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ABSTRACT

The Tolerance/Intolerance of Ambiguity literature is plagued by conceptual confusion and methodological inadequacies. In particular, formulations of the construct and the instruments constructed to measure it suffer from a number of faults, including (1) incomplete and logically inconsistent definitions, (2) confusion regarding the relation between Tolerance/Intolerance of Ambiguity and Rigidity, (3) test confounds such as verbal ability and reactivity, (4) problems of item interpretation due to their verbal nature, (5) low estimates of internal consistency, and (6) questionable construct validity.

In this study, a reconceptualization of Tolerance/Intolerance of Ambiguity was distinguished from the construct of Rigidity, and a non-verbal measure was developed which employs ambiguous figures as item stimuli and reaction statements as a response format for each item. Figural stimuli were utilized in order to circumvent confounding factors such as verbal ability, reactivity, and "fakeability." Analysis of 142 ambiguous figures yielded five categories which served as subscales of the test. After pilot testing and refinement, the psychometric properties of the resultant 30-item test, the Figural Measure of Ambiguity Tolerance (FMAT), were investigated by including it as part of battery of tests administered to high school, college, and university students (N=160). This battery included verbal and non-verbal tests of Authoritarianism, Intolerance of Ambiguity and Cognitive Ability chosen so as to allow for an evaluation of construct validity via examination of a Multi-Trait, Multi-Method correlation matrix. A second matrix, generated by adjusting for verbal and non-verbal Cognitive Ability, was also examined. In addition, a criterion-group referencing approach was used to examine construct validity.
The Figural Measure of Ambiguity Tolerance showed evidence of good internal consistency reliability at the subscale and total scale levels. The \textit{a priori} subscale structure was well-supported by factor-analytic results. Results of the validation portion of the study were inconclusive in that evidence of construct validity was minimal for all the measures involved. Given the limitations of previous conceptualizations and current verbal tests of Tolerance/Intolerance of Ambiguity, however, the results support the viability of this non-verbal measurement approach.
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I would like to dedicate this thesis, a poor substitute for poetry, to my mother, Irene Weir, with love.
CHAPTER I. INTRODUCTION AND BACKGROUND

The personality construct 'Intolerance of Ambiguity' was first formulated by Frenkel-Brunswik while working on a group of studies later published as The Authoritarian Personality (Adorno, Frenkel-Brunswik, Levinson and Sanford, 1950). In a number of followup studies, Frenkel-Brunswik elaborated her definition of the variable, discussed relevant findings and postulated the determinants of 'intolerance'. She first defined the variable as a "tendency to resort to black-white solutions, to arrive at premature closure as to valuative aspects, often at the neglect of reality, and to seek for unqualified overall acceptance or rejection of other people" (Frenkel-Brunswik, 1949, p.115).

Frenkel-Brunswik drew on psychoanalytic theory for an explanation of the mechanism behind Intolerance of Ambiguity. In brief, her postulation was that the antecedent conditions occurred in childhood, when the child is forced to suppress the negative feelings she has towards her parents in the face of strong parental sanctions against their expression. The child senses that her negative evaluations and feelings regarding her parents are unwanted, even dangerous, and comes to regard even private thoughts of such kind as threatening. Repression of these feelings takes place, leaving the child with only positive valuations of her parents and the authority and power they represent. This intolerance of emotional ambivalence generalizes to the child's cognitive functioning, characterizing her belief and attitude systems, her interpersonal and social functioning, her problem-solving behavior and her perception. (Frenkel-Brunswik, 1949, 1951, 1954).

The bulk of Frenkel-Brunswik's work on Intolerance of Ambiguity involved clinical and experimental research conducted with children who scored either
extremely high or extremely low on measures of ethnic prejudice. One example may suffice to give the flavour of the experimental research she conducted. Subjects were presented with a picture of a dog, followed by a series of pictures which together represented a gradual transformation of the dog into a cat. With each presentation, Ss were asked to identify the object on the given card. Although differences between the high- and low-ethnically prejudiced Ss were not always statistically significant, Frenkel-Brunswik observed that the prejudiced group tended to hold on longer to the initial object and to respond more slowly to the changing stimuli.

"There was greater reluctance in the prejudiced Ss to give up the original object about which one had felt relatively certain and a tendency not to see what did not harmonize with the first set as well as a shying away from transitional solutions. Once this perseveration was broken, there seemed to be in this group either a spell of haphazard guessing or a blocking by the uncertainties inherent in the solution" (1949, p.128).

On the basis of the results of her own studies, her extensive interview material and research conducted by co-workers on the same group of children, Frenkel-Brunswik concluded: 1) that Tolerance/Intolerance of Ambiguity generalized to the entire social, emotional and cognitive functioning of the individual as well as to the way in which the individual perceived the world, and 2) that Intolerance of Ambiguity was positively related to the authoritarian family of personality traits.

Much interest was generated by Frenkel-Brunswik’s endeavours and numerous attempts were then made to devise instruments or test-situations which could accurately measure the construct of Intolerance of Ambiguity. Kenny and
Ginsberg (1958) investigated aspects of the construct validity of 12 such tests by examining their correlations with each other and with a measure of authoritarian submission. Their findings were discouraging; of 66 obtained correlations, most were negligible and only 5 reached, or exceeded, $r = +.31$ (p.303). Kenny and Ginsberg concluded "in so far as the present measures may be regarded as relevant indicators...the results offer little support for a general construct of Intolerance of Ambiguity" (p.304). Bochner (1965) criticizes the Kenny and Ginsberg study on the grounds that their findings are in part attributable to the inadequate methodological and psychometric characteristics of the test examined. He argues that the measures included are not logically consistent operational definitions of Intolerance of Ambiguity and that the extremely skewed distributions they yielded are not amenable to correlational investigation.

Despite the general pall cast over the field by the Kenny and Ginsberg study, several researchers subsequently endeavoured to create measures of Intolerance of Ambiguity as a generalized construct which would be valid and reliable (Hamilton, 1957; Martin and Westie, 1959; Budner, 1962; Bochner, 1965; Rydell and Rosen, 1966; MacDonald, 1970; Norton, 1975). Often, in the attempt to operationalize and measure the construct, Frenkel-Brunswik's initial formulation has been altered, adapted or redefined. Although a number of these measures have been used widely and some continue to enjoy popularity with social science researchers, there is little evidence that any one of them is an adequately valid and reliable measure of Intolerance of Ambiguity (Budner, 1962; Kirton, 1981). Unfortunately, no close psychometric examination of these more current measurement attempts has been conducted. It will be instructive, however, and within the scope of this study, to examine one of them. The IA scale (Budner,
1962), being the instrument most often employed, is an appropriate choice.

A. BUDNER'S IA SCALE

Budner (1962) reformulated Frenkel-Brunswik's conception of the intolerance of ambiguity as "the tendency to perceive (i.e. interpret) ambiguous situations as sources of threat" and the tolerance of ambiguity as "the tendency to perceive ambiguous situations as desirable" (p.29). An ambiguous situation was seen as "one which cannot be adequately structured or categorized by the individual because of a lack of sufficient cues due to the novelty, complexity or insolubility of the situation" (p.30). Perception of ambiguity as a source of threat was seen as taking place on at least one of two levels ---the phenomenological (perceptions, evaluations and feelings) and the operative (behavior with reference to external environment)---in which the range of possible reactions can be divided roughly into submission or denial. Thus Budner based his measure on four types of reactions with respect to three categories of situation characteristics: Phenomenological Submission (anxiety and discomfort), Phenomenological Denial (repression and denial), Operative Submission (avoidance behavior) and Operative Denial (destructive or reconstructive behavior) with respect to the novelty, complexity or insolubility of the situation (p.30).

Initially, 33 items were chosen with the criterion being that each had to tap one of the four indicators of perceived threat. Respondents indicated their level of agreement or disagreement on a 7-point Likert-type scale. Following a pre-test on three samples of university students (Ns=35,37,45), each item was analyzed for each sample using a tetrachoric correlation procedure. Using a criterion of .35 or higher, the 33 items were reduced to 10 positively worded
and 8 negatively worded items. Two positive items were dropped in order to achieve a balanced instrument (see attached copy of instrument, Appendix A). Budner abandoned his 4 (types of reactions) by 3 (categories of situation characteristics) underlying structural grid because there was an uneven distribution of items (6 cells were left empty) and because he was unsure of the placement of some of the items. In his evaluation of the reliability and validity of the test, he used only total scores.

The IA scale may serve as a representative example of the measures of Intolerance of Ambiguity which are currently used in the field (Martin and Westie, 1959; Rydell and Rosen, 1966; MacDonald, 1970; and Norton, 1975) in that 1) the construction and content of the items bears a striking similarity to items in other popular tests and 2) the presentation and scoring procedures are essentially the same (see Appendices B, C, D and E).

Compare, for example, Budner's item #1:

"An expert who doesn't come up with a definite answer probably doesn't know too much" (rating scale response)

with Martin and Westie's item #3:

"A person either knows the answer to a question or he doesn't" (rating scale response)

and Budner's item #2:

"There is really no such thing as a problem that can't be solved"

with Rydell and Rosen's item #7:
"Practically every problem has a solution" (true/false response)

and with Norton's item #1:

"Almost every problem has a solution" (rating scale response).

It should be noted that MacDonald's scale is a revision of Rydell and Rosen's in that he added four new items to the end of their 16-item scale, retaining the 'true/false' response format. In turn, Norton began with MacDonald's scale and, finding it had a low estimate of internal consistency (KR-20 of .49), first adopted a rating scale response format and then added new items, some of which are taken from Martin and Westie's and from Budner's scales and some which were rephrasings of already included items. As well, Norton (1975) based the content analysis of the items in his scale directly on Budner's conceptualization of the construct.

One may make the tentative assumption, then, that the methodological and psychometric flaws of the IA scale reflect those of other measures it resembles. Although such data is scarce the little evidence there is casts some doubt on the validity and reliability of the IA Scale as an adequate measure of Intolerance of Ambiguity. For example:

1) It has been found to have low estimates of internal consistency. Kirton (1981) reported a KR-20 of .49, Dollinger (1984) reported a Cronbach's alpha of .56 and Budner (1962) himself reported an average reliability estimate of .49 (Cronbach' alpha) across 14 samples (p.34).

2) The IA scale has validity deficits, in that it has been found to correlate only marginally with other tests of Intolerance of Ambiguity (Budner, 1962; Norton, 1975 and Kirton, 1981) and in a marginal and inconsistent
manner with measures of theoretically-related constructs such as Authoritarianism, conservatism, Rigidity, dogmatism and inflexibility (Budner, 1962; Vannoy, 1965; Norton, 1975; Kirton, 1981; Rump & Walker, 1982; Leak, 1984).

3) Many items in the IA scale seem problematic grammatically, lexically and semantically. Sentence construction is complicated; words and phrases used are often either advanced or colloquial, and the meaning of items is often obfuscated by the use of indefinite qualifiers (for example, Item #6: "A person who leads an even, regular life in which few surprises or unexpected happenings arise, really has a lot to be grateful for." (See Appendix A).

4) The IA scale has been found to be negatively correlated to measures of verbal ability (Vannoy, 1965; Domangue, 1978; Tatzel, 1980; Rotter & O'Connell, 1982; Sypher & Applegate, 1982). Although some writers (Gallagher, 1964; Vannoy, 1965) have postulated that ambiguity-intolerant individuals will necessarily be less expressive and hence less verbally fluent than ambiguity-tolerant individuals, this has never been adequately tested. The possibility exists that the verbal element may seriously confound the measurement of the construct when a verbal test is used. The use of a non-verbal measure of Intolerance of Ambiguity would circumvent this problem and allow for a more clear-cut examination of the relation between verbal ability and Intolerance of Ambiguity.

B. CONCEPTIONALIZATIONS OF INTOLERANCE OF AMBIGUITY

In a later paper, Frenkel-Brunswik (1954), presented a more detailed definition of Intolerance of Ambiguity as a personality variable. She first clarified what was meant by 'ambiguity': "it was not intended to indicate undesirable
aspects of cognition, such as confusion or inarticulate vagueness; rather it was to stand for the complexity and differentiation which is an essential aspect of the creative process" (p.246). She then defined Intolerance of Ambiguity as having the following characteristics:

"...undue preference for symmetry, familiarity, definiteness and regularity; tendency toward black-white solutions, over-simplified dichotomizing, unqualified either-or solutions, premature closure, perseveration and stereotypy; a tendency toward excessively 'good' form (that is, excessive Pragnanz of Gestalt organization), achieved either by diffuse globality or by over-emphasis on concrete detail; compartmentalization, stimulus-boundness; avoidance of uncertainty as accomplished by the narrowing of meanings, by inaccessibility to experience, by mechanical repetition of sets, or by a segmentary randomness and an absolutizing of those aspects of reality which have been preserved" (p.247).

In the attempt to operationalize and measure the construct of Intolerance of Ambiguity, Frenkel-Brunswik’s formulation has often been altered, adapted or redefined.

As well as recasting the construct, Budner (1962), sought to place it within a more general framework. He began by stating his bias: persons are most profitably viewed not historically, but in cross-section, that is, in terms of their attributes at any given point in time. This represented a clear break with Frenkel-Brunswik, who, with her psychoanalytic background, viewed persons more in terms of the events which have made them what they are. Budner then outlined the five basic elements brought by the individual to the process of adaptation to his internal and external environments, the means with which all human beings cope.
These are the individual's:

1) hierarchy of values and goals
2) diversity and quality of personal resources (e.g. health, intelligence, skills).
3) conceptions of reality, both
   i) the nature of the situation facing one, and
   ii) what must be done to contend with it.
4) self-image.
5) idiosyncratic pattern of adaptive or coping mechanisms.

Given this framework, Budner saw Intolerance of Ambiguity as belonging only to one's hierarchy of values; ambiguity as a "goal which individuals seek to gain, avoid or to which they are indifferent" (p.31). Accordingly, Intolerance of Ambiguity does not fit into the categories of resources, conceptions of reality, self-image or coping mechanisms.

Although Budner's attempt to define Intolerance of Ambiguity and to fit it into a more general framework is, at times, penetrating, it is also contradictory and problematic. As Kirton (1981) has pointed out, the positive pole of the construct was not elaborated by Budner and the use of the word 'desirable' poses certain problems of meaning. More serious flaws can be seen however, if one looks at the definition at the opposite end, that is, ambiguity as "the tendency to perceive ambiguous situations as sources of threat" (p.29). To perceive ambiguity as threatening implies that one has a certain conception of reality, specifically concerning the nature of the situation one is confronted with. To react to this perceived threat with either submission or denial likewise implies a conception of reality, this time in terms of what must be done in order to contend with it. Finally, use of either method to deal with the various instances
of perceived threat suggests an idiosyncratic pattern of adaptive or coping mechanisms. Thus, while Budner explicitly claims that Intolerance of Ambiguity belongs solely to the category of a hierarchy of values and goals, his own definition seems to place it into other categories as well, such as 'conceptions of reality' and 'pattern of coping mechanisms'. Arguments to place it into the categories of 'resources' and 'self-image' could also be made.

Rydell & Rosen (1966) examined Intolerance of Ambiguity in terms of its relation to 'need-cognition' (the need to know or understand). Unfortunately, their conceptualization of Intolerance of Ambiguity is bound to that of need-cognition and difficult to extricate from it. They postulate, for example, that the individual with a high need-cognition will be attracted to an ambiguous situation only to the extent that it can be analyzed and restructured; lack of closure can be permitted only long enough to effect this end. This is only true, however, for the individual who is both of high need-cognition and high ambiguity-tolerance; motivation for ultimate closure or resolution is lacking in the individual who has only the latter characteristic (p.149). It remains unclear, however, why high need-cognition 'over-rides' high tolerance of ambiguity when present in the same individual and what the nature of the interaction would be for other combinations. Perhaps a more serious deficiency of Rydell & Rosen's conceptualization is the absence of any treatment of the defining characteristics of individuals who respond to ambiguity with great intolerance.

Although MacDonald (1970) chose to adopt and augment Rydell & Rosen's scale for use in his reliability and validity study of Intolerance of Ambiguity, he based his operational definition on aspects of Budner's formulation. In particular, the ambiguity-intolerant person was seen as one who has a general tendency to
perceive ambiguous material or situations as threatening, whereas the tolerant person would tend to perceive ambiguity as desirable. MacDonald elaborated the latter, stating that "persons having high tolerance of ambiguity: a) seek out ambiguity b) enjoy ambiguity and c) excel in the performance of ambiguous tasks" (p.791). One problem with this formulation is that it equates desire with tolerance; wanting ambiguity is clearly not the same as enduring it.

The most recent attempt to redefine, operationalize and measure the construct of Intolerance of Ambiguity was undertaken by Norton (1975). He was particularly methodical, arriving at a definition of Intolerance of Ambiguity by first performing a content-analysis of all the articles dealing with ambiguity referenced in Psychological Abstracts from 1933 to 1970 and then combining the results with a definition of intolerance taken from the Encyclopedia of Psychology (Eysenck, Arnold & Meili, 1972). For Norton, then, the construct of Intolerance of Ambiguity was seen as "...a tendency to perceive or interpret information marked by vague, incomplete, fragmented, multiple, probable, unstructured, uncertain, inconsistent, contrary, contradictory or unclear meanings as actual or potential sources of psychological discomfort or threat" (p.608). Once again, however, the definition is incomplete; Norton did not elucidate what is meant by tolerance of ambiguity.

Although many attempts have been made to conceptualize the construct of Intolerance of Ambiguity, no logically-consistent, fully-articulated formulation has yet been articulated. For the purposes of this study, a formulation of Intolerance of Ambiguity will be presented which seeks to integrate what is seen as the best aspects of these prior attempts.
C. TOWARDS A NEW CONCEPTUALIZATION OF THE CONSTRUCT

In order to build towards a new conceptualization of Tolerance of Ambiguity, it is important to be systematic and to retain what is valuable from previous work. Thus, the results of Norton’s content analysis of the articles dealing with ambiguity is a good starting point. Of 125 uses of the term 'ambiguous', he found that eight categories emerged. Along with the percentage of uses in each category, these are: 1) Multiple Meanings (28%); 2) Vagueness, Incompleteness, Fragmented (18%); 3) As a Probability (12%); 4) Unstructured (10%); 5) Lack of Information (9%); 6) Uncertainty (a consequence of a situation, event, interaction etc.) (9%); 7) Inconsistencies, Contradictions, Contraries (8%) and 8) Unclear Meanings (5%) (Norton, 1975; p.608).

