opposed principles are intermingled. Low ambiguity tolerance is shown by the desire to have everything reduced to black and white . . ." (p. 24).

It is the impression of the author that persons having high tolerance of ambiguity (a) seek out ambiguity, (b) enjoy ambiguity, and (c) excel in the performance of ambiguous tasks. "An ambiguous situation may be defined as one which cannot be adequately structured or categorized by the individual because of lack of sufficient cues" (Budner, 1962, p. 30).

Historically, the concepts of "intolerance of ambiguity" and "rigidity" have been somewhat confounded. Frenkel-Brunswik used the term "rigidity" to refer to intolerance of ambiguity and also to refer to resistance to change (1951). The author, among others (e.g., Brown, 1965; Budner, 1962), maintains that, although related, the two concepts are theoretically and empirically separate.

Whereas ambiguity tolerance implies tendencies to relate to and interact in differing ways with certain classes of phenomena, rigidity refers to a more generally pervasive singular response mode. A rigid person may be viewed as one who perseverates in a given response (despite empirical evidence to the contrary) whereas an intolerant person may be more likely to replace one response with another. For example, a rigid person and an intolerant person may be equally anxious for closure, and therefore each may seize upon immediately available answers to various questions. Once having accepted an answer, the former will tenaciously (i.e., rigidly) hold on to it, even in the face of new contradictory evidence. The latter, on the other hand, may easily exchange the held belief for a better one. Consequently, one may be intolerant of ambiguity and yet be flexible, though the two characteristics are often found together. Empirical support for the notion that rigidity and ambiguity tolerance are separate is offered by Eysenck who reports over-all low correlations between measures of intolerance of ambiguity and perceptual and conceptual rigidity (Eysenck, 1954).

The confusion concerning the definitions of the terms "rigidity" and "intolerance of ambiguity" has been paralleled by confusion in the measurement of these concepts. For example, Frenkel-Brunswik (1949) tested for intolerance of ambiguity by measuring the extent to which Ss maintained an original response (i.e., a "set") despite empirical evidence to the contrary (which is the definition of rigidity offered above). A picture of a dog was shown and then followed by a number of pictures representing a gradual transformation of the dog into a cat. Those who held on to the original interpretation (i.e., dog) for the longest time were considered to have lower tolerance for ambiguity.

Recently, attempts have been made to develop paper-and-pencil tests of ambiguity tolerance. By and large, such efforts have not shown a great deal of promise. For example, Ehrlich (1965) discredited Walk's A Scale when she reported that the scale had virtually no internal consistency (i.e., a Kuder-Richardson Formula 20 of .08) and that one-third of the items correlated negatively in an inter-item correlational matrix. The remaining correlations were consistently low and predominantly nonsignificant. Another example of the lack of internal consistency found in such scales is reported by Child (1965). Child reports an r of .16 (alpha coefficient) for his tolerance of ambiguity scale.

On the more positive side, the Budner Scale of Tolerance-Intolerance of Ambiguity has shown fairly good internal consistency (Budner, 1962). Reliabilities (alpha coefficients) reported for 13 of his 17 samples ranged from .39 to .62, with a mean of approximately .49. However, the reported association between the Budner and Walk scales (i.e., $r = .54$, $p < .05$; Budner, 1962) is difficult to evaluate in light of Ehrlich's criticism of Walk's A Scale, presented above.

Recently another measure of ambiguity tolerance was introduced into the research literature (Rydell & Rosen, 1966). It consists of 16 true-false items.

No internal consistency coefficients are reported for this scale; however, stability estimates based upon retest intervals of 1 and 2 mo. are .71 and .57 respectively. Each estimate attained significance beyond the .001 level of confidence. Additionally, Rydell (1966) reports information regarding the validity of the scale. Ss of high and low tolerance differed significantly on mean semantic differential ratings of contradictory and noncontradictory adjective-noun concept-combinations. The following is a report of a series of studies done in order to furnish additional data on the properties of this instrument and a minor revision thereof.

METHOD

Reliability

The Rydell-Rosen test (Items 1 to 16, Table 1) was administered to 74

TABLE 1
THE AT-20 SCALE*

Please do not spend too much time on the following items. There are no right or wrong answers and therefore your first response is important. Mark *T* for true and *F* for false. Be sure to answer every question.

1. A problem has little attraction for me if I don't think it has a solution. (F)
2. I am just a little uncomfortable with people unless I feel that I can understand their behavior. (F)
3. There's a right way and a wrong way to do almost everything. (F)
4. I would rather bet 1 to 6 on a long shot than 3 to 1 on a probable winner. (T)
5. The way to understand complex problems is to be concerned with their larger aspects instead of breaking them into smaller pieces. (T)
6. I get pretty anxious when I'm in a social situation over which I have no control. (F)
7. Practically every problem has a solution. (F)
8. It bothers me when I am unable to follow another person's train of thought. (F)
9. I have always felt that there is a clear difference between right and wrong. (F)
10. It bothers me when I don't know how other people react to me. (F)
11. Nothing gets accomplished in this world unless you stick to some basic rules. (F)
12. If I were a doctor, I would prefer the uncertainties of a psychiatrist to the clear and definite work of someone like a surgeon or X-ray specialist. (T)
13. Vague and impressionistic pictures really have little appeal for me. (F)
14. If I were a scientist, it would bother me that my work would never be completed (because science will always make new discoveries). (F)
15. Before an examination, I feel much less anxious if I know how many questions there will be. (F)
16. The best part of working a jigsaw puzzle is putting in that last piece. (F)
17. Sometimes I rather enjoy going against the rules and doing things I'm not supposed to do. (T)
18. I don't like to work on a problem unless there is a possibility of coming out with a clear-cut and unambiguous answer. (F)
19. I like to fool around with new ideas, even if they turn out later to be a total waste of time. (T)
20. Perfect balance is the essence of all good composition. (F)

Note.—Items 1-16 are taken from Rydell and Rosen (1966) and are reproduced by permission from *Psychological Reports*. Items 17 and 18 are taken from the California Personality Inventory (Items 275 and 363; Gough, 1957) and are reproduced by special permission from the Consulting Psychologists Press. Items 19 and 20 are taken from Barron's Conformity Scale (Items 15 and 18; Barron, 1953) and are reproduced by permission from the Duke University Press.

*Test is scored for high ambiguity tolerance.

female undergraduate students at Cornell University. Also included were two items (275 and 363) taken from the California Personality Inventory (Items 17 and 18, Table 1), and two items (15 and 18) from Barron's (1953) conformity scale (Items 19 and 20, Table 1). Item analysis of the Rydell-Rosen test showed that all items correlated well with the total test score. Table 2 shows that the biserial correlations ranged from .21 to .70. The coefficient of internal consistency (split-half corrected by Spearman-Brown) was computed as .64.

TABLE 2
BISERIAL CORRELATIONS OF ITEMS TO TOTAL SCORES AND RELIABILITY ESTIMATES FOR THE RYDELL-ROSEN 16-ITEM AMBIGUITY TOLERANCE SCALE AND THE 20-ITEM REVISION (AT-20)

Items*	Item Correlation with Total Scores		Items*	Item Correlation with Total Scores	
	Rydell-Rosen 16-item Scale	20-item Revision (AT-20)		Rydell-Rosen 16-item Scale	20-item Revision (AT-20)
1	.70	.71	12	.21	.31
2	.57	.60	13	.48	.52
3	.57	.63	14	.67	.61
4	.33	.23	15	.69	.69
5	.26	.26	16	.62	.55
6	.52	.38	17		.50
7	.36	.53	18		.73
8	.60	.40	19		.63
9	.50	.62	20		.36
10	.50	.53	Reliability	.64*	.86†
11	.50	.45			.73‡

*Item content is specified in Table 1.