Allowing that a criticism of Norton’s approach is that he has taken a post hoc, empirical route to a relevant definition of ambiguity, it can also be said that in casting a wide net, he may have arrived at a comprehensive definition. Given these characteristics of ambiguity, his definition of Intolerance of Ambiguity becomes 'the tendency to perceive (interpret) ambiguous information as actual or potential sources of psychological discomfort or threat.' The meaning of this statement can be examined profitably using the Budner’s general outline of what individuals bring to the adaptive process. That is, the tendency to perceive ambiguity as a threat can be examined with respect to three of Budner’s categories, namely values and goals, conceptions of reality and self-image.

One notes a certain salient feature (ambiguity) of a situation or stimulus and evaluates that feature negatively. This conception and evaluation is inextricably tied to one's self-image and one's hierarchy of values and goals. Due to the life experiences which shape one's hierarchy of values and goals,
ambiguity has no positive place among them; conversely, the unequivocal has
great value. Furthermore, ambiguity is perceived as threatening because one
judges one's ability to deal with it as inadequate. The bulk of Frenkel-Brunswik's
theoretical work can be seen as dealing with the historical aspects of this, the
determinants of such a hierarchy of values and goals, and of such a self-image.

One of the difficulties with Norton's definition is that it does not
operationalize Intolerance of Ambiguity. This is important, of course, because a
person's perception or interpretation of ambiguity cannot be accessed directly. The
definition simply outlines the intra-psychic 'evaluative' component and not the
concomitant response. Some behavior or other, in the broad sense of the word,
must be observed from which we can infer the inner process. Frenkel-Brunswik's
definition of Intolerance of Ambiguity, on the other hand, is more elaborated, in
that she outlined responses characteristic of the inner process and evaluation.
Expressed preference for symmetry, familiarity, black-white, etc. are seen as
behaviors which are markers of Intolerance of Ambiguity; their presence implies
or demonstrates intolerance. In a more roundabout way, Budner also attempted
to deal with the issue of behavioral markers, first by outlining the four types of
possible responses and the three types of situation characteristics and then by
creating items to fill the resultant 12-cell structure. He assumed that repression,
denial, destructive or reconstructive behavior, avoidance, anxiety and discomfort,
as intolerant reactions to ambiguity, could be inferred from the rating-scale
responses to his test. Unfortunately, in the final version of his test he was
forced to abandon his 12-cell structure due to lack of appropriate items,
rendering the scales' potential for tapping behavioral markers greatly reduced.
Thus, whereas Norton's elaboration of the Intolerance of Ambiguity construct falls
short of operationalization, Frenkel-Brunswik and Budner strove to make explicit the link between the inner process and its behavioral manifestations. What is still missing from their elaborations, however, is an explicit definition of tolerance of ambiguity and its hallmark behaviors.

The pertinent dictionary definition of the word 'tolerate' is "to endure, permit (a practice, action, person's doing); to sustain, endure, (suffering, etc.) without harm" (Concise Oxford Dictionary, Fowler & Fowler, 1964). Perhaps an elaboration of tolerance of ambiguity can begin with this—-the tolerant individual is able to endure (permit, sustain) exposure to ambiguity without psychological harm, distress or discomfort. The question then arises: 'How long can the tolerant individual endure ambiguity? Temporarily? Indefinitely?' Framing an answer first requires an examination of the phenomena of ambiguity in everyday life.

The accepted definition (from Norton) describes ambiguous information as that being marked by "vague, incomplete, fragmented, multiple, probable, unstructured, uncertain, inconsistent, contrary, contradictory or unclear meanings" (p.608). Ambiguity, then, refers to situations and stimuli which present no readily accessible interpretations or meaning, ranging from those which are not easily interpretable to those which are almost uninterpretable. In a real sense this describes the bulk of situations and information which human beings are confronted with throughout their life-span. Thus, ambiguity can be seen to be a common feature of human life. The world presents to the individual a multiplicity of things to be perceived and sensed, 'bundles' of information, all of which run

† Note that 'information', 'meaning' and therefore 'ambiguity' are human linguistic constructions and can not be inherent in a thing-in-itself. At times it may seem as if this is being implied, however, it is only a convenient communication device.
the gamut of interpretability. In order to survive, the individual must make some sense of this information; he must edit, select, restructure, ignore, impose order on and, in other ways, interpret. Human beings need to be able to reduce each and every instance of apprehended information, marked by ambiguity, so as to render life more predictable, organized and comprehensible, and to allow one to develop and maintain a sense of continuity. Each instance of interpretation entails the exclusion of some information and the restructuring of some aspects which are retained. Often one interpretation out of many possible interpretations emerges to dominate the meaning ascribed to the information, but not always. Accordingly the scenario is this: the individual is presented with a confusing stream of ambiguous information which must be made comprehensible; in a sense, survival will entail the reduction and resolution of ambiguity to a point which can be tolerated and utilized by the individual.

Despite the development of the individual, the increasing cognitive organization and ability to deal with ambiguity, it does not, in effect, go away. Indeed, the increased perceptiveness concomitant with cognitive development likely increases the amount of ambiguous information which then needs to be processed. As a dominant characteristic of apprehended information, ambiguity remains.

As a result of different native abilities and developmental experiences, individuals will vary in their ability to put off closure or resolution. This variability can be construed as a continuum of relative tolerance to relative intolerance. Thus, the ambiguity-tolerant person can be thought of as one who can 'live with' the ambiguity of a situation longer than the ambiguity-intolerant individual, and is able to bring about a closure or resolution (arrive at an interpretation) which is more sophisticated and reality-based. The intolerant person
effects closure or resolution of the ambiguous situation sooner and therefore often at the neglect of certain important aspects of reality.

It seems clear that general intolerance of ambiguity would be a handicap of a kind and so is a less desirable trait. For example, even in a situation where a swift decisiveness is important the ambiguity-tolerant individual would be more effective than his opposite, all other things being equal. He does not desire or relish ambiguity and so is not bound to prolong it, rather he is able to resolve it more effectively, with fewer distortions and with less internal pressures operating to force a resolution. There is little research available to shed light on this directly; however, in one study (Harrington, Block & Block, 1978) early intolerance of ambiguity in seven-year-old boys was related to general anxiety, structure-seeking behaviors and less effective cognitive functioning. In girls of the same age, intolerance was primarily related to "a pattern of highly stable peer relationships in which the girls played nonassertive roles" (p.242).

There may be some instances where the tolerant person can let ambiguity stand, can enjoy it and find it interesting or stimulating. However, he would not likely find it desirable as the dominant feature of his experience. The tolerant person may also choose to let ambiguity stand, to deal with it by seeing it as a stimulus or situation which has contradictory properties (cf. the drawings of M. C. Escher), in this way simply meaningful as an instance of ambiguity. Thus, even his tolerance of ambiguity is not uniform. Similarly, the ambiguity-intolerant individual may be less intolerant in some areas than in others depending on the content-domain, degree of importance, and numerous other factors. Tolerance of Ambiguity as a generalized construct, then, may only be measureable to the extent that it is not overly domain-specific.
To determine the antecedents of Tolerance of Ambiguity is to answer the question of how native ability and/or development account for the variability of persons’ capacity to endure ambiguity. Frenkel-Brunswik, of course, makes the case that this variability can be traced to early childhood experiences----intolerance, in particular, to the exposure of the child to strong parental sanctions against emotional ambivalence and ambiguity in general. In the extreme, such parents foist their dogmatic beliefs, stereotyped categorizations and rigidly dichotomized world-view on their children and brook no objections to their authoritarian rule. At the opposite pole, the ambiguity-tolerant individual’s childhood will more likely be marked by warmer, closer and more affectionate relations with the parents, a greater overall acceptance of the child; a more ‘democratically-run’ household, with an emphasis on negotiation and explanation rather than rule-boundness, and a more ’liberal’ outlook in general. To date, Frenkel-Brunswik’s work in this area stands out and stands alone. Although there have been no serious challenges to her theory, it cannot be said that it is widely endorsed; most researchers make passing reference to it or ignore it entirely. Perhaps the conceptual issues surrounding the construct of Intolerance of Ambiguity have made more immediate demands in the field than the theoretical issues concerning its determinants. Indeed, it is difficult to imagine how progress in any other direction can be made until the conceptualization of the construct is more clear.
D. SUMMARY AND OPERATIONAL DEFINITION

Previous definitions and conceptualizations of the construct of Intolerance of Ambiguity have been flawed by incompleteness, inconsistency and a lack of elaboration. The attempt was made to arrive at a logically-consistent, complete formulation of the construct which would incorporate aspects of this previous work.

The resultant conceptualization is as follows:

**Ambiguous** describes information, arising out of a situation or stimulus, whose meaning is indeterminate due to vagueness, incompleteness, fragmentation, lack of structure, inconsistency, contrariness, contradiction, lack of clarity or equivocality. In a sense, this is true of all information. Ambiguity, then, is a relative characteristic, that is, information may be apprehended as more or less complete, fragmented, structured etc. Typically, information is labelled ambiguous when there is a consensus among perceivers that no one interpretation can be readily made.

**Tolerance of Ambiguity** refers to an individual's tendency to perceive or interpret ambiguous information in a particular way as inferred by characteristic responses as outlined below.

The **ambiguity-intolerant** individual will tend to perceive or interpret ambiguity as an actual or potential source of psychological discomfort or threat. This will provoke responses such as: 1) anxiety 2) negative valuation of the ambiguous stimulus 3) avoidance behavior 4) seeking a premature resolution of the ambiguity by way of unqualified or over-simplified restructuring which neglects significant aspects of reality.

The **ambiguity-tolerant** individual will tend not to perceive or interpret
ambiguity as a source of psychological discomfort or threat and will tend not to respond to ambiguity in the ways listed above. This individual may still find ambiguity arousing, but not to the degree that is uncomfortable; will be more likely to evaluate the ambiguous stimulus as neutral or positive; will not seek to avoid ambiguity or resolve it prematurely.

The construct Tolerance of Ambiguity is seen as incorporating both an evaluative tendency and a concomitant coping mechanism of an individual.

E. RIGIDITY AND INTOLERANCE OF AMBIGUITY

Historically, Rigidity and Intolerance of Ambiguity have been conceptually confounded due to the lack of agreement of definitions for the two constructs. Although a diversity of psychological terms has been used to refer to Rigidity, such as constriction, inhibition, premature closure, conservatism, dogmatism, anality, compulsiveness and Intolerance of Ambiguity, most conceptualizations have centered on perseveration as the defining characteristic. Examples of such definitions of Rigidity include those of Goldstein (1943): "adherence to a present performance in an inadequate way," Werner (1946): "lack of variability of response," Rokeach (1948): "the inability to change one's set when the objective conditions demand it," Buss (1952): "resistance to shifting from old to new discriminations," Cattell and Tiner (1949): "the difficulty with which old established habits may be changed in the presence of new demands," and Wesley (1953): "tendency to persist in responses that may previously have been suitable in some situation or other but that no longer appear adequate to achieve current goals or to solve current problems." Chown (1959), who reviewed the early, ground-breaking work in the field, stated "Rigidity has been used to describe
behaviours characterized by the inability to change habits, sets, attitudes and discriminations" (p.195). Perhaps an elaborated definition can be constituted by adding to this statement the notion that this inability or reluctance persists even in the face of situational demands which require change.

Research regarding the determinants of Rigidity has been equally controversial. A more recent reviewer of the literature (Leach, 1967) traced the study of Rigidity from its inception as a neurologically determined peculiarity of perception, through initial attempts to link perceptual and social Rigidity as defences against ego-involving stimuli, to the contemporary view of Rigidity "as a manifestation of basic personality variables, observable in the cognitive and social fields, as well as in perception" (p.11).

In the midst of all the conceptual and definitional wranglings concerning Rigidity, the distinction between it and Intolerance of Ambiguity has often been blurred, if not entirely lost. Intolerance of ambiguity has been seen as a component of Rigidity (Rehfish, 1958), as a descriptive term for Rigidity (Leach, 1967) and as synonymous with Rigidity (Chown, 1959 and Eysenck, 1954). Perhaps the origins of this confusion can be traced to Frenkel-Brunswik herself, who did not distinguish between the two concepts and whose experimental studies focused on aspects of perception which had theretofore been associated with Rigidity (eg. perseveration and premature closure). It has been left to subsequent researchers of Intolerance of Ambiguity to struggle with this issue.

Hamilton (1957) noted that while aspects of Frenkel-Brunswik's definition---such as the inability to think in terms of probability and the mechanical repetition of sets---served to reduce Intolerance of Ambiguity to a variant of Rigidity, reports of low correlations between measures of Intolerance of
Ambiguity and perceptual and conceptual Rigidity (Eysenck, 1954) suggested otherwise. Hamilton concluded that "any obvious similarities between these two constructs may be only a function of definition and experimental technique" (p.200). Budner (1962), whose formulation of Intolerance of Ambiguity is outlined above, distinguished it from Rigidity by referring to the former as a content characteristic of the individual and the latter as a formal characteristic of the individual. He saw Intolerance of Ambiguity as a "tendency to evaluate phenomena in a particular way" and ambiguity itself as a goal which individuals find desirable or undesirable. This in contrast to Rigidity, which he viewed as an aspect of coping behavior, as a "tendency to manifest certain modes of response irrespective of the phenomena being dealt with" (p.31). MacDonald (1970) concurred with Budner, maintaining that Intolerance of Ambiguity and Rigidity are theoretically and empirically separate. He clarified the distinction with an example: the rigid person and the intolerant person, both anxious for closure, choose a readily available answer to a certain question. Faced with empirical evidence to the contrary, the rigid person clings to the original response, whereas the intolerant person is more likely to replace the first response with another, even though it will be arrived at in a similar fashion as the first. The two characteristics, then, need not necessarily be found together in an individual, although this may often be the case.

The conceptualization of Tolerance of Ambiguity used in this study differs from Budner's in that it is seen as both a content and a formal characteristic of the individual. Thus, Budner's distinction between it and Rigidity is no longer a useful one. MacDonald's clarifying illustration is still applicable, however, in that Rigidity and Intolerance of Ambiguity, both aspects of coping behavior and
related to one another, denote different characteristic responses. Rigidity (as perseveration) denotes an inability to change sets and can only be observed by inter-relating successive responses to similar situations. Furthermore, a number of concrete aspects of the responses must be the same or similar for Rigidity to be inferred, hence the common use of the Luchins water-jar test situations as an operational measure of Rigidity (Luchins, 1942). (The first five water-jar problems can be solved by one method only; thus a 'set' is established. The remaining problems serve to delineate the individual's perseveration with respect to this established set). This contrasts with Intolerance of Ambiguity, which denotes a similarity of responses only in terms of their outcome or effect, and which can be inferred from reactions to quite dissimilar situations. Once again, the possible existence of flexibility is implied in the ambiguity-intolerant person; he can resolve the ambiguity of a situation in diverse ways, need not consistently use the same methods and can respond to information which renders previous resolutions inadequate. The obvious distinction between Rigidity and Intolerance of Ambiguity should also be mentioned here: Intolerance of Ambiguity refers specifically to responses to information characterized by ambiguity, whereas Rigidity does not. The Luchins water-jar test, for example, presents a relatively unambiguous task to a subject.

F. SUMMARY

Tolerance/intolerance of Ambiguity was first conceptualized and studied by Frenkel-Brunswik, who concluded that the construct: 1) generalized to the entire social, emotional, perceptual and cognitive functioning of the individual and, 2) related positively to the Authoritarian family of traits.
Although much research has been conducted on Intolerance of Ambiguity, the literature reveals evidence of conceptual confusion and methodological inadequacies. In particular, previous formulations and the instruments constructed to measure it have suffered from a number of faults, including 1) incomplete and logically inconsistent operational definitions, 2) confusion regarding the relation between Intolerance of Ambiguity and Rigidity, 3) possible test confounds such as verbal ability and reactivity, 4) low estimates of internal consistency, and 5) weak evidence of construct validity.

It was shown that measures of Intolerance of Ambiguity which are currently used in the field have many shared features (Martin & Westie, 1959; Budner, 1962; Rydell & Rosen, 1966; MacDonald, 1970; Norton, 1975). In all of these popular tests: 1) the construction and content of the items bear a striking similarity to one another, 2) the presentation and scoring procedures are essentially the same, and 3) mature respondents are the apparent target populations; both the content and form of the items are aimed at subjects of advanced verbal ability and adult life experience. All currently extant tests are verbal measures, much affected by various response biases, differential verbal ability, transparency and reactivity. These confounding difficulties may account for research outcomes which indicate that these most widely-used instruments have serious psychometric flaws.

In this chapter, the attempt was made to arrive at a logically consistent, complete formulation of Tolerance of Ambiguity which incorporates aspects of previous conceptual work. Subsequent discussion highlighted the distinction between Tolerance of Ambiguity and the personality construct Rigidity.
A. RECENT RESEARCH INTEREST

Despite the numerous attempts of researchers to clarify and measure operationally the construct of Intolerance of Ambiguity, it has been shown above that previous formulations have been flawed and that previous instruments have not been wholly satisfactory. The validity and utility of social science investigations which employ these scales may be jeopardized, as a consequence. Nevertheless, much diverse substantive research continues to be done in the areas of educational, personality, social, developmental, counselling and clinical psychology, using the existing verbal measures. For example, the five instruments reviewed in Chapter I have been recently used to investigate Intolerance of Ambiguity with respect to cognitive complexity (Vannoy, 1965; Heck & Lichtenberg, 1977; Domangue, 1978; Sypher & Applegate, 1982 and Klemmack & Roff, 1983), interpersonal attraction (Crandall, 1971), counsellor training (Chasnoff, 1976), deafness (Chen, 1977), life status (Raphael & Chasen, 1980), career choice (Tatzel, 1980), religious conversion (Ullman, 1982 and Aidala, 1985), conservatism (Rump & Walker, 1982), sex-role orientation (Rotter & O'Connell, 1982), leadership behavior (Pratt & Jiambalvo, 1982), Authoritarianism (Rigby & Rump, 1982 and Singh, Sinha & Kumari, 1985), hindsight bias (Campbell & Tesser, 1983), information-seeking behavior (McPherson, 1983), self-actualization (Leak, 1984 and Jones & Crandall, 1986), cognitive styles, abilities and aptitudes (Federico & Landis, 1984), brainstorming tasks (Comadena, 1984), motivation (Butler & Womer, 1985), self-righteousness (Falbo & Belk, 1985), person-environment congruence (Paragament, Johnson, Echmedea & Silverman,
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1985), and androgyny (Anderson, 1986). Budner's IA Scale is, by far, the most popular measure of Intolerance of Ambiguity (19 out of the above 32 studies used it). Other researchers have chosen to adapt these measures or to fashion their own (for example, Singer & Flavell, 1981; Heilbrun, 1983; Ashford & Cummings, 1985; Forgas & Bond, 1985 and Bhusan & Amal, 1986).

Research concerning the role that Tolerance of Ambiguity can play in an educational setting necessarily covers a wide range of topics. The relation between Tolerance of Ambiguity and such educational subjects as problem-solving behavior (Lesser & Hlavacek, 1977), computer-assisted learning (McMahan, Anderson & Barton, 1977 and Chapelle & Jamieson, 1986), training effects (Bruhn, Floyd & Bunce, 1978), students’ course assessments (Ross & Houtz, 1979), writing apprehension (Daly & Wilson, 1983), teacher’s expectations of student performance (Tom, Cooper & McGraw, 1984), ESL proficiency (Chapelle & Roberts, 1985), creativity (Richardson, 1985), crystallized and fluid intelligence (Federico, 1986), formal reasoning (Hooper; Hooper, Colbert & McMahan, 1986), and career development (Leong, 1988) have been recently investigated. The bulk of educational research dealing with Tolerance of Ambiguity, however, has been concerned with secondary or post-secondary students. This is most likely not a reflection of researchers' lack of interest in younger students, but of the lack of an appropriate, standardized measurement approach. All of the Tolerance of Ambiguity scales in common use are, as noted above, constructed with mature respondents in mind; both the content and the form of their items are aimed at subjects of advanced verbal ability and adult life experience. What is needed, therefore, is a test which has the capability of being used with intermediate or even elementary-school respondents, so as to facilitate appropriate educational
research with younger students.

On a broader level, the classroom teacher and pupil are engaged in a mutual pursuit of kinds of knowledge, which, by their very nature, are not ultimately unequivocal. For many years, for example, it has been widely recognized that the study of history is not so much the study of what actually happened, but what is said to have happened, the perspective of the person generating the 'facts' and his or her biases being all-important. Along more psychological lines, the idea that each person 'creates' his or her own reality is also changing the study of history as well as many other art and science disciplines. An even more pervasive and powerful effect is being felt in all disciplines by the ramifications of the general principle of relativity, in the form which states that all experimental and physical events have meaning only with respect to their relationships to other events. Thus, from a broader relativistic perspective, no event has an intrinsic meaning independent of other events or of a general framework within which it may be viewed. This is currently leading to a transformation of school curriculum and teaching approaches, as the attempt is made to allow for the existence of multiple and 'plastic' facts. In another way, too, elementary and high-school education is being transformed, particularly in North America, by the increasing importance and emphasis of pluralism, seen in the study of world religions, mythologies, cultures and all other social constructions.

It is for these reasons and many others that the examination of an individual's basic response to ambiguity is important now in educational research and why it will grow in importance in years to come. A proper formulation of Tolerance of Ambiguity is prerequisite to a proper measurement of the construct;
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as measurement is a prerequisite to the determination of possible change.

B. STATEMENT OF THE PROBLEM

The attempt to develop a new measure of Tolerance of Ambiguity is justified by the failure of current tests to display adequate psychometric properties and methodological consistency, and to be operational expressions of inconsistent or incomplete conceptualizations of the construct. A measurement instrument constructed so as to be relatively free of former test confounds and bias problems, and to be suitable for use with younger subjects, would fill a space in the storehouse of research tools available to educational and psychological researchers and allow for a more cohesive investigation of the construct Tolerance of Ambiguity.

The present study involved the construction, pilot-testing, refinement and initial psychometric evaluation of a new measure of Tolerance of Ambiguity, based on the reconceptualization of the construct outlined above. Specifically, a 30-item, paper-and-pencil, self-administered test was developed using items not principally verbal in nature. The instrument (to be referred to as the 'Figural Measure of Ambiguity' or FMAT) was made up of items involving one or more representational or non-representational figures which are ambiguous. Three types of response formats assessed at the pilot-test level yielded a final format which employs 'agreeableness/disagreeableness' reaction statements. Throughout the development of the FMAT, five different types of ambiguous figures served as subscales for the test (refer to 'Method' section for identifications).

The construct validation phase of the study required a design having the potential a) to assess the association between a figural and a verbal approach to
the measurement of Intolerance of Ambiguity, b) to distinguish between Intolerance of Ambiguity measures and those of other constructs, c) to account for the extent of method variance in measures of Intolerance of Ambiguity and related constructs, d) to relate the Intolerance of Ambiguity measures to measures of a hypothetically-related construct, and e) to assess the impact of verbal ability as a test confound. A Multi-Trait, Multi-Method approach (Campbell & Fiske, 1959) was the design of choice.

C. RATIONALE

A figural approach to the measurement of Tolerance of Ambiguity has been chosen in order to address problems arising from the use of methods. The presentation of ambiguity, in particular, may be more easily standardized through the use of figural forms than through verbal descriptions, as the latter requires an additional step of cognitive processing. That is, with a figural approach the response referent is the visual stimulus on the page, whereas with a verbal statement the response referent is derived from the product of the cognitive processing of the verbal statement on the page.

A figural test of this kind, with well-established reliability and validity, would have numerous advantages over existing verbal measures. The absence of verbal ability as a confounding factor would result in a reduction of social desirability response bias. With a figural test, a respondent's level of verbal sophistication would not contribute to an ability to 'see through' to the investigator's intent. Thus, the decreased transparency of the test's purpose will serve to ensure that indications along the continuum of Tolerance/Intolerance of Ambiguity reflect reality rather than artifacts of measurement. Furthermore,
figural stimuli should increase the likelihood that less verbally sophisticated subjects understand items well enough to respond to them meaningfully; this would allow for applicability of the instrument to a wider range of populations. A figural test also has the potential for reducing acquiescence response bias inherent in the very nature of verbal attitude measures (Jackson and Messick, 1957). Finally, the problem of reactivity may be handled more adequately by a figural test, especially when care is taken to select emotionally neutral stimuli.
CHAPTER III. METHOD

In this study, a measurement instrument was developed, based on the formulation of Tolerance of Ambiguity given in Chapter 2. The instrument employed figural stimuli rather than verbal statements as item stems. Three pilot versions were created using identical sets of 80 figures with different response formats. The final, 30-item version of the scale was then given as part of a battery of relevant tests in a modified Multi-Trait, Multi-Method (MTMM) design.

The procedures used in this study will be described in the two sections which follow.

A. DEVELOPMENT OF THE FMAT

1. Creation of the Item Pool; initial reduction

Using the general definition of ambiguity and the specific definition of ambiguous figures (from Chapter II), the literature on cognitive and perceptual psychology was searched for a) existing examples of ambiguous figures, b) figures which were ambiguous but not named as such, and c) suitable material for the construction of ambiguous figures. By borrowing, adapting and creating ambiguous figures, a pool of 142 items was generated. Items were selected and/or created on the basis of being highly ambiguous and having low interest value (so as to minimize emotional reactivity). Due to the exploratory nature of the study, a wide variety of ambiguous figures was sought. In order to ensure that each figure was seen as ambiguous, as well as to heighten the sense of ambiguity experienced, some ambiguous figures were displayed along with corresponding figures, serving to highlight alternate, non-ambiguous interpretations of the
ambiguous figure (see Figure 1).

Collecting and creating these items led to clustering the ambiguous figures into a taxonomy of five categories or types. The five categories of ambiguous figures were:

(1) **Reversible**—figures best illustrated and known by the Necker Cube and Old Woman/Young Woman figure; (see Figure 2) (2) **Non-reversible**—these were figures which functioned like the reversible in that they had two or more probable interpretations, but which were not actually reversible (see Figure 3); (3) **Impossible**—figures which initially appear as two-dimensional representations of three-dimensional solids, but which, upon further inspection, are seen to violate the rules of perspective-drawing, hence, it is the three-dimensional solid which is 'impossible' (see Figure 4); (4) **Fragmented**—figures which were once representations of well-known objects or symbols, but which have been 'degraded' to the point of being virtually unrecognizable (cf. Thorndike's mutilated words, Street's Gestalt figures) (see Figure 5); (5) **Unstructured**—figures which are completely abstract, meaningless conglomerations of line, texture and negative space, but within which many possible representations seem to exist (see Figure 6).

Since *a priori* subscales offer attractive validation possibilities, it was decided that the five categories would be maintained throughout the item-pool reduction and pilot test phases, if possible, in order to build five subscales into the final version of the instrument and to assess differences and similarities.

Initially, in order to reduce the item pool, independent judges were used to rate each figure for ambiguity and for emotional reactivity. At first, a successive evaluation method was used, in which each figure was rated on a 1-7
scale in turn. This method produced biased ratings as a result of fatigue effects, especially in the last third of the items. Instead, a Q-sorting methodology was adopted; the 142 figures were rated 'simultaneously' for ambiguity by each of 6 judges, and separately for emotional reactivity by 6 others. Each rater’s task was to end up with a 'forced normal' distribution of the 142 items in 9 'bins', each of which corresponded to a level of ambiguity or emotional reactivity. Based on an aggregated rating score, the 16 'best' items were selected from each of the 5 categories of items; 'best' being those rated highest in ambiguity and most neutral in emotional reactivity. Thus 80 items were selected from the original 142 to make up the pilot version of the scale.
FIGURE 1: EXAMPLE OF A MULTI-Figure ITEM
FIGURE 3: FMAT ITEMS IN NON-REVERSIBLE SUBSCALE
(PHOTO-REDUCED)
FIGURE 4: FMAT ITEMS IN UNSTRUCTURED SUBSCALE
(PHOTO-REDUCED)
FIGURE 5: FMAT ITEMS IN IMPOSSIBLE SUBSCALE
(PHOTO-REDUCED)

#6

#13

#22

#24

#26

#30
FIGURE 6: FMAT ITEMS IN FRAGMENTED SUBSCALE
(PHOTO-REDUCED)

#4

#8

#9

#14

#27

#19
2. Response Formats

Next, the problem of response format had to be solved. The problem was, of course, how best to both tap an individual's tolerance/intolerance to the ambiguous figures as well as to discriminate this reaction among respondents. For pilot-testing, three different response formats were employed, each used with the same set of 80 figural items, in a separate version of the test. Version One used six bipolar, six-point adjective scales with each item. The adjective pairs were selected from the Evaluation factor of the Semantic Differential (Osgood, 1955) using the criteria of relevance to figural stimuli and highest loadings on the factor. The adjective pairs used were: good-bad, beautiful-ugly, valuable-worthless, pleasant-unpleasant, nice-awful and tasteful-distasteful (see Figure 7). Version Two also employed Semantic Differential scales, but used a combination of adjective pairs taken from the Evaluation Factor and the Potency Factor. The adjective pairs used were: good-bad, beautiful-ugly, nice-awful (Evaluation) and strong-weak, rugged-delicate, deep-shallow (Potency) (see Figure 8). Version Three used six, six-point Likert-type agreement scales, each attached to a one-word stem. These stems (Agreeable, Pleasureable, Soothing, Offensive, Annoying and Frustrating) were adverbs chosen from thesaurus headings of 'agreeableness, pleasurable' and disagreeablesnes, displeasureable' and were intended to be reflective of psycho-emotional reactions associated with tolerance/intolerance (see Figure 9).†

Each respondent, then, was called upon to record his reactions to each ambiguous figure, using six assessment scales. The sum of six scales scores

†To control for various kinds of response bias, both the order of the response scales and the polarity of the adjective pairs, where appropriate, was randomized. This meant that each of the three pilot-test versions was composed of the same 80 figures and 80 unique response pages.
represented a respondent's overall reaction to the item; in turn, these item composites were summed for the subscale and for the total test. Subscale and total scores were considered to produce quasi-interval measures by definition, and were subsequently analyzed with statistical procedures appropriate to interval scales. High scores, representing positive reactions, denoted 'tolerance' for the ambiguous figures; low scores, representing negative reactions, denoted 'intolerance'. The assumption that Tolerance/Intolerance of Ambiguity can be inferred by personal assessment or preference is not without precedent; indeed, most of the existing tests of the construct operate in a similar fashion. As seen in Chapter I, these tests' items are composed of statements such as "I prefer to go to parties where I know most everyone" and require respondents to say 'Yes' or 'No' or to respond according to a Likert-type scale of agreement/disagreement. Examples are also found further afield, as in the construction of political and ideological tolerance scales and tolerance of violence measures (cf. Response Analysis of Princeton, 1973; Seligson & Caspi, 1983 and Harrell, 1981).

Each version of the scale was made up in the same fashion, as follows: cirlo-x-bound booklets of 80 items pages and 80 response pages were paired so that the figure (stem) appeared on the left-hand page and the response scales for that item appeared on the right. Each booklet began with introduction, instructions, general information and example pages (see Appendix F). The pilot versions were administered on four separate occasions to three university undergraduate classes in education and one psychology class at a local community college. The three versions were distributed in a random fashion to the four classes and administration time was about one hour in all cases. Version One was administered to 25 people (59% females); overall mean age was 23.0);
Version Two was administered to 26 people (65% females; mean age was 23.2) and Version Three was administered to 26 people (62% females; mean age was 26.7). An additional 10 individuals were given identical portions of all three versions and asked to rank order the response formats in terms of their relevance and meaningfulness with respect to the figural stems. Internal consistency estimates were calculated for each version of the pilot test and its respective subscales.

The information gathered in the pilot test was used to select the best response format and the best 30 items for the final version of the instrument. Once again, the five subscales were retained, this time with six items each. The presentation format for the final version was identical to that of the three pilot versions, with the following exceptions: the 6 response scales were reduced to 4, and a single response scale 'page' was selected in a random fashion and used throughout the test to facilitate analysis (see Figure 10). The resultant version of the instrument, which was next used in a preliminary validation study, is referred to as the 'Figural Measure of Ambiguity Tolerance' (FMAT) in the balance of this thesis.

† Informal process analysis was conducted with 8 individuals, in which randomly selected portions of each version were presented along with the instructions. These people were asked to make their process verbally explicit as they went along. The principal outcome of this procedure was to confirm that the tests were functioning as intended.
LOOK AT THE FIGURE CAREFULLY AND RECORD YOUR REACTIONS TO IT ON THE SCALES PROVIDED BELOW.

TASTEFUL_1__2__3__4__5__6__DISTASTEFUL

WORTHLESS_1__2__3__4__5__6__VALUABLE

GOOD_1__2__3__4__5__6__BAD

NICE_1__2__3__4__5__6__AWFUL

UNPLEASANT_1__2__3__4__5__6__PLEASANT

BEAUTIFUL_1__2__3__4__5__6__UGLY
LOOK AT THE FIGURE CAREFULLY AND RECORD YOUR REACTIONS TO IT ON THE SCALES PROVIDED BELOW.

GOOD 1 2 3 4 5 6 BAD

DEEP 1 2 3 4 5 6 SHALLOW

STRONG 1 2 3 4 5 6 WEAK

BEAUTIFUL 1 2 3 4 5 6 UGLY

AWFUL 1 2 3 4 5 6 NICE

DELICATE 1 2 3 4 5 6 RUGGED
LOOK AT THE FIGURE CAREFULLY AND RECORD YOUR REACTIONS TO IT ON THE SCALES PROVIDED BELOW.

I FIND THE ABOVE FIGURE....

PLEASURABLE______SD____D____MD____MA____A____SA

SOOTHING______SD____D____MD____MA____A____SA

OFFENSIVE______SD____D____MD____MA____A____SA

AGREEABLE______SD____D____MD____MA____A____SA

FRUSTRATING______SD____D____MD____MA____A____SA

ANNOYING______SD____D____MD____MA____A____SA

FIGURE 10: FMAT RESPONSE PAGE

LOOK AT THE FIGURE CAREFULLY AND RECORD YOUR REACTIONS TO IT ON THE SCALES PROVIDED BELOW.

I FIND THE FIGURE........

FRUSTRATING_____ SD_____ D_____ MD_____ MA_____ A_____ SA **

SOOTHING_____ SD_____ D_____ MD_____ MA_____ A_____ SA

ANNOYING_____ SD_____ D_____ MD_____ MA_____ A_____ SA

PLEASUREABLE_____ SD_____ D_____ MD_____ MA_____ A_____ SA

** KEY: SD: strongly disagree  D: disagree  MD: mildly disagree
        MA: mildly agree   A: agree   SA: strongly agree
B. INITIAL PSYCHOMETRIC EVALUATION

To assess the construct validity of the FMAT, as well as other of its psychometric properties and scalar characteristics, the instrument was administered as part of a battery of relevant tests (see "Analysis: MTMM Design") to 160 respondents (65% females) in 8 sittings. The battery consisted of the following: a) a figural measure of ambiguity tolerance (FMAT, see Appendix H); b) a verbal measure of ambiguity tolerance (Budner's IA Scale, see Appendix A); c) a figural measure of Authoritarianism (Symbolic-Figures (S-F) Test, Hogan, 1970, see Appendix I); d) a verbal measure of Authoritarianism (Right-Wing Authoritarianism (RWA) Scale, Altemeyer, 1981, see Appendix J); e) a figural measure of cognitive ability (Figure-Matching (F-M) Test, Coren & Porac, 1987 (from French, 1963); see Appendix K); f) a verbal measure of cognitive ability (Baddeley Grammatical Reasoning Test, 1968, see Appendix L); and g) a page of questions adapted from validity studies conducted by Budner, Norton and others titled "Lifestyle Questions" (see Appendix M). Each copy of the battery also contained an Introduction page, which included a 'consent to participate' declaration, and an Information page (see Appendix N) placed at the beginning. Since the grammatical reasoning test (Baddeley) and the visual discrimination test (F-M Test) are speeded tests, each booklet began with these two tests. Half of the booklets began with the Baddeley and half with the F-M Test. Using a Latin Square, the remaining 5 components of the battery were assigned to 5 different versions of the battery wherein the order varied systematically.
C. ANALYSIS

1. Scoring, reliability, initial analysis of FMAT

   The scoring of the tests in the battery was consistent with that indicated in publications by their authors and other users. Accordingly, the FMAT and IA Scale were scored such that low scores corresponded with tolerance and high score with intolerance; the S-F Test and RWA Scale were scored such that low scores indicated relative absence and high scores relative presence of the trait of Authoritarianism; the Baddeley and F-M Test were scored such that the number of items correct indicated the level of cognitive ability in the respective assessment modes. Estimates of internal consistency reliability (Cronbach’s alpha) were calculated for the FMAT, IA Scale, S-F Test and RWA Scale, but not for the Baddeley or F-M Test as these latter two were speeded tests.