†Split-half corrected by Spearman-Brown.

‡Kuder-Richardson Formula 20.

In an effort to increase the reliability of the test, the two CPI and two Barron conformity items were added to the scores based upon the 16-item test, thus producing a 20-item test. Table 2 shows that the correlations of these items with the total score ranged from .36 to .73. The internal consistency estimate for the 20-item test was computed at .86, which represented a sizable increase above the .64 obtained for the 16-item test. Reliability for the 20-item scale was also computed using the more conservative estimate provided by the Kuder-Richardson Formula 20. The K-R 20 yielded an r of .73.

The 20-item ambiguity tolerance test (AT-20) was subsequently administered (primarily for cross-validated purposes) to 789 undergraduate students (in class) at Ithaca College. An r of .63 (K-R 20) was obtained on this group. The mean and standard deviation for the total group were 10.51 and 3.32 (males: 10.04, 3.38, $N = 341$, and females: 10.87, 3.23, $N = 448$).

To obtain a stability estimate, the AT-20 was administered to 24 male un-

dergraduate students. The interval between tests was 6 mo. The correlation between administrations was .63 ($p < .01$). The stability coefficient exceeded those obtained on the Rokeach Dogmatism Scale (Form E) (.45, $p < .05$) and the Gough-Sanford Rigidity Scale (.57, $p < .01$), which were also administered.

Validity

The hypothesis that ambiguity tolerance would be associated with level of performance in ambiguous tasks was tested on 50 (19 males and 31 females) advanced placement high school students at Cornell University.¹ Within a larger package of materials, Ss were administered the AT-20 and an anagram test (developed by the author). The Scrambled Words Test consists of a list of 20 common words whose letters have been scrambled. The words range from three to seven letters in length. Ss were assigned the task of unscrambling as many words as possible within a 3-min. time period. A significant correlation ($r = .33$, $p < .01$) was obtained between the scores on the AT-20 and the scores on the Scrambled Words Test.

In an effort to establish construct validity, the AT-20 was administered, along with measures of related concepts, to 789 (341 males and 448 females) undergraduates at Ithaca College. The forms were administered in class.² Rigidity (Gough-Sanford Rigidity Scale; Rokeach, 1960, p. 418) and Dogmatism (Form E; Rokeach, 1960) were measured along with ambiguity tolerance. To provide information on the extent to which these measures might be affected by social desirability response tendencies, the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960) was also administered to a sub-sample of 341 students (121 males and 220 females). In addition to these tests, information concerning frequency of church attendance was collected. Ss were asked to indicate how often they attended church services. Responses were placed upon a six-point scale (i.e., "once a week" through "rarely or never") with high scores being associated with frequent attendance. It was hypothesized that frequent church attendance would be associated with intolerance of ambiguity, dogmatism, and rigidity.

Data reported in Table 3 indicate that the AT-20, Rokeach Dogmatism Scale, and the Gough-Sanford Rigidity Scale are tapping a common dimension. AT-20 accounts for approximately 18% of the variance in the Dogmatism scores and about 17% of the variance in the Rigidity scores.

The hypothesized relationship between ambiguity tolerance, rigidity, and dogmatism was supported by the data. Significant correlations obtained among all measures. It is of some interest that the correlations between church attend-

¹The author would like to express his appreciation to Steve Berg for his assistance throughout all phases of this study.

²The author would like to thank the faculty and students of Ithaca College for their cooperation in this study. A note of special thanks is due Drs. Margaret Feldman and Lawrence O. Grant, who took especially active parts.

ance and AT-20 and the Gough-Sanford are approximately twice as large as that obtained between Dogmatism and church attendance. Also, the correlation between dogmatism and church attendance was significant for females but not for males.