   An initial psychometric evaluation of the FMAT itself consisted of item analysis of each subscale and of the total scale, reliability estimation (Cronbach’s alpha) of each subscale, inter-correlation of subscale and total scale scores and factor analysis of the subscale structure.

2. Multi-Trait, Multi-Method Design

   Six of tests in the battery were chosen to form a modified Multi-Trait, Multi-Method design (Campbell and Fiske, 1959): two measurement methods (figural and verbal) are crossed with three 'traits' (Ambiguity Tolerance, Authoritarianism and broadly, Cognitive Ability). In this type of design, evidence of discriminant and convergent validity is sought through examination of the inter-variable correlation matrix and instrument internal consistency reliability
estimates. The present study also called for these comparisons in a modified correlation matrix, generated by partiailling out effects of the cognitive ability variables.

The IA Scale (Budner, 1962) was included in the battery as the most representative measure of Intolerance of Ambiguity with which to establish convergent validity with the FMAT. Since Intolerance of Ambiguity is seen as belonging to the Authoritarianism family of traits, which includes Rigidity, Dogmatism, Conservatism, etc., (Frenkel-Brunswik, 1950; Budner, 1962; Kelman & Barclay, 1963), the Right-Wing Authoritarianism Scale was included as a verbal measure and the Symbolic Fascism Test as a figural measure of Authoritarianism. The presence of these tests in the battery allowed for an assessment of the discriminant validity of the Intolerance of Ambiguity scales. Furthermore, correlations between the FMAT and the Authoritarianism measures could be compared with those of the IA Scale. The correlations between the Intolerance of Ambiguity measures and the Authoritarianism measures could also be compared. Finally, the extent of the confounding influence of verbal and visual cognitive ability could be assessed by including the Baddeley Grammatical Reasoning Test, which has been recently evaluated favourably (Carter, Kennedy & Bittner, 1981) and by the Figure-Matching Test developed and assessed by Coren & Porac (1987) and modeled after one devised by French (1963).

3. FMAT Subscale Scores

In a similar series of analyses, correlation coefficients were calculated first between FMAT subscale scores and the other test battery measures in order to examine their interrelationships, and to the potential moderating effects of the
cognitive ability measures. This procedure was then repeated with FMAT factor scores replacing the subscale scores.

4. Analysis of "Lifestyle Questions"

The "Lifestyle Questions" were selected from previous research conducted for the most part to enhance the construct validity of various Intolerance of Ambiguity scales. Questions #1a and #1b derive from Budner (1962), #1c from both Budner and MacDonald (1970), #2 is meant to reflect the absence of emotional ambivalence which Frenkel-Brunswik (1949) considered a concomitant of Intolerance of Ambiguity, #3 derives from McPherson's (1983) study of IA and information-seeking, #4 derives from the work on androgyny by Rotter and O'Connell (1982) and #5 derives from Norton (1975). The intention was to investigate these findings further with the IA Scale and the FMAT by predicting relative tolerance and intolerance with reference to responses to the questions.
CHAPTER IV. RESULTS AND DISCUSSION

A. RESULTS

This chapter describes the results of the data collected and analyzed at each stage of the development and evaluation of the FMAT. The second part of this chapter discusses the results in the same sequence as they are reported.

1. Item Pool; Pilot-test Versions

Analyses involving the initial Q-sort ratings of the 142 items on ambiguity and emotional reactivity (re-coded to reflect the degree of neutrality) required the use of items as cases and raters as variables. In this way a matrix was produced in which raters’ scores were inter-correlated. The results indicated moderate but consistent agreement among raters. For the quality of ambiguity, 13 out of 15 correlations were positive; for neutrality, 6 out of 15 were positive; for both, no other correlations differed from zero (p less than .05). Emotional reactivity seemed to be independent of ambiguity as there was no evidence that the two were related for individual sorters; as well, total scores for ambiguity and neutrality ratings (calculated by summing across sorters) were uncorrelated.

Eighty items were selected for the pilot-test versions on the basis of high ambiguity and neutrality; 16 items were chosen for each of the 5 categories of ambiguous figures. Three pilot-test versions were evaluated: Version One employed only Evaluation factor adjectives (from the Semantic Differential), Version Two used adjectives from both the Evaluation and Potency factors, and Version Three used psycho-emotional reaction statements. Descriptive statistics (mean, s.d. and range) for the subscale and total scores of each version showed them to be
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roughly comparable, and Kolmogorov-Smirnov (K-S) tests (p=.01) indicated that all distributions were normal. Cronbach's alpha reliability coefficients, displayed in Table 1, were comparable for all the subscale and total scores with Version Three achieving the highest total test estimate of reliability, alpha=.936.

Table 1
Cronbach's Alpha Reliability Estimates for Pilot Test Versions of FMAT

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Version One</th>
<th>Version Two</th>
<th>Version Three</th>
</tr>
</thead>
<tbody>
<tr>
<td>reversible</td>
<td>.74</td>
<td>.83</td>
<td>.76</td>
</tr>
<tr>
<td>non-reversible</td>
<td>.80</td>
<td>.76</td>
<td>.71</td>
</tr>
<tr>
<td>unstructured</td>
<td>.94</td>
<td>.73</td>
<td>.92</td>
</tr>
<tr>
<td>impossible</td>
<td>.94</td>
<td>.91</td>
<td>.90</td>
</tr>
<tr>
<td>fragmented</td>
<td>.81</td>
<td>.75</td>
<td>.81</td>
</tr>
<tr>
<td>Total Test</td>
<td>.908</td>
<td>.910</td>
<td>.936</td>
</tr>
</tbody>
</table>

Subscale inter-correlation patterns varied somewhat from one version to another; however, correlations between subtests and the total test were comparable for the three pilot versions, indicating in each case that no single subscale dominated the others. Overall, the results indicated few empirical differences between the three response formats, with the exception of Version Three's superior alpha. The results that most strongly influenced the decision regarding the format for the final version came from the rank-ordering data. Ten persons, given randomly-selected items and all three response formats, were asked to rank-order the formats in terms of most preferred due to relevance and meaningfulness.
They overwhelmingly favored the response format used in Version Three—the psycho-emotional reaction statements. (Nine out of the ten chose Version Three's format as most preferred and the tenth person ranked it second most preferred).

Table 2

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>reversible</td>
<td>294.7</td>
<td>44.3</td>
</tr>
<tr>
<td>non-reversible</td>
<td>329.0</td>
<td>41.0</td>
</tr>
<tr>
<td>unstructured</td>
<td>339.4</td>
<td>77.1</td>
</tr>
<tr>
<td>impossible</td>
<td>334.3</td>
<td>58.8</td>
</tr>
<tr>
<td>fragmented</td>
<td>356.9</td>
<td>48.7</td>
</tr>
<tr>
<td>Total Test</td>
<td>1653.3</td>
<td>200.4</td>
</tr>
</tbody>
</table>

Notes: Possible item score range: 6-36 (6 response scales per item)
Possible subscale score range: 96-576 (16 items per subscale)
Possible total test score range: 480-2880 (80 items in total test, 5 subscales)

Therefore, Version Three was chosen as the prototype for the final form of the test. Item analysis was used to select the 30 items from the 80 pilot test items. Specifically, 6 items were selected from each subscale by referring to their contributions to both subscale and total test internal consistency reliability. The psycho-emotional reaction scales were reduced from 6 to 4 per item by examining their performance relative to one another for the entire test. Reliabilities were recalculated to ensure that this procedure did not result in reduced internal consistency. Table 2 displays the means and standard deviations of the subscale and total scores for Version Three and Table 3 shows the subscale and total scores.
scale inter-correlations. NONREV was the only subscale which correlated with the age of respondent.

Table 3

Inter-correlations of Subscales and Total Test: Version Three

<table>
<thead>
<tr>
<th>Subscales</th>
<th>reversible</th>
<th>nonreversible</th>
<th>unstructured</th>
<th>impossible</th>
<th>fragmented</th>
</tr>
</thead>
<tbody>
<tr>
<td>non-reversible</td>
<td>.77</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>unstructured</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>impossible</td>
<td>.43</td>
<td>.49</td>
<td>.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fragmented</td>
<td>---</td>
<td>---</td>
<td>.74</td>
<td>.54</td>
<td></td>
</tr>
<tr>
<td>Total Test</td>
<td>.67</td>
<td>.62</td>
<td>.77</td>
<td>.79</td>
<td>.81</td>
</tr>
</tbody>
</table>

Notes: For all pearson's r shown, p<.01 (one-tailed), n=26. All dashes represent non-significant correlations. Correlations between subscales and total test are not corrected for overlap

2. Battery Measures: Psychometric Evaluation

The final version of the instrument, the FMAT, was given as part of a battery of relevant tests which included a verbal test of intolerance of ambiguity (IA Scale), a figural test of Authoritarianism (SF Test), a verbal test of Authoritarianism (RWA Scale), a verbal abilities test (Baddeley Grammatical Reasoning, to be denoted by VERBAL), a visual discrimination test (F-M Test, to be denoted by VISUAL) and a page of questions entitled "Life Style Questions". Sample sizes, means, standard deviations, ranges, and where appropriate, reliability estimates and standard errors of measurement, for the battery measures are shown in Table 4. All distributions were found to be normal (K-S
test, p = .05) with the exception of age of respondent which had a pronounced positive skew. Of the Intolerance of Ambiguity and Authoritarianism scales, the FMAT had a high estimate of internal consistency reliability (alpha = .811), as did the RWA (alpha = .766) and the SF Test (alpha = .722). The IA Scale, however, displayed a rather low estimate of reliability (alpha = .380).

Table 4

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>mean</th>
<th>s.d.</th>
<th>range</th>
<th>α</th>
<th>s.e.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMAT</td>
<td>160</td>
<td>451.7</td>
<td>47.3</td>
<td>243.0</td>
<td>.81</td>
<td>22.0</td>
</tr>
<tr>
<td>IA Scale</td>
<td>159</td>
<td>56.4</td>
<td>6.7</td>
<td>35.0</td>
<td>.38</td>
<td>5.6</td>
</tr>
<tr>
<td>SF Test</td>
<td>162</td>
<td>24.1</td>
<td>3.0</td>
<td>14.5</td>
<td>.72</td>
<td>1.6</td>
</tr>
<tr>
<td>RWA Scale</td>
<td>123</td>
<td>87.8</td>
<td>14.0</td>
<td>71.5</td>
<td>.76</td>
<td>6.7</td>
</tr>
<tr>
<td>VERBAL</td>
<td>162</td>
<td>23.9</td>
<td>8.5</td>
<td>38.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VISUAL</td>
<td>162</td>
<td>57.7</td>
<td>15.0</td>
<td>75.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGE</td>
<td>162</td>
<td>21.0</td>
<td>7.0</td>
<td>39.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Although the other three scales show adequate or even superior, internal consistency reliabilities, the IA Scale, with 62% of observed variance being due to error, must be regarded with some caution in all subsequent analyses which involve it.
Table 5

Means, Standard deviations and Alpha Values for FMAT Subscales and Total Test Scores (n=160)

<table>
<thead>
<tr>
<th>Subscales</th>
<th>mean</th>
<th>s.d.</th>
<th>a</th>
</tr>
</thead>
<tbody>
<tr>
<td>reversible</td>
<td>78.9</td>
<td>13.9</td>
<td>.61</td>
</tr>
<tr>
<td>non-reversible</td>
<td>89.0</td>
<td>14.3</td>
<td>.56</td>
</tr>
<tr>
<td>unstructured</td>
<td>93.6</td>
<td>17.8</td>
<td>.73</td>
</tr>
<tr>
<td>impossible</td>
<td>92.8</td>
<td>19.0</td>
<td>.83</td>
</tr>
<tr>
<td>fragmented</td>
<td>95.5</td>
<td>14.8</td>
<td>.59</td>
</tr>
<tr>
<td>Total Test</td>
<td>451.7</td>
<td>47.3</td>
<td>.81</td>
</tr>
</tbody>
</table>

Notes: Possible item score range: 4-24 (4 response scales per item)
Possible subscale score range: 24-144 (6 items per subscale)
Possible total test score range: 120-720 (30 items, 5 subscales in total test)

3. FMAT: Subscales and Factor Structure

Item analysis of the FMAT revealed that each of the 30 items positively contributed to the internal-consistencies of their respective subscale and to the total test. All subscale distributions were normal (according to K-S tests and examination of skewness and kurtosis), with a close uniformity of means and standard deviations. Internal-consistency reliability estimates varied among subscales, ranging from an alpha of .56 to .83 (see Table 5). The pattern of inter-correlations between FMAT subscales, total test and age of respondent was similar to that for the Version Three pilot test; this is noteworthy because the FMAT employed 30 items with 160 respondents and Version Three used 80
items with 26 respondents (see Table 6, compare with Table 3).

Table 6

Inter-correlations of Subscales and Total Test: FMAT

<table>
<thead>
<tr>
<th>Subscales</th>
<th>reversible</th>
<th>nonreversible</th>
<th>unstructured</th>
<th>impossible</th>
<th>fragmented</th>
</tr>
</thead>
<tbody>
<tr>
<td>non-reversible</td>
<td>.36</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>unstructured</td>
<td></td>
<td>.15*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>impossible</td>
<td>.52</td>
<td>.23</td>
<td>.17*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fragmented</td>
<td></td>
<td>.19</td>
<td>.60</td>
<td>.16*</td>
<td></td>
</tr>
<tr>
<td>Total Test</td>
<td>.57</td>
<td>.55</td>
<td>.61</td>
<td>.67</td>
<td>.59</td>
</tr>
</tbody>
</table>

Notes: For all Pearson's r shown, p<.01 (one-tailed), except *, where p<.05 (one-tailed), n=160. All dashes represent non-significant correlations. Correlations between subscales and total test are not corrected for overlap.

Table 7

Pearson Correlations Between FMAT Subscales and Factors I to IV

<table>
<thead>
<tr>
<th>Factors</th>
<th>reversible</th>
<th>nonreversible</th>
<th>unstructured</th>
<th>impossible</th>
<th>fragmented</th>
<th>FMAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>.65</td>
<td></td>
<td>.92</td>
<td>.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>-.13</td>
<td></td>
<td>.92</td>
<td>.13</td>
<td>.83</td>
<td>.61</td>
</tr>
<tr>
<td>III</td>
<td>.41</td>
<td>.65</td>
<td>.21</td>
<td>.14</td>
<td>.44</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>.15</td>
<td>.65</td>
<td></td>
<td></td>
<td></td>
<td>.26</td>
</tr>
</tbody>
</table>

Sum of All Factors: .54 .72 .52 .61 .50 .95

Notes: All Pearson correlations shown are significant at p<.05 level. All blanks represent non-significant correlations.
Factor analytic examination of the subscale structure began by comparing the results of two commonly-used extraction/rotation procedures: Principal Component analysis (PC) with Varimax rotation and Image analysis with Oblimin rotation. Image analysis extracted 10 factors (10 eigenvalues greater than 1.0) representing only 36.9% of the variance. The Oblimin rotation failed to converge in 25 iterations, later failing to converge in 75 iterations. In contrast, Principal Components solution yielded 10 factors which represented 66.3% of the variance, and the Varimax rotation converged in 12 iterations. PC extraction followed by Oblique and again by Oblimin rotations also failed to converge after 25 iterations. Application of Cattell's Scree Test (1966) to the graph of plotted eigenvalues (Figure 11), suggested a 4-factor solution; reanalysis extracting 4 factors captured 42.3% of the variance. As these 4 factors were highly interpretable, PC extraction was repeated, extracting exactly 4 factors. Several rotation methods were again employed including Equamax, Quartimax and Oblimin. However, Varimax rotation, converging in 6 iterations, and exhibiting simple structure, resulted in the most interpretable solution. In the 'forced' 4-factor solution, with Varimax rotation, all 30 items showed loadings of at least .35 on the 4 factors. Once again, this solution exhibited simple structure with only one item, #20, loading at the criterion level on more than one factor (see Figure 12). Figures 13, 14, 15, and 16 show the item composition of the FMAT factors. The pattern matrix is reproduced in full in Appendix G. Pearson correlations between the a priori subscales and Factors I to IV are displayed in Table 7.
FIGURE 11: PRINCIPAL COMPONENTS ANALYSIS EIGENVALUE PLOT
Figure 12

Four-Factor, Principal Components Solution of FMAT, With Varimax Rotation

| Items (by item number) shown in descending order of magnitude and identified by subscale. | Factors |
|---|---|---|---|
| #24 | #17 | #16 | #03 |
| #22 | #11 | #05 | #07 |
| #30 | #23 | #25 | |
| #13 | #14 | #15 | |
| #26 | #06 | #27 | #12 | #20 |
| #04 | | | |
| #18 | #21 | #28 | #01 |
| #10 | #20 | #02 | #19 |
| | | | #09 |
| | | #08 | |

% Variance accounted for: 15.2 12.5 7.4 6.1
Total: 41.3%

Notes: All items shown loaded at greater than .35, n=160.
Only one item (#20) loaded on more than one factor (II and IV).

Subscale Key: i = impossible, r = reversible, u = unstructured, n = non-reversible, f = fragmented
FIGURE 13: FMAT—FACTOR I ITEMS (PHOTO-REDUCED)
FIGURE 14: FMAT—FACTOR II ITEMS (PHOTO-REDUCED)
FIGURE 15: FMAT-FACTOR III ITEMS (PHOTO-REDUCED)
FIGURE 16: FMAT---FACTOR IV ITEMS (PHOTO-REDUCED)
4. MTMM Analysis

The intercorrelation matrices of the six tests which made up the bulk of the battery indicated a pattern of only slight association. The same pattern prevailed after the ability measures (VERBAL and VISUAL) were partialed out (see Figures 17 and 18). No correlation exceeded an absolute value of 30 for any pair of measures. The two measures of ambiguity tolerance, the FMAT and the IA Scale, were uncorrelated before and after partialling, and did not attain a significant correlation even after correction for attenuation. Slight evidence of convergent validity existed for the Authoritarianism and abilities measures in that the SF Test and RWA Scale correlated at $r = .29$ and the VISUAL and VERBAL tests also correlated at $r = .29$. Similarly, slight evidence of discriminant validity also existed in that the multi-trait, monomethod intercorrelations were lower in magnitude than the monotrait-multimethod coefficients both for the figural tests (.23, .14 and .15 are less than .29 and .29) and the verbal tests (.14, -.22 and -.14 are less in magnitude than .29 and .29) (see Figure 17). This evidence held for the Authoritarianism scales even after the abilities measure were partialed out (see Figure 18). These results will be further examined and interpreted in the "Discussion" section of this chapter.

The *a priori* subscales of the FMAT showed a similarly slight pattern of associations with the test battery measures, both before and after the ability measures were controlled (see Table 8). None of the subscales correlated with the IA Scale in either condition. With respect to the other measures, the UNSTRUCT, IMPOSS and FRAG subscales showed a slight but consistent pattern of positive correlations with the Authoritarianism measures, which remained after partialling the VISUAL and VERBAL measures out.
Following a similar procedure employing the factor scores (Factor I to Factor IV), the pattern of association with the battery measures was seen to be more complex (see Table 9). While Factors I and II showed slight correlations (.11 to .16) with the Authoritarianism measures and were uncorrelated with the IA Scale, Factor III correlated at about the same level (.17) with the IA Scale, but with nothing else, and Factor IV displayed only a negative correlation (-.19) with the RWA Scale.

Because Factors I and II behaved in a similar fashion with respect to the other trait measures, whereas Factors III and IV behaved differently, further analysis was conducted by creating factor composites Amb.One (Factor I plus Factor II) and Amb.Two (Factor III plus Factor IV). Factor composite Amb.Tot was created by adding all factor scores together. In this way, potentially "pure" forms of the FMAT could be examined with respect to the other trait measures. Table 10 shows the correlations between Amb.One and Amb.Two before and after partially out VERBAL and VISUAL. Correlations for Amb.Tot are not displayed as they did not contribute further to the presented results.
Figure 17

MTMM Matrix: Zero-order Correlations Among Test Battery Measures

<table>
<thead>
<tr>
<th>Measures</th>
<th>Method I</th>
<th></th>
<th>Method II</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FMAT</td>
<td>SF Test</td>
<td>VISUAL</td>
<td>IA Scale</td>
</tr>
<tr>
<td>FMAT</td>
<td>(.81)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SF Test</td>
<td>.23&lt;sup&gt;A&lt;/sup&gt;</td>
<td>(.72)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VISUAL</td>
<td>.14&lt;sup&gt;B&lt;/sup&gt;</td>
<td>.15&lt;sup&gt;C&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IA Scale</td>
<td></td>
<td></td>
<td>.14&lt;sup&gt;D&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>RWA Scale</td>
<td></td>
<td></td>
<td>.29&lt;sup&gt;E&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>VERBAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key: Two monomethod blocks (reliability diagonals with heterotrait-monomethod triangles): Correlations labelled A through F

One Heteromethod block (validity diagonal with two heterotrait-heteromethod triangles): Correlations labelled 1 through 9

Notes: For all Pearson correlations shown, p < .05 except where * p < .10 (one-tailed)

For IA Scale, n = 157; RWA Scale, n = 122; all others, n = 160
Cronbach's alpha values along diagonal, where appropriate.
All dashes represent non-significant correlations.
Figure 18

MTMM Matrix: Second-order Partial Correlations Among Test Battery Measures; VISUAL and VERBAL Partialled Out of All Variables

<table>
<thead>
<tr>
<th>Measures</th>
<th>Method I</th>
<th>Method II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FMAT</td>
<td>SF Test</td>
</tr>
<tr>
<td>I</td>
<td></td>
<td>(.81)</td>
</tr>
<tr>
<td>SF Test</td>
<td>.21 A</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IA Scale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RWA Scale</td>
<td></td>
<td>.30 a</td>
</tr>
</tbody>
</table>

Key: Two monomethod blocks (reliability diagonals plus heterotrait-monomethod triangles): Correlations labelled A and B

One Heteromethod block (validity diagonal plus heterotrait-heteromethod triangles): Correlations labelled 1 through 4

Notes: For all pearson correlations shown, p<.05 except where * p<.10 (one-tailed)
Cronbach's alpha values along diagonal.
All dashes represent non-significant correlations.
Table 8
Inter-correlations Between FMAT Subscales and Test Battery Measures

<table>
<thead>
<tr>
<th>Measures</th>
<th>reversible</th>
<th>nonreversible</th>
<th>unstructured</th>
<th>impossible</th>
<th>fragmented</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Before partialling out VERBAL and VISUAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IA Scale</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SF Test</td>
<td>.13</td>
<td></td>
<td>.19</td>
<td>.22</td>
<td>.25</td>
</tr>
<tr>
<td>RWA Scale</td>
<td>.12*</td>
<td></td>
<td>.18</td>
<td>.12*</td>
<td></td>
</tr>
<tr>
<td>VISUAL</td>
<td>.19</td>
<td></td>
<td>.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VERBAL</td>
<td>.19</td>
<td></td>
<td>.11*</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>B. After partialling out VERBAL and VISUAL from all variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IA Scale</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SF Test</td>
<td>.11*</td>
<td></td>
<td>.16</td>
<td>.21</td>
<td>.23</td>
</tr>
<tr>
<td>RWA Scale</td>
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<td></td>
<td></td>
<td>.18</td>
<td>.24</td>
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</table>

Notes: For all Pearson’s r shown, p<.05 (one-tailed), except *, where p<.10 (one-tailed). All blanks represent non-significant correlations.
Table 9

Pearson Correlations Between Factors I to IV and Test Battery Measures

<table>
<thead>
<tr>
<th>Measures</th>
<th>Factors</th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
<td>II</td>
<td>III</td>
<td>IV</td>
</tr>
<tr>
<td><strong>A. Before partialling out VERBAL and VISUAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMAT</td>
<td>.59</td>
<td>.61</td>
<td>.44</td>
<td>.26</td>
</tr>
<tr>
<td>IA Scale</td>
<td></td>
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<td></td>
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<tr>
<td>SF Test</td>
<td>.16</td>
<td>.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RWA Scale</td>
<td>.14</td>
<td>.12*</td>
<td></td>
<td>-.20</td>
</tr>
<tr>
<td>VISUAL</td>
<td></td>
<td></td>
<td>-.11*</td>
<td></td>
</tr>
<tr>
<td>VERBAL</td>
<td></td>
<td></td>
<td>-.19</td>
<td>.11*</td>
</tr>
<tr>
<td><strong>B. After partialling out VERBAL and VISUAL from all variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMAT</td>
<td>.58</td>
<td>.60</td>
<td>.46</td>
<td>.27</td>
</tr>
<tr>
<td>IA Scale</td>
<td></td>
<td>.17</td>
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<td>.15</td>
<td>.16</td>
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<td></td>
</tr>
<tr>
<td>RWA Scale</td>
<td>.15</td>
<td>.11*</td>
<td></td>
<td>-.19</td>
</tr>
</tbody>
</table>

Notes: For all pearson's r shown, p<.05 (one-tailed), except where * p<.10 (one-tailed). All blanks represent non-significant correlations.
Table 10
Pearson Correlations Between Combined Factors and Test Battery Measures

<table>
<thead>
<tr>
<th>Measures</th>
<th>AMB.ONE</th>
<th>AMB.TWO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Before partialling out VERBAL and VISUAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMAT</td>
<td>.85</td>
<td>.50</td>
</tr>
<tr>
<td>IA Scale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SF Test</td>
<td>.25</td>
<td></td>
</tr>
<tr>
<td>RWA Scale</td>
<td>.18</td>
<td>-.18</td>
</tr>
<tr>
<td>VISUAL</td>
<td>.15*</td>
<td></td>
</tr>
<tr>
<td>VERBAL</td>
<td>-.12*</td>
<td></td>
</tr>
<tr>
<td><strong>B. After partialling out VERBAL and VISUAL from all variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMAT</td>
<td>.84</td>
<td>.51</td>
</tr>
<tr>
<td>IA Scale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SF Test</td>
<td>.22</td>
<td></td>
</tr>
<tr>
<td>RWA Scale</td>
<td>.18*</td>
<td>.17*</td>
</tr>
</tbody>
</table>

**Notes:** For all pearson’s r shown, p<.05 (one-tailed), except where * p<.10 (one-tailed). All blanks represent non-significant correlations.
AMB.ONE = Factor I plus Factor II
AMB.TWO = Factor III plus Factor IV
5. Analysis of "Lifestyle Questions", School Groups and Gender

Analysis of the "Lifestyle Questions" responses was conducted with respect to the trait measures. Table 11 and Table 12 show results of oneway analysis of variance and of t-tests, respectively, for the trait measures. Most of the group differences did not reach even the level of p=.10, however, a few differences were significant and some trends were apparent. The clearest results were for question #5, which concerned the willingness to participate in an unknown experimental study. "No" respondents scored significantly higher than "Yes" respondents for the IA Scale, however, for the FMAT the non-significant difference was in the opposite direction (see Table 12). Likewise, the IA Scale score means for "Yes" responses on #2, which was framed to reflect an absence of emotional ambivalence, were higher than "No" responses (p=.107), however, the opposite trend was evident for the FMAT means. It should be noted that SF Test and RWA Scale means also showed trends similar to that of the IA Scale with respect to these two questions.

All of the trait measures including the FMAT showed a similar pattern of differences between means for questions #3 and #4, which dealt with preferred newspaper and with psychological androgyny, respectively. With respect to #3, the means of all the trait measures evidenced a rise from a low mean ("Globe and Mail" response group), to a middle mean ("The Vancouver Sun" response group), to a high mean ("The Province" response group). In question #4, "No" responses, indicating a denial of any degree of personal psychological androgyny, were associated with higher scores on all of the trait measures when compared to the "Yes" responses. Patterns in gender differences, however, held for all the trait measures except for the FMAT scores, in that only for the latter was the mean
higher for females than males.

The FMAT subscales, Factors I to IV, Amb.One, Amb.Two and Amb.Tot were also analyzed with respect to the "Lifestyle Questions", educational groups and gender. No significant differences or trends were in evidence.
# Table 11

Oneway Analysis-of-Variance Summary: Means and p-values for Test Battery Measures by Selected "Lifestyle Questions" and Educational Grouping

### Question 1a. Belief in a Divine Power

<table>
<thead>
<tr>
<th>Measures</th>
<th>Yes</th>
<th>Maybe</th>
<th>No</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMAT</td>
<td>457.1</td>
<td>442.4</td>
<td>454.4</td>
<td></td>
</tr>
<tr>
<td>IA Scale</td>
<td>56.2</td>
<td>55.9</td>
<td>58.1</td>
<td></td>
</tr>
<tr>
<td>SF Test</td>
<td>24.2</td>
<td>24.4</td>
<td>24.0</td>
<td></td>
</tr>
<tr>
<td>RWA Scale</td>
<td>89.3</td>
<td>88.8</td>
<td>82.5</td>
<td></td>
</tr>
</tbody>
</table>

### Question 1c. Church Attendance

<table>
<thead>
<tr>
<th></th>
<th>Weekly</th>
<th>Monthly</th>
<th>Yearly</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMAT</td>
<td>445.9</td>
<td>457.3</td>
<td>452.2</td>
</tr>
<tr>
<td>IA Scale</td>
<td>56.1</td>
<td>58.5</td>
<td>56.2</td>
</tr>
<tr>
<td>SF Test</td>
<td>25.0</td>
<td>24.1</td>
<td>24.0</td>
</tr>
<tr>
<td>RWA Scale</td>
<td>92.6</td>
<td>88.6</td>
<td>87.0</td>
</tr>
</tbody>
</table>

### Question 3. Preferred Newspaper

<table>
<thead>
<tr>
<th></th>
<th>The Province</th>
<th>The Sun</th>
<th>The Globe and Mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMAT</td>
<td>455.2</td>
<td>450.8</td>
<td>442.4</td>
</tr>
<tr>
<td>IA Scale</td>
<td>56.7</td>
<td>56.6</td>
<td>55.4</td>
</tr>
<tr>
<td>SF Test</td>
<td>24.6</td>
<td>24.2</td>
<td>23.5</td>
</tr>
<tr>
<td>RWA Scale</td>
<td>90.1</td>
<td>88.8</td>
<td>80.7</td>
</tr>
</tbody>
</table>

### Educational Groups

<table>
<thead>
<tr>
<th></th>
<th>University</th>
<th>College</th>
<th>High School</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMAT</td>
<td>454.6</td>
<td>447.5</td>
<td>449.5</td>
</tr>
<tr>
<td>IA Scale</td>
<td>56.4</td>
<td>56.3</td>
<td>56.6</td>
</tr>
<tr>
<td>SF Test</td>
<td>24.6</td>
<td>23.4</td>
<td>24.0</td>
</tr>
<tr>
<td>RWA Scale</td>
<td>89.4</td>
<td>84.5</td>
<td>.070</td>
</tr>
</tbody>
</table>

Notes: All differences were non-significant at p<.10 level, unless otherwise indicated.
Table 12

T-test Summary: Means and p-values for Test Battery Measures by Selected "Lifestyle Questions" and Gender

<table>
<thead>
<tr>
<th>Question 1b. &quot;I have often thought and wondered about the meaning of religion and God.&quot;</th>
<th>Measures</th>
<th>Responses</th>
<th></th>
<th></th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FMAT</td>
<td>Yes</td>
<td>453.2</td>
<td>No</td>
<td>444.1</td>
</tr>
<tr>
<td></td>
<td>IA Scale</td>
<td>Yes</td>
<td>56.0</td>
<td>No</td>
<td>58.0</td>
</tr>
<tr>
<td></td>
<td>SF Test</td>
<td>Yes</td>
<td>24.2</td>
<td>No</td>
<td>24.3</td>
</tr>
<tr>
<td></td>
<td>RWA Scale</td>
<td>Yes</td>
<td>87.8</td>
<td>No</td>
<td>90.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 2. &quot;I find I tend either to like individuals entirely or to not like them at all.&quot;</th>
<th>Measures</th>
<th>Responses</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FMAT</td>
<td>Yes</td>
<td>444.4</td>
<td>No</td>
<td>454.7</td>
</tr>
<tr>
<td></td>
<td>IA Scale</td>
<td>Yes</td>
<td>57.7</td>
<td>No</td>
<td>55.8</td>
</tr>
<tr>
<td></td>
<td>SF Test</td>
<td>Yes</td>
<td>24.7</td>
<td>No</td>
<td>24.0</td>
</tr>
<tr>
<td></td>
<td>RWA Scale</td>
<td>Yes</td>
<td>89.1</td>
<td>No</td>
<td>87.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 4. &quot;I have at least a little of both masculine and feminine aspects to my own personality.&quot;</th>
<th>Measures</th>
<th>Responses</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FMAT</td>
<td>Yes</td>
<td>449.4</td>
<td>No</td>
<td>458.4</td>
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<tr>
<td></td>
<td>IA Scale</td>
<td>Yes</td>
<td>55.9</td>
<td>No</td>
<td>58.0</td>
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<tr>
<td></td>
<td>SF Test</td>
<td>Yes</td>
<td>23.9</td>
<td>No</td>
<td>25.2</td>
</tr>
<tr>
<td></td>
<td>RWA Scale</td>
<td>Yes</td>
<td>86.8</td>
<td>No</td>
<td>92.9</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 5. &quot;Would you ever be willing to help out in an experimental study without knowing anything about it?&quot;</th>
<th>Measures</th>
<th>Responses</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FMAT</td>
<td>Yes</td>
<td>452.5</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>IA Scale</td>
<td>Yes</td>
<td>55.2</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>SF Test</td>
<td>Yes</td>
<td>24.1</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>RWA Scale</td>
<td>Yes</td>
<td>89.1</td>
<td>No</td>
</tr>
</tbody>
</table>
Table 12 continued

<table>
<thead>
<tr>
<th>Gender</th>
<th>FMAT</th>
<th>IA Scale</th>
<th>SF Test</th>
<th>RWA Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>449.5</td>
<td>57.3</td>
<td>24.9</td>
<td>89.6</td>
</tr>
<tr>
<td>Female</td>
<td>452.1</td>
<td>56.0</td>
<td>23.8</td>
<td>86.9</td>
</tr>
<tr>
<td>p-value</td>
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<td>.038</td>
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</tbody>
</table>

Notes: All differences were non-significant at p<.10 level, unless otherwise indicated.