Additional evidence of the relational fertility of the AT-20 was obtained from a sample of 90 male physical education majors at Ithaca College. A correlation of $-.30$ ($p < .01$) was found between Ss' scores on the 29-item F scale (Rokeach, 1960, p. 416) and the AT-20.

Inspection of the data presented in Table 3 shows that the AT-20 is free from social desirability response bias (as measured by the Marlowe-Crowne SDS) whereas small but significant correlations were found between the Marlowe-Crowne and the measures of dogmatism ($r = -.23$, $p < .01$) and rigidity ($r = .18$, $p < .01$). Incidentally, Becker and Dileo (1967) hypothesized that the Dogmatism and Marlowe-Crowne Scales would be correlated. Their hypothesis was not supported in their study of 216 undergraduate students. These data indicate that a small, but negative, correlation obtains between the two variables.

TABLE 3
INTERCORRELATIONS AMONG MEASURES OF AMBIGUITY TOLERANCE, DOGMATISM,
RIGIDITY, SOCIAL DESIRABILITY RESPONSE BIAS, AND CHURCH ATTENDANCE

	Dogmatism (Rokeach, Form E)†	Rigidity (Gough- Sanford)‡	Church Attend- ance§	Social Desirability Response Bias (Marlowe- Crowne) §
Ambiguity Tolerance (AT-20)ξ				
Total	-.42**	-.41**	-.24**	.02
Males	-.39**	-.42**	-.23**	.03
Females	-.42**	-.39**	-.28**	.01
Dogmatism				
Total		.36**	.13**	-.23**
Males		.37**	.08	-.25*
Females		.35**	.20**	-.19*
Rigidity				
Total			.26**	.18**
Males			.16**	.08
Females			.35**	.24**
Church Attendance				
Total				.21**
Males				.21*
Females				.19**

* $p < .05$. ** $p < .01$.

† $N = 698$ (301 males and 397 females).

‡ $N = 787$ (341 males and 446 females). Church attendance was indicated on a six-point scale ("once a week" through "rarely or never"). The higher the score the more frequent the church attendance.

§ $N = 784$ (337 males and 447 females).

¶ $N = 341$ (121 males and 220 females).

ξ $N = 789$ (341 males and 448 females).

DISCUSSION

This series of studies undertaken to investigate the properties of the Rydell-Rosen 16-item Ambiguity Tolerance Scale has led to revision of that scale. The inclusion of four additional items raised the split-half reliability coefficient from .64 to .86 (or .73, by K-R 20). Cross-validation of the 20-item scale (AT-20) yielded an r of .63 (by K-R 20) on a sample of 789 undergraduate students. Compared with other tests of ambiguity tolerance, this scale has shown reasonably good internal consistency.

The AT-20 demonstrated rather high retest reliability for a test interval of 6 mo. The stability coefficient of .63, obtained with a sample of 24 male physical education majors, is consistent with the .71 and .57 (1- and 2-mo. intervals, respectively) reported by Rydell and Rosen (1966) for their 16-item scale.

The possible contribution of the artifact of social desirability response tendency was explored by computing the correlation between the AT-20 and the Marlowe-Crowne SDS. The obtained coefficient of .02 indicates that the AT-20 is free of such response bias. The corresponding issue of response set was not explored and perhaps should be, in light of the fact that the numbers of items scored true and false are not balanced.

Evidence for construct validity is indicated by the support obtained for the hypotheses that (a) ambiguity tolerance is related to performance of ambiguous tasks (i.e., people with high tolerance tend to excel in such tasks) and (b) that intolerance of ambiguity is associated with frequent church attendance. Additional validation evidence was reflected in the significant correlations between the AT-20 and the Rokeach Dogmatism Scale (Form E), the Gough-Sanford Rigidity Scale, and the F Scale.

In view of the obtained findings it is concluded that the AT-20 shows promise of being a useful instrument for the measurement and further investigation of ambiguity tolerance.

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Accepted March 10, 1970.