B. DISCUSSION

1. Instrument Development

a. Item Pool

The pool of 142 items generated for the construction of a figural measure of Tolerance of Ambiguity were specifically chosen and developed with two criteria uppermost in mind, namely that they be ambiguous figures and that they be relatively non-reactive emotionally in terms of content. Of these 142 items, 80 items were chosen according to the Q-sort rankings of the degree of ambiguity and of emotional reactivity (or neutrality) by 12 judges. Specifically, items with high ambiguity rating totals (summed across judges) and high neutrality rating totals, were selected within each type of ambiguous figure. Moderate, but general agreement among the judges was found with respect to these two item characteristics. Thus it is fairly certain that the resultant 80-item pilot-test instruments contain figures in which the characteristic of ambiguity is
not only manifest, but salient; as a whole the test items are organized around
the common feature of ambiguity. The content validity of the FMAT, therefore,
is satisfactory. Face validity, however, is not desirable for this measure; instead
the goal of a lack of transparency seems to have been achieved.

b. Pilot-tests

The 80 items selected for the pilot tests were the best 16 items in each
of the 5 categories of ambiguous figures. Three versions of the pilot test were
created by using each of three different response formats with the selected items.
The tolerance-intolerance response continuum was variously assessed at this stage
by using adjective pairs from the Evaluation and Potency factors of the Semantic
Differential and psycho-emotional reaction statements. Analysis of the three
pilot-test versions produced comparable results with respect to their subscale and
total test score distributions (in terms of distribution normality and descriptive
statistics), reliability estimates and subscale intercorrelations. The inference can be
made from these results that the three response formats measure the same or
similar psychological reactions to the figural stimuli, that is, that responses along
the dimensions of Evaluation, Potency and the psycho-emotional reaction
statements used reflect similar internal reactions to the item stems. Thus, the
use of the Version Three response format in the final instrument is justified due
to its slight psychometric superiority and overwhelming popularity in terms of
being most congruent with the respondent's task.

Important psychometric indications are already present at the pilot test
level; these indications are reiterated and strengthened in the final form of the
instrument. In particular, (1) Version Three's high overall estimate of internal
consistency indicates a relative homogeneity of items, all of which converge to measure a single construct. 2) The pattern of subscale intercorrelations suggests that the construct has a multifaceted nature, with some dependence and some independence among those facets. 3) The high estimates of reliability for the subscales supports this and suggests that the subscales are reasonable assessment vehicles for the multiple dimensions. 4) The normality test of the total score distribution indicates that the construct has a variability across respondents which is essentially normally distributed. Similar results at the subscale level indicate that the dimensions assessed via the subscales are likewise variable and normally distributed in the sample. Finally, 5) the range of subscale-total test correlations (.62 to .81) suggest a balanced multidimensional structure to the instrument, wherein no one subscale dominates over any others.

c. *FMAT*

Pilot-test Version Three was chosen to be the basis of the final instrument, the FMAT. All of the above points are recapitulated in the results for the FMAT itself with further empirical evidence found through the use of factor analysis. The results of the 'best' solution, seen on Figure 12, show how the items load on four factors. Essentially, the factor analytic solution represents a slight reorganization and condensation of the *a priori* subscales.

Factor I is composed of the entire subscale IMPOSS, plus three items from the REVERS subscale (see Figure 13). One striking common feature of all of these items is that the figures are composed of clean, geometric lines and, for the most part (except #18), can be seen as collections of lines and planes or even geometric solids.
Factor II is made up of 11 items: the entire subscale UNSTRUCT and 5 items from the subscale FRAG (see Figure 14). A salient feature belonging to all of the items in this factor is an abstract quality—the complete absence of any one clear interpretation or meaning. In fact, the remaining item of the FRAG subscale, #19, is the only one in this group which suggests a specific interpretation by reference to the chair outline above it, and is the only one not also loading on Factor II. The amalgamation of the two subscales to form this one factor suggests that the difference between them is not substantial; specifically, respondents were not able to perceive readily that FRAG items are degraded forms of representational images, whereas UNSTRUCT items are entirely abstract. Along these lines, it should be noted that the most interpretable FRAG items, #8 and #9, have relatively low loadings. The difference in the dimensions of the FRAG and UNSTRUCT distributions, and their correlation at only $r = .60$, suggests that there is still some value in retaining them as separate subscales.

Factor III is composed of 7 items (see Figure 15), three each from the NONREV and REVERS subscales with #19 from FRAG loading as the last item on the factor. One common feature to these items can be seen as both a structural and a content element, namely that each ambiguous figure is placed below unambiguous, but related, forms.

Factor IV is made up of 4 items (see Figure 16): three from the NONREV subscale and #20 from the UNSTRUCT subscale. Item #20 was the only item to load above a .35 criterion on more than one factor; it also loaded on Factor II. Items #3, #7 and #25 (NONREV) are all distinct examples of overlapping figures of the 'non-reversible, multiple meaning' type and so clearly
belong together. The relation of item #20 to these three items is, however, unclear.

In review, the results of the factor analysis support the notion of the multidimensional nature of the construct measured and, in addition, that the subscales used to give shape to that multidimensionality are not too few in number, but rather may be more discriminating than the subscale structure suggested by the principal components analysis. As well, these results the logic of the typology of the ambiguous figures and the cohesiveness of the resulting subscales. This is shown most strongly for the IMPOSS, UNSTRUCT and FRAG subscales, and somewhat less so for the REVERS and NONREV subscales. While the factor solution shows a subsumptive mapping of 5 correlated subscales onto 4 orthogonal factors, these factors leave approximately 60% of the variance in the FMAT scores unaccounted for, therefore, the use of the a priori subscales may be more informative and appropriate. The general sample-specific nature of factor analytic solutions also supports this conclusion, in the absence of a cross-validation of the factor structure.

Results of the instrument development phase indicate that the FMAT is a highly reliable (internally-consistent) measure of a multidimensional construct which involves the psycho-emotional reaction to ambiguity presented in a figural form. As well, the a priori subscale structure intended to measure the different dimensions of the construct is judged adequate insofar as it is validated by the factor analysis results. Whether the construct measured is a generalized Tolerance of Ambiguity or Tolerance of Figural Ambiguity in a narrower sense cannot be known at this point. Unfortunately, the evidence to determine this does not materialize from the rest of the investigation.
2. Validation Study

a. MTMM Component

The technique of construct validation via examination of a multitrait-multimethod matrix was first developed by Campbell and Fiske (1959). They described how the intercorrelation matrix can be set up and divided into three major components: two monomethod blocks and one heteromethod block. Each monomethod block is composed of a reliability diagonal and a heterotrait-monomethod triangle while a heteromethod block is composed of 'validity diagonal' (containing monotrait-heteromethod values) and two non-identical heterotrait-hetermethod triangles (see Figures 17 and 18). Reliabilities (estimates of internal consistency) are seen in two reliability diagonals, one for each method. Reliabilities can also be considered monotrait-monomethod values.

Campbell and Fiske outline four requirements for evidence of convergent and discriminant validity:

"In the first place, the entries in the validity diagonal should be significantly different from zero and sufficiently large to encourage further examination of validity. This requirement is evidence of convergent validity. Second, a validity diagonal value should be higher than the values lying in its column and row in the heterotrait-hetermethod triangles. That is, a validity value for a variable should be higher than the correlations obtained between that variable and any other variable having neither trait nor method in common....A third common-sense desideratum is that a variable correlate higher with an independent effort to measure the same trait than with measures designed to get at different traits which happen to employ the same method. For a given variable, this involves comparing its values in the validity diagonals with its values in the
heterotrait-monomethod triangles....A fourth desideratum is that the same pattern of trait interrelationship be shown in all of the heterotrait triangles of both the monomethod and heteromethod blocks....The last three criteria provide evidence for discriminant validity" (pp.82-83).

Applying these requirements to the data at hand, it is soon seen that the entries in the validity diagonal (see Figure 17) are so low as to discourage further examination of construct validity for this set of measures. Although the measures VISUAL and VERBAL were chosen to assess quite different abilities, so that it was not expected that they be highly related, in fact, their correlation at r = .29 is the highest level of association achieved in this matrix. In other words, finding this low a 'validity coefficient' for VISUAL and VERBAL is not as surprising as the lack of relationship between the Tolerance of Ambiguity measures and between the Authoritarianism measures, the SF Test and the RWA Scale, both of which are currently popular research instruments.

Looking beyond this indication of a lack of convergent validity, the second requirement of Campbell and Fiske's can be translated into the following from Figure 17: for Tolerance of Ambiguity, the correlation labelled '1' should be of greater magnitude than correlations labelled '2', '3', '4' and '7'; for Authoritarianism, 5 should be greater than 2, 4, 6 and 8; and for Cognitive Ability, 9 should be greater than 3, 6, 7 and 8. It can be seen that these relationships hold in the last two cases but not for the the first; in other words, evidence of discriminant validity exists for Authoritarianism and Ability, but not for Tolerance of Ambiguity. The next requirement can be similarly stated as the following: for Tolerance of Ambiguity, 1 should be greater than A, B, D and E; for Authoritarianism, 5 should be greater than A, C, D and F and for Ability,
9 should be greater than B, C, E and F (see Figure 17). Once again, evidence of discriminant validity exists for Authoritarianism and Ability but not for Tolerance of Ambiguity. The fourth requirement, that of a similarity of trait interrelationship pattern does not hold for any of the variables involved.

These outcomes are echoed in the case of the intercorrelation matrix for the trait measures after VISUAL and VERBAL have been partialed out of each variable (see Figure 18). Again, evidence of convergent validity is lacking (correlations labelled 1 and 4). Discriminant validity for Authoritarianism is supported (4 is greater than 2 and 3) but not for Tolerance of Ambiguity (1 is not greater than 2 and 3). The third requirement is again met for Authoritarianism (4 is greater than A and B) but not for Tolerance of Ambiguity (1 is not greater than A and B). The fourth requirement cannot be applied in this case because no patterns exist in these heterotrait triangles.

In summary, the main conclusions drawn from the examination of the MTMM are: 1) there is no evidence of either convergent or discriminant validity for the Tolerance of Ambiguity measures; 2) there is some evidence of convergent and discriminant validity for the Authoritarianism and Cognitive Ability measures, however, this evidence is overshadowed by the very low coefficients found in the 'validity diagonal'. Thus the evidence supports this conclusion only in the most minimal sense. The validity of the Cognitive Ability measures is not really of concern to this study, in fact, the low correlation between VISUAL and VERBAL suggests that these measures are functioning properly in that they are able to partial out quite distinctly different abilities. Finally, 3) points one and two are recapitulated in the secondary MTMM matrix, that is, after the Cognitive Ability measures have been partialed out.
b. Relationships among battery measures

The relationship between each pair of variables in the MTMM matrices is also of interest. The IA Scale shows a slight relationship to the SF Test and RWA Scale in the predicted positive direction, both before and after VISUAL and VERBAL are partialed out, however, the strongest associations are seen between the IA Scale and the Ability measures (see Figures 17 and 18). Unfortunately the amount of error variance in the IA Scale is so large proportional to true variance, that these results must be viewed as extremely tentative.

The surprisingly low correlation between the SF Test and the RWA Scale may point to one or both of these measures lacking construct validity. Another possibility is that they each measure the construct of Authoritarianism differentially, that is, by emphasizing different aspects of the trait.

Hogan (1975), who developed the SF Test, is not explicit about his conceptualization of the trait Authoritarianism, except to imply that he means that construct "as originally used in the Adorno, et al. (1950) study" (p.540). He also cites evidence for convergent validity of the SF Test as it correlates significantly "...with Adorno-type verbal measures of Authoritarianism: .64 for 73 American undergraduates (Hogan, 1970), .29 for 78 American nursing students (Hogan, 1971), .29 for 83 German law students, and .26 for 86 New Zealand Borstal boys" (Hogan, 1975; p.540).

The RWA Scale, developed by Altemeyer (1981), is intended to measure Right-Wing Authoritarianism, by which is meant "...the covariation of three attitudinal clusters: 1) Authoritarian submission...,; 2) Authoritarianism aggression...,; and 3) Conventionalism..." (p.148). He labels the construct 'right-wing' Authoritarianism "...because the submission is to established
AUTHORITIES. THERE IS NO UNDERLYING ASSUMPTION THAT THE GOVERNMENT MUST BE RIGHT-WING TO COMMAND THIS SUBMISSION" (P.152). ALTMEYER DEVELOPED THIS INSTRUMENT AFTER AN EXHAUSTIVE EXAMINATION OF 30-YEARS-WORTH OF RESEARCH ON AUTHORITARIANISM, AND SPENT 10 YEARS DEVELOPING, REFINING AND VALIDATING IT. THE RESULTANT INSTRUMENT, ACCORDING TO ALTMEYER, TAPS THE CENTRAL CORE COMPONENTS OF AUTHORITARIANISM (1981, PP.170-172), AND DOES SO IN A UNIDIMENSIONAL FASHION, AS OPPOSED TO THE MULTIDIMENSIONALITY OF PREVIOUS SCALES (PP.172-174).

MOST LIKELY, THEN, THE SF TEST AND THE RWA SCALE DO NOT CORRELATE HIGHLY BECAUSE THEY SAMPLE DIFFERENT DOMAINS OF THE CONSTRUCT AUTHORITARIANISM IN THE BROADEST SENSE. THE SF TEST IS BASED ON THE F-SCALE, OR VERSIONS OF IT, AND REFLECTS THE MULTIDIMENSIONALITY OF THOSE INSTRUMENTS, WHEREAS THE RWA SCALE Focuses ON A SINGLE DIMENSION MADE UP OF THE COVARIATION OF THREE CORE COMPONENTS. SEEN IN THIS LIGHT, THE SMALL AMOUNT OF SHARED VARIANCE FOUND FOR THESE TWO SCALES IS MADE MORE COMPREHENSIBLE.

c. FMAT AND IA SCALE

THE TWO MEASURES OF TOLERANCE/INTOLERANCE OF AMBIGUITY WERE FOUND TO BE ENTIRELY UNCORRELATED, BOTH BEFORE AND AFTER PARTIALLING OUT THE ABILITY MEASURES. AT THE LEVEL OF SUBSCALES, TOO, IT WAS FOUND THAT NO ASSOCIATION EXISTED BETWEEN THE FMAT AND THE IA SCALE. FACTOR III, HOWEVER, COMPOSED MAINLY OF NONREV AND REVERS ITEMS, WAS FOUND TO CORRELATE WITH THE IA SCALE AT R=.17, P LESS THAN .05 (SEE TABLE 9). ASIDE FROM THE PSYCHOMETRIC PROBLEMS OF THE IA SCALE, PERHAPS THESE FINDINGS CAN BE BEST EXPLAINED BY PROPOSING THAT THE FMAT AND THE IA SCALE BOTH MEASURE AMBIGUITY TOLERANCE BUT IN ENTIRELY DIFFERENT DOMAINS. THE NOTION OF DOMAIN-SPECIFIC RESPONSES TO AMBIGUITY HAS NOT BEEN EXPLORED IN A
systematic way except for one study (Rogers and King, 1976), in which the hypothesis was tested that "...individuals will express relatively independent degrees of tolerance for ambiguity in different experiential domains" (pp.1-2). Using Theoretical, Social, Economic (wealth and power) and Aesthetic domains, Rogers and King constructed a test based on items adapted from the IA Scale and that of MacDonald (1970). By comparing the individual subscales' internal consistency estimates with intercorrelations among subscales, they concluded that the hypothesis of domain-specificity was supported, at least for the domains measured by the Social, Aesthetic and Theoretical subscales. They state: "Currently popular measures ....which treat tolerance of ambiguity as a personality trait which operates similarly in most areas of an individual's experience may not be appropriate for testing theoretical propositions involving the construct" (pp.8-9). Indeed, their findings are supportive of Scott's (1969) reservations about the generality of cognitive traits and consistent with Mischel's (1973) views of the situational specificity of personality traits. Similarly, Vannoy (1965) demonstrated that cognitive complexity-simplicity may vary considerably over areas of an individual's experience.

While Rogers and King (1976) found evidence to support the domain-specificity of Tolerance of Ambiguity, it should be noted that this work was conducted with only verbal items. The domain-specificity of the construct may be even more pronounced when the form of the items as well as their content is domain-specific, as is the case with the FMAT. This line of reasoning leads to the notion that the FMAT is a measure of Tolerance of Ambiguity in the domain of visual processing, as distinct from the domain the IA Scale taps, although "modality" might be a more fitting substitute for "domain" in this case.
The only subset of the FMAT items to correlate at all with the IA Scale are those represented by Factor III and these items are, perhaps the least 'figural' of all in that they include numbers and letters (see Table 9 and Figure 15). In line with recent research on the differential processing of left and right brain hemispheres (Bogen, 1975; Ornstein, 1975 and Bradshaw & Nettleton, 1981), perhaps the FMAT will more likely assess right-brain ambiguity-tolerance—that associated with synthetic, holistic and non-rational cognitive functioning, whereas the IA Scale is more likely to assess ambiguity tolerance in the left-brain modality—those functions involving language, speech and analytic, rational and sequential modes of cognition. Although this line of thinking remains highly speculative it may prove fruitful in the future, especially if a more reliable verbal Tolerance of Ambiguity instrument can be developed and used.

d. FMAT, SF Test and Ability measures

The VISUAL and VERBAL measures had a surprisingly small degree of association with the two figural measures, the FMAT and the SF Test (see Figure 17). These findings suggest not only that verbal ability has little bearing on the two measures but also that visual discrimination ability has very little to do with them either.

e. FMAT and Authoritarianism measures

The correlation between the FMAT and the SF Test (r=.23 before partiallalling and r=.21 after) was in the expected direction, but less in magnitude than expected. The FMAT did not correlate with the RWA Scale in either condition. Further examination of the results reveals that the items making up
the two subscales NONREV and REVERS relate in a different and sometimes opposite way to the Authoritarianism scales than the other three subscales. As subscales, neither correlate with the RWA Scale and only REVERS correlates with the SF Test at a minimal level (see Table 8). Arranged as the major components of Factors III and IV (see Figure 12), these items more clearly deviate from the rest in the FMAT. Factor III correlates positively with the IA Scale (the only such instance) and not at all with the Authoritarianism measures; Factor IV correlates only with the RWA Scale, but inversely and positively with the VERBAL measure (see Table 9). Perhaps the clearest evidence emerges with the composite variables Amb.One and Amb.Two, where it can be seen that Amb.Two, composed almost entirely of NONREV and REVERS items correlates only with the RWA Scale but inversely, whereas Amb.One, composed of the other three subscales' items, correlates positively with the SF Test and RWA Scale, positively with the VISUAL measure and negatively with the VERBAL measure (see Table 10).

These findings suggest that there is a subgroup of items in the FMAT which relate in a very different way to the Authoritarianism scales, indeed in a reverse fashion, compared to the other items. Either the kind of ambiguity which characterizes these items or some other feature common to them may be responsible for these findings. These items, found in Factors III and IV, appear different with respect to their composition and their complexity, however the attempt to relate these features to the trait of Authoritarianism would not only be speculative, but also counter-intuitive. Recalling how small the proportions of shared variances are also cautions against further speculations. As it is, it can be seen that the elements of the FMAT which relate to the RWA Scale on a
level comparable to its relation to the SF Test are cancelled out by elements which do not relate or which relate in an opposing way. The differential relationship of the FMAT to the SF Test and the RWA Scale may also be due in some way to those two measures' differential assessment of the trait of Authoritarianism.

f. Analysis of "Lifestyle Questions", School Groups and Gender

Taken as a whole, the results of the analysis of the "Lifestyle Questions" are inconsistent and inconclusive, especially since so few of the comparisons of the means reached significance even at the $p = .10$ level. Of those comparisons that were significant or which displayed trends, the results indicate slight support for the construct validity of the IA Scale, SF Test and RWA Scale, in that higher means were found for those response groups which were predicted as being more ambiguity-intolerant and more authoritarian. This was found with respect to the questions dealing with willingness to participate in an unknown experimental (#8), absence of emotional ambivalence (#2), preferred newspaper (#3), personal psychological androgyny (#4) and gender. Such evidence of construct validity was found for the FMAT, however, with respect to questions #3 and #4 only. There was, however, such slight evidence that, by and large, these results neither contribute to the enhancement of the construct validity of the IA Scale or the FMAT, nor do they clarify the relationship between the two scales or between the Tolerance/Intolerance scales and the Authoritarianism scales.
CHAPTER V. SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter summarizes the reconceptualization of Tolerance of Ambiguity and the development of an instrument designed to measure the trait using figural stimuli. The instrument was included in a battery of relevant tests used to assess its construct validity in a modified MTMM design.

Suggestions for the use of the instrument in further research are also made, and limitations of this research are identified.

A. SUMMARY

1. Summary: Reconceptualization of the Construct

A review of the literature revealed that, since its inception, the construct of Intolerance of Ambiguity has been plagued by conceptual difficulties. In particular, previous formulations were faulted in many ways, including (1) incomplete definitions--e.g. lack of an articulation of both tolerance and intolerance, (2) logically inconsistent definitions and (3) confusion regarding the distinction between Intolerance of Ambiguity and Rigidity. A reconceptualization of the construct was developed for this study, which incorporated sound aspects of the previous work and which aimed at completeness and logical consistency.

Ambiguosity was defined in a relevant context and Tolerance of Ambiguity was defined in terms of responses characterizing ambiguity-intolerant and ambiguity-tolerant individuals. (see Chapter I, pp.18-19.) This formulation of Tolerance of Ambiguity, referring to individual's tendencies of perception and interpretation, was distinguished from the construct Rigidity, which refers to the perseverance of a mental set or solution (see pp.19-23).
2. Summary: Need for a New Measure

The Intolerance of Ambiguity literature also shows that the many attempts to measure the trait have been weakened by methodological inadequacies. In particular, previous measurement instruments suffered from a number of faults, including (1) flawed operational definitions, (2) possible test confounds such as verbal ability and reactivity, (3) problems of item interpretation due to their verbal nature, (4) low estimates of internal consistency and (6) equivocal construct validation results.

The five most currently popular measures of Intolerance of Ambiguity were compared and shown to have many similarities. The most popular of these measures, the IA Scale (Budner, 1962), was examined and found to have psychometric problems such as reliability and validity deficits, possibly arising from the verbal nature of the test.

A brief review of the Intolerance of Ambiguity research literature revealed, however, that much interest exists in the construct, particularly in the areas of social, developmental, personality, counselling, clinical and educational psychology. Research interest in Tolerance of Ambiguity in educational settings focuses on how this construct interacts with teacher and pupil characteristics to affect the learning process. This interest is becoming even more pronounced as North American school curriculums make allowances for new perspectives on truth, equivocality and factuality in traditionally fact-based disciplines and for an increasing emphasis on pluralism in culture, religion and politics. Research interest in these areas is hampered, however, due to a lack of research tools suitable for use with younger subjects. A figural approach to the measurement of Tolerance of Ambiguity was adopted because it had the potential: a) to avoid problems
arising from the use of verbal items and b) to be a suitable research tool with both and adults and children.

3. Summary: Instrument Development and Analysis

Beginning with an item pool of 142 ambiguous figures, 80 items were selected on the basis of their high ambiguity ratings and low emotional reactivity ratings. The 80 items were used to construct three parallel pilot-test versions which employed response formats based on semantic differential adjective pairs and reaction statements. On the basis of a slight psychometric superiority and a greater meaningfulness, Version Three, which used reaction statements for item responses, was chosen as the foundation for the final instrument.

The Figural Measure of Ambiguity Tolerance was constructed from the 30 best items of the 80 items used in Version Three. The 30 items are organized into 5 subscales, namely: Reversible (REVERS), Non-reversible (NONREV), Unstructured (UNSTRUCT), Fragmented (FRAG) and Impossible (IMPOSS). The categorization of ambiguous figures into 5 types was established directly from the item pool and maintained throughout test construction. Along the way, indications of the validity of this typology showed up in the reliability estimates of the subscales, both at the pilot-test level and for the final version. A stronger indication came from the results of the factor analysis of the FMAT data, which demonstrated the basic cohesiveness of the subscale structure. The final version, the FMAT, had a Cronbach's alpha reliability of .81, with the subscale alphas ranging from .56 to .83. The subscales showed a wide range of correlations with one another and a narrow range of moderate correlations with the total test score (not corrected for overlap). It may be concluded that the subscales measure
somewhat different dimensions, but that the different dimensions combine to reflect an overall personality construct.

4. Summary: Validation Study

The results of the modified MTMM analysis showed no support for the construct validity of Tolerance of Ambiguity as measured by the FMAT and the IA Scale. There was, however, modest evidence of construct validity for Authoritarianism as measured by the S-F Test and the RWA Scale and the construct Ability as measured by the F-M Test (VISUAL) and the Baddeley Grammatical Reasoning Test (VERBAL). In particular, evidence of discriminant validity was found for the Authoritarianism and Ability measures, but largely as function of the lack of convergent validity demonstrated for these constructs. This minimal kind of discriminant validation was recapitulated after the Ability measures were partialed out.

There was only minimal evidence that ability, either in a verbal or visual domain, confounded the FMAT as a measurement instrument. Stronger associations, however, existed between both Ability measures and the IA Scale, indicating that greater ability, especially of a verbal kind, tends to go with lower scores on the IA Scale. As with the FMAT, the Authoritarianism scales were virtually uncorrelated with the Ability measures.

There was a notable lack of association among the six battery measures, which was surprising especially for the Tolerance/Intolerance of Ambiguity and Authoritarianism measures, as they displayed little or no convergent validity and minimal association between the traits, although they are theoretically related.

Internal-consistency reliability estimates for the trait measures were
satisfactory for the FMAT (.81), S-F Test (.72), and RWA Scale (.76), but not for the IA Scale (.38).

Results of the "Lifestyle Questions", educational groupings and gender analyses with respect to the trait measures were largely inconclusive. Slight non-significant support existed, however, for the construct validity of the IA Scale, S-F Test and RWA Scale with respect to willingness to participate in an unknown experimental study, absence of emotional ambivalence, preferred newspaper, personal psychological androgyny and gender. Similar support existed for the FMAT with respect to preferred newspaper and androgyny only.

B. CONCLUSIONS

The main conclusions of this study centre around the conceptualization of Tolerance/Intolerance of Ambiguity, the psychometric inadequacies of currently popular measures of this construct and the psychometric evaluation of the Figural Measure of Ambiguity Tolerance (FMAT).

A review of the Intolerance of Ambiguity literature has revealed that conceptualization of the construct has been problematic since it was first formulated by Frenkel-Brunswik. These deficiencies in clarity and articulation have contributed to confusion and a lack of meaningful progress in the field. Likewise, the psychometric flaws in the currently popular measures have produced research results which, as a group, lack cohesion and vigor. This study has shed light on these problematic areas, and it offers a conceptualization of Tolerance of Ambiguity which may serve as a new foundation for further theoretical and applied work on the construct.

As regards the psychometric evaluation of the FMAT, results indicate that
it has satisfactory internal consistency reliability, both at the subscale and total test level. It is a balanced, multidimensional instrument with subscales which have a priori meaning as well as factorial validity. The measure shows good face and content validity and this, along with the degree of care taken in its construction, development and refinement, demonstrates that the FMAT is a valid measure of Tolerance of Figural Ambiguity, if not Ambiguity in a broader sense. Whether the FMAT measures Tolerance of Ambiguity in the broader sense is in question; it did not relate well to the IA Scale or to measures of Authoritarianism. The strength of this doubt is moderated, however, by the lack of psychometric adequacy of the IA Scale and by the general lack of association between any of the trait measures. The evidence suggests that the FMAT is not subject to the influence of varying cognitive ability in respondents, specifically in the areas of verbal ability or visual discrimination ability.

Secondary conclusions have to do with the psychometric adequacy of Budner's IA Scale. The results of this study tend to confirm, for the most part, that the IA Scale has reliability and validity deficits. In particular, its internal consistency reliability was found to be unsatisfactory, it did not relate well to measures of Authoritarianism, it did not garner much support for construct validity when referenced to criterion groups, and it showed evidence of being subject to test confounded with both verbal and visual discrimination ability.

Although the internal consistency reliability of the two Authoritarianism measures was satisfactory, there was little evidence of convergent validity between them.

Aside from the general limitations inherent in any study which employs a sample of convenience—and this study made greater efforts than most to achieve
a heterogenous sample—the main limitations centre on the attempt to assess construct validity. Specifically, the power of the MTMM was diminished due to the use of the IA Scale as the extant measure of Tolerance of Ambiguity and the use of the Authoritarianism scales as the theoretically related construct measures. As well, the use of the "Lifestyle Questions" to generate criterion-referenced response groups, which had formerly been used with diverse verbal measures of Intolerance of Ambiguity, lacked the discriminating power required for this approach to construct validation.

C. RECOMMENDATIONS

The main recommendations for future research are the following:

i) Further theoretical work is required. Research on the construct Tolerance of Ambiguity has been severely hampered by a lack of rigor in its conceptualization. What is being suggested here is the development of a complete model of the psychological processes involved in Tolerance/Intolerance of Ambiguity. This task would involve a further examination of ambiguity itself in terms of definition, taxonomy, etc., as well as an identification of the important situational and dispositional determinants of Tolerance of Ambiguity. Finally, this model would have to identify essential processes and map the dynamics of their inter-relationships. An example of such a model for a related construct is that of Rokeach's (1949) for Dogmatism.

ii) Further research is required, obviously, to explore the construct validity of the FMAT. As a beginning, a similarly designed validation study could be conducted with a different verbal measure of Intolerance of Ambiguity (Norton's, for example) and different theoretically-related constructs, such as Conversatism or
iii) Further research approaches could be developed which explore the domain-specificity of Tolerance of Ambiguity (a la Rogers and King, 1976), while including both the verbal and figural methods of assessment. A fully-crossed design which features different domains of ambiguity and different methods of assessing respondents' reactions to those domains would provide much illuminating and useful information. As well, the specificity issue could be explored with respect to modality, especially along the lines of current work on brain hemispheric specialization (cf. Bradshaw and Nettleton, 1981).

iv) Another quite exploratory research direction would be to try to establish a link between Tolerance of Ambiguity and a possible physiological concomitant (e.g., blood pressure, galvanic skin response).

v) Further research could also be conducted to explore the use of the FMAT with younger respondents, either in its original form, or with some modifications. Perhaps the FMAT could be included with two or three different measurement approaches (e.g., those of Hamilton, 1957; Harrington, Block and Block, 1978; Singer and Flavell, 1981) in order to "triangulate" on the child's response to ambiguity, as well as to assess each method's relative success.
REFERENCES


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INSTRUCTIONS

Please respond to the following questions according to your own opinions. You will probably find that you agree with some of the statements, disagree with others, and to varying extents. Record your opinion on the scales provided, according to the amount of your agreement or disagreement, by circling one of the following for each statement:


1. An expert who doesn't come up with a definite answer probably doesn't know too much.
   str.d____ md____ sli.d____ n____ sli.a____ ma____ str.a

2. There is really no such thing as a problem that can't be solved.
   str.d____ md____ sli.d____ n____ sli.a____ ma____ str.a

3. A good job is one where what is to be done and how it is to be done are always clear.
   str.d____ md____ sli.d____ n____ sli.a____ ma____ str.a

4. In the long run it is possible to get more done by tackling small, simple problems rather than large and complicated ones.
   str.d____ md____ sli.d____ n____ sli.a____ ma____ str.a

5. What we are used to is always preferable to what is unfamiliar.
   str.d____ md____ sli.d____ n____ sli.a____ ma____ str.a

6. A person who leads an even, regular life in which few surprises or unexpected happenings arise, really has a lot to be grateful for.
   str.d____ md____ sli.d____ n____ sli.a____ ma____ str.a

7. I like parties where I know most of the people more than ones where all or most of the people are complete strangers.
   str.d____ md____ sli.d____ n____ sli.a____ ma____ str.a

8. The sooner we all acquire similar values and ideals the better.
   str.d____ md____ sli.d____ n____ sli.a____ ma____ str.a
9. I would like to live in a foreign country for a while.

10. People who fit their lives to a schedule probably miss most of the joy of living.

11. It is more fun to tackle a complicated problem than to solve a simple one.

12. Often the most interesting and stimulating people are those who don’t mind being different and original.

13. People who insist upon a yes or no answer just don’t know how complicated things really are.

14. Many of our most important decisions are based upon insufficient information.

15. Teachers or supervisors who hand out vague assignments give a chance for one to show initiative and originality.

16. A good teacher is one who makes you wonder about your way of looking at things.
APPENDIX B: INTOLERANCE OF AMBIGUITY SCALE; MARTIN AND WESTIE, 1959
INTOLERANCE OF AMBIGUITY SCALE

1. There are two kinds of people in the world: the weak and the strong.
   Strongly agree  Agree  Undecided  Disagree  Strongly disagree
2. A person is either a 100% American or he isn't.
3. A person either knows the answer to a question or he doesn't.
4. There are two kinds of women: the pure and the bad.
5. You can classify almost all people as either honest or crooked.
6. First impressions are very important.
7. It doesn't take very long to find out if you can trust a person.
8. There is only one right way to do anything.
APPENDIX C: TOLERANCE OF AMBIGUITY SCALE; RYDELL AND ROSEN, 1966
### The Tolerance of Ambiguity Scale

<table>
<thead>
<tr>
<th>Key*</th>
<th>No.</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>1.</td>
<td>A problem has little attraction for me if I don't think it has a solution.</td>
</tr>
<tr>
<td>F</td>
<td>2.</td>
<td>I am just a little uncomfortable with people unless I feel that I can understand their behavior.</td>
</tr>
<tr>
<td>F</td>
<td>3.</td>
<td>There's a right way and a wrong way to do almost everything.</td>
</tr>
<tr>
<td>T</td>
<td>4.</td>
<td>I would rather bet 1 to 6 on a long shot than 3 to 1 on a probable winner.</td>
</tr>
<tr>
<td>T</td>
<td>5.</td>
<td>The way to understand complex problems is to be concerned with their larger aspects instead of breaking them into smaller pieces.</td>
</tr>
<tr>
<td>F</td>
<td>6.</td>
<td>I get pretty anxious when I'm in a social situation over which I have no control.</td>
</tr>
<tr>
<td>F</td>
<td>7.</td>
<td>Practically every problem has a solution.</td>
</tr>
<tr>
<td>F</td>
<td>8.</td>
<td>It bothers me when I am unable to follow another person's train of thought.</td>
</tr>
<tr>
<td>F</td>
<td>9.</td>
<td>I have always felt that there's a clear difference between right and wrong.</td>
</tr>
<tr>
<td>F</td>
<td>10.</td>
<td>It bothers me when I don't know how other people react to me.</td>
</tr>
<tr>
<td>F</td>
<td>11.</td>
<td>Nothing gets accomplished in this world unless you stick to some basic rules.</td>
</tr>
<tr>
<td>T</td>
<td>12.</td>
<td>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.</td>
</tr>
<tr>
<td>F</td>
<td>13.</td>
<td>Vague and impressionistic pictures really have little appeal for me.</td>
</tr>
<tr>
<td>F</td>
<td>14.</td>
<td>If I were a scientist, it would bother me that my work would never be complete (because science will always make new discoveries).</td>
</tr>
<tr>
<td>F</td>
<td>15.</td>
<td>Before an examination, I feel much less anxious if I know how many questions there will be.</td>
</tr>
<tr>
<td>F</td>
<td>16.</td>
<td>The best part of working a jigsaw puzzle is putting in that last piece.</td>
</tr>
</tbody>
</table>

*All items keyed for high tolerance of ambiguity.*
APPENDIX D: AMBIGUITY TOLERANCE SCALE; MACDONALD, 1970
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.
Philosophy

1. Almost every problem has a solution.

2. I like to fool around with new ideas, even if they are a total waste of time.

3. Nothing gets accomplished in this world unless you stick to some basic rules.

4. I do not believe that in the final analysis there is a distinct difference between right and wrong.

5. Usually, the more clearly defined rules a society has, the better off it is.

6. Personally, I tend to think that there is a right way and a wrong way to do almost everything.

7. I prefer the certainty of always being in control of myself.

Interpersonal Communication

8. I tend to be very frank with people.

9. It irks me to have people avoid the answer to my question by asking another question.

10. I really dislike it when a person does not give straight answers about himself.

11. It really disturbs me when I am unable to follow another person's train of thought.

12. I prefer telling people what I think of them even if it hurts them, rather than keeping it to myself.

Public Image

13. It would bother me if different close friends of mine had conflicting opinions of me.

14. I always want to know what people are laughing at.

15. It intensely disturbs me when I am uncertain of how my actions affect others.

16. It bothers me when I don't know how strangers react to me.

Job-Related

17. I function very poorly whenever there is a serious lack of communication in a job situation.

18. In a situation in which other people evaluate me, I feel a great need for clear and explicit evaluations.

19. If I am uncertain about the responsibilities of a job, I get very anxious.

20. If I were a scientist, I might become frustrated because my work would never be completed (science will always make new discoveries).

21. 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.

Problem-Solving

22. Once I start a task, I don't like to start another task until I finish the first one.

23. Before any important job, I must know how long it will take.

24. In a problem-solving group it is always best to systematically attack the problem.

25. A problem has little attraction for me if I don't think it has a solution.

26. I do not like to get started in group projects unless I feel assured that the project will be successful.

27. In a decision-making situation in which there is not enough information to process the problem, I feel very uncomfortable.

28. I don't like to work on a problem unless there is a possibility of coming out with a clear-cut and unambiguous answer.

29. Complex problems appeal to me only if I have a clear idea of the total scope of the problem.

30. A group meeting functions best with a definite agenda.
Social
31. I seem to enjoy parties the most when I know most of the people there.
32. Before going to a party, I always want to know what kind of a party it is.
33. I get pretty anxious when I'm in a social situation involving me which I have little control of.
34. Whenever I am in a new group, I usually take the initiative in introducing myself.
35. First impressions tend to be very important to me.
36. Whenever I go out to have fun, I like to have at least a vague purpose in mind.
37. I am just a little uncomfortable with people unless I feel that I can understand their behavior.
38. I don't feel comfortable with people until I can find out something about them.
39. I have a good idea of exactly how many friends I could really count on.

Habit
40. I like to know ahead of time what will be for dinner.
41. Whenever I go on a long trip, I like to keep track of the miles to go.
42. I will not consider buying an item unless the price is clearly marked on it.
43. It matters to me to know what day it is.
44. I get very anxious waiting to hear the election results.
45. I usually like to know what time it is.
46. I want to know what a salesman is selling before I'll listen to him.
47. It really bothers me when a person shows up late for an appointment without an explanation.
48. If I don't get the punch line of a joke, I don't feel right until I understand it.
49. I enjoy carefully rehashing my conversations in my mind afterwards.
50. Before going out, I always check my appearance to make sure I look right.
*51. I am tolerant of ambiguous situations.
52. The best part of working a jigsaw puzzle is putting in that last piece.

Art Forms
53. I tend to like obscure or hidden symbolism.
54. Mysticism is too abstract and undefined for me to take seriously.
55. If I miss the beginning of a good movie, I like to stay to see the start of it.
*56. Vague and impressionistic pictures appeal to me more than realistic pictures.
57. I tend to prefer pictures with perfect balance in the composition.
58. I like movies or stories with definite endings.
*59. Generally, the more meanings a poem has, the better I like it.
60. A poem should never contain contradictions.
61. In the final analysis, the correct interpretation of a poem or story is the author's interpretation.

Note. The items with the asterisk are the items which must be reversed in the scoring.

Note. A seven-point scale is suggested for this version of the MAT-50. We have found the following scale to be workable: YES! YES yes ? no NO NO!. In the directions, it is explained that this scale ranges from "very strong agreement" with the statement to "very strong disagreement" with the statement.
INTRODUCTION

The purpose of this project is to investigate how people react to different types of pictures or figures. Do they like them or dislike them, find them beautiful or ugly, annoying or pleasing? Taken as a group, your individual responses to the following set of items will lead to an increased understanding of personality differences with respect to visual material.

You are asked to complete the following rating task according to the instructions provided. You are asked to respond honestly, to carefully consider your responses and also to work quickly, as your initial reactions are of the most interest in this study. The task will take about 40 minutes to complete. Your name is not required on the booklet; this assures confidentiality. Your age, gender and some educational information only are requested. We assume your consent for participation with your completion of the task, however, you may withdraw from the study at any time.

Thanks very much for your co-operation.
INSTRUCTIONS

We are interested in how people evaluate or describe certain kinds of figures.

On the following 80 pages of figures, please record your reactions to the figures on the rating scales provided.

Describe each figure in terms of the six adjective pairs (GOOD-BAD, AWFUL-NICE, etc.). Some of the adjective pairs may make less sense than others, but do what you can with them. Circle the number which best corresponds to your own reaction.

Some pages have single figures on them while others have two or more. For each page that has more than one figure, you are to look carefully and see how the figures are similar and how they are different from one another. After you have done this, consider the bottom figure only and describe it in terms of each of the six adjective pairs.

There is no right or wrong, so please use your own judgement—that's what we are interested in. Start with #1 and continue right through to #80. Work quickly, don't skip any items or scales and avoid going back to items you have already done.

If you have questions about what you are supposed to do, please ask. Thanks again for your participation.

On the next page are two examples of completed items.
INSTRUCTIONS

We are interested in how people evaluate or describe certain kinds of figures.

On the following 80 pages of figures, please record your reactions to the figures on the rating scales provided.

Describe each figure in terms of the six adjectives (SOOTHING, OFFENSIVE, etc.). Some of the adjectives may make less sense than others, but do what you can with them. Circle the number which best corresponds to your own reaction.

Some pages have single figures on them while others have two or more. For each page that has more than one figure, you are to look carefully and see how the figures are similar and how they are different from one another. After you have done this, consider the bottom figure only and describe it in terms of each of the six adjectives.

There is no right or wrong, so please use your own judgement-that's what we are interested in. Start with #1 and continue right through to #80. Work quickly, don't skip any items or scales and avoid going back to items you have already done.

If you have questions about what you are supposed to do, please ask. Thanks again for your participation.

On the next page are two examples of completed items.
INFORMATION PAGE (Please fill out)

AGE

GENDER: Male ___ Female ___

SCHOOL PROGRAM (IF APPLICABLE): ____________

YEAR IN PROGRAM ____________
APPENDIX G: PATTERN MATRIX FROM FOUR-FACTOR, PRINCIPAL COMPONENTS SOLUTION OF FMAT, WITH VARIMAX ROTATION
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APPENDIX H: FIGURAL MEASURE OF AMBIGUITY TOLERANCE (FMAT)--INSTRUCTIONS, ITEM STEMS, SAMPLE RESPONSE PAGES
INSTRUCTIONS

We are interested in how people evaluate or describe certain kinds of figures.

On the following 30 pages of figures, please record your reactions to the figures on the rating scales provided.

Evaluate each figure in terms of the four adjectives (FRUSTRATING, SOOTHING, etc.). Some of the words on the scales may make less sense than others, but do what you can with each one. Circle the number which best corresponds to your own reaction.

Some pages have single figures on them while others have two or more. For each page that has more than one figure, you are to look carefully and see how the figures are similar and how they are different from one another. After you have done this, consider the bottom figure only and describe it in terms of each of the ten adjective rating scales.

There is no right or wrong, so please use your own judgement—that’s what we are interested in. Start with #1 and continue right through to #30. Work quickly, don’t skip any items or scales and avoid going back to items you have already done.

If you have questions about what you are supposed to do, please ask.

On the next page are two examples of completed items. You may begin as soon as you are ready.
LOOK AT THE FIGURE CAREFULLY AND RECORD YOUR REACTIONS TO IT ON THE SCALES PROVIDED BELOW.

I FIND THE FIGURE........

FRUSTRATING ______ SD _____ D _____ MD _____ MA _____ A _____ SA

SOOTHING _______ SD _____ D _____ MD _____ MA _____ A _____ SA

ANNOYING ________ SD _____ D _____ MD _____ MA _____ A _____ SA

PLEASUREABLE _____ SD _____ D _____ MD _____ MA _____ A _____ SA

KEY: SD: strongly disagree D: disagree MD: mildly disagree
     MA: mildly agree A: agree SA: strongly agree
LOOK AT THE TOP FIGURE CAREFULLY AND RECORD YOUR REACTIONS TO IT ON THE SCALES PROVIDED BELOW

I FIND THE FIGURE........

FRUSTRATING_______SD_______D_______MD_______MA_______A_______SA

SOOTHING__________SD_______D_______MD_______MA_______A_______SA

ANNOYING___________SD_______D_______MD_______MA_______A_______SA

PLEASUREABLE_______SD_______D_______MD_______MA_______A_______SA

KEY: SD: strongly disagree D: disagree MD: mildly disagree
      MA: mildly agree A: agree SA: strongly agree
LOOK AT THE TOP TWO FIGURES CAREFULLY. THEN LOOK CAREFULLY AT THE BOTTOM FIGURE AND RECORD YOUR REACTIONS TO IT ON THE SCALES PROVIDED BELOW.

I FIND THE FIGURE......

FRUSTRATING  SD  D  MD  MA  A  SA

SOOTHING   SD  D  MD  MA  A  SA

ANNOYING  SD  D  MD  MA  A  SA

PLEASUREABLE  SD  D  MD  MA  A  SA

LOOK AT THE TOP GROUP OF FIGURES CAREFULLY. THEN LOOK CAREFULLY AT THE BOTTOM FIGURE AND RECORD YOUR REACTIONS TO IT ON THE SCALES PROVIDED BELOW.

I FIND THE FIGURE......

FRUSTRATING______ SD _____ D _____ MD _____ MA _____ A _____ SA

SOOTHING____________ SD _____ D _____ MD _____ MA _____ A _____ SA

ANNOYING____________ SD _____ D _____ MD _____ MA _____ A _____ SA

PLEASUREABLE_______ SD _____ D _____ MD _____ MA _____ A _____ SA

KEY: SD: strongly disagree  D: disagree  MD: mildly disagree
     MA: mildly agree  A: agree  SA: strongly agree
ITEM 2
ITEM 3
ITEM 4
ITEM 5

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ITEM 7
ITEM 12

A

12314

C

13
ITEM 16
ITEM 20
ITEM 23
ITEM 24
ITEM 27
APPENDIX I: SYMBOLIC FIGURES (SF) TEST (PHOTO-REDUCED); HOGAN, 1970
Below are 15 pairs of line drawings and number arrangements. Look at each pair and then draw a large check mark through the ONE drawing or number arrangement in EACH PAIR that you like best.

1. [drawing of two line segments]
2. [drawing of two line segments]
3. [drawing of a V shape]
4. [drawing of two squares]
5. [drawing of two squares]
6. [drawing of numbers 1, 2, 3, 4 and 5]
7. [drawing of a line and a plus sign]
8. [drawing of numbers 1, 2, 3, 5, 4, 1, 2, 5, 3]
9. [drawing of a triangle]
10. [drawing of a triangle]
11. [drawing of two parallel lines]
12. [drawing of two parallel lines]
13. [drawing of a square with numbers 30-40, 20-30, 5-10, 10-20, 30-40]
14. [drawing of a dashed line and a square]
15. [drawing of an 'X' and a square]
INSTRUCTIONS

This survey involves an investigation of public opinion concerning a variety of social issues. You will probably find that you agree with some of the statements, disagree with others, and to varying extents. Please record your opinion on the scales provided, according to the amount of your agreement or disagreement, by circling one of the following for each statement:


1. Laws have to be strictly enforced if we are going to preserve our way of life.
   STR.D____ MD____ SLI.D____ N____ SLI.A____ MA____ STR.A

2. People should pay less attention to the Bible and the other old traditional forms of religious guidance, and instead develop their own personal standards of what is moral and immoral.
   STR.D____ MD____ SLI.D____ N____ SLI.A____ MA____ STR.A

3. Women should always remember the promise they make in the marriage ceremony to obey their husbands.
   STR.D____ MD____ SLI.D____ N____ SLI.A____ MA____ STR.A

4. Our customs and national heritage are the things that have made us great, and certain people should be made to show greater respect for them.
   STR.D____ MD____ SLI.D____ N____ SLI.A____ MA____ STR.A

5. Capital punishment should be completely abolished.
   STR.D____ MD____ SLI.D____ N____ SLI.A____ MA____ STR.A

6. National anthems, flags, and glorification of one’s country should all be de-emphasized to promote the brotherhood of all men.
   STR.D____ MD____ SLI.D____ N____ SLI.A____ MA____ STR.A

7. The facts on crime, sexual immorality, and the recent public disorders all show we have to crack down harder on deviant groups and troublemakers if we
are going to save our moral standards and preserve law and order.

8. A lot of our society's rules regarding modesty and sexual behavior are just customs which are not necessarily any better or holier than those which other peoples follow.

9. Our prisons are a shocking disgrace. Criminals are unfortunate people who deserve much better care, instead of so much punishment.

10. Obedience and respect for authority are the most important virtues children should learn.

11. Organizations like the army and the priesthood have a pretty unhealthy effect upon men because they require strict obedience of commands from supervisors.

12. One good way to teach certain people right from wrong is to give them a good stiff punishment when they get out of line.

13. Youngsters should be taught to refuse to fight in a war unless they themselves agree the war is just and necessary.

14. It may be considered old-fashioned by some, but having a decent, respectable appearance is still the mark of a gentleman and, especially, a lady.

15. In these troubled times laws have to be enforced without mercy, especially when dealing with the agitators and revolutionaries who are stirring things up.

16. Atheists and others who have rebelled against the established religions are no doubt every bit as good and virtuous as those who attend church regularly.
17. Young people sometimes get rebellious ideas, but as they grow up they ought to get over them and settle down.

18. Rules about being "well-mannered" and respectable are chains from the past which we should question very thoroughly before accepting.

19. The courts are right in being easy on drug offenders. Punishment would not do any good in cases like these.

20. If a child starts becoming a little too unconventional, his parents should see to it he returns to the normal ways expected by society.

21. Being kind to loafers or criminals will only encourage them to take advantage of your weakness, so it's best to use a firm, tough hand when dealing with them.

22. A "woman's place" should be wherever she wants to be. The days when women are submissive to their husbands and social conventions belong strictly in the past.

23. Homosexuals are just as good and virtuous as anybody else, and there is nothing wrong with being one.

24. It's one thing to question and doubt someone during an election campaign, but once a man becomes the leader of our country we owe him our greatest support and loyalty.
How quickly can you recognize a figure that is hidden among other lines? This test contains many rows of patterns. In each pattern you are to look for the model shown below:

```
   /\  
  /   \  
```

The model must always be in this position, not on its side or upside down.

In the next row, when the model appears, it is shown by heavy lines:

```
( ) ( ) ( ) ( ) (x) ( ) (x) ( ) ( )
```

Your task will be to place an X in the space below each pattern in which the model appears. Now, try this row:

```
1. 2. 3. 4. 5. 6. 7. 8. 9. 10.
( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )
```

You should have marked patterns 1, 3, 4, 8, and 10, because they contain the model.

Your score on this test will be the number marked correctly minus the number marked incorrectly. Work as quickly as you can without sacrificing accuracy.

There are 3 pages to this test. At the examiner's signal, turn the page and begin. You will have 3 minutes for this test.
In the following there are a number of short sentences, each followed by a set of three letters (such as JNL or LJN). The sentences claim to describe the order of the some of the letters, that is to say, the sentences indicate which letters come before or after the other letters. They can do this in several different ways. For instance, the order JNL can be correctly described by saying either (1) J precedes L, (2) N follows J, (3) L does not precede N or (4) N precedes L and follows J. All of these are correct descriptions of the letter sequence JNL, but would be incorrect if the sequence were LNJ.

Your job is to read each sentence and to decide whether it is a true or false description of the letter sequence which follows it. If you think that the sentence describes the set of letters correctly, simply put a tick mark next to the word "True". If you think that the sentence does not give a correct description of the letter sequence put a tick mark next to the word "False".

This is illustrated in examples 1 and 2 below. When you have read 1 and 2, try examples 3, 4, 5 and 6.

1. J follows N--NLJ
2. L precedes J--JNL
3. N is followed by J--NJL
4. J is not followed by L--JLN
5. L does not precede N--JNL
6. J follows N but not L--NJL

When you start the main test, work as quickly as you can without making any mistakes. Start with sentence 1 and work systematically through the test, leaving no blank spaces.

After the experimenter asks you to turn the page you will have 3 minutes to complete the test.

DO NOT TURN THE PAGE UNTIL THE SIGNAL TO DO SO
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<tr>
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<td>L follows J--LJN</td>
<td>true</td>
<td>false</td>
</tr>
<tr>
<td>18</td>
<td>L is not preceding N--NLJ</td>
<td>true</td>
<td>false</td>
</tr>
<tr>
<td>19</td>
<td>N is not following both J and L--JNL</td>
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<td>false</td>
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<tr>
<td>20</td>
<td>J precedes N--NLJ</td>
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<td>false</td>
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<tr>
<td>21</td>
<td>L follows J and precedes N--JLN</td>
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<td>22</td>
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<td>23</td>
<td>J precedes L--LNJ</td>
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<td>24</td>
<td>L is preceding both J and N--JNL</td>
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</tr>
<tr>
<td>25</td>
<td>N precedes L but not J--JLN</td>
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<tr>
<td>26</td>
<td>J is not followed by L and N--LNJ</td>
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<td>false</td>
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<td>27</td>
<td>L precedes N--LNJ</td>
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<tr>
<td>28</td>
<td>N does not follow J--NLJ</td>
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<tr>
<td>29</td>
<td>J is following L--JNL</td>
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<td>false</td>
</tr>
<tr>
<td>30</td>
<td>L is not preceded by N--LNJ</td>
<td>true</td>
<td>false</td>
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<tr>
<td>31</td>
<td>N does not follow J--NJL</td>
<td>true</td>
<td>false</td>
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<tr>
<td>32</td>
<td>J follows neither L or N--NJL</td>
<td>true</td>
<td>false</td>
</tr>
<tr>
<td>33</td>
<td>L precedes both J and N--LNJ</td>
<td>true</td>
<td>false</td>
</tr>
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<td>34</td>
<td>N does not precede L--LNJ</td>
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<td>false</td>
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<td>35</td>
<td>J precedes neither N nor L--JLN</td>
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<td>false</td>
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<td>36</td>
<td>L follows N--NLJ</td>
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<td>37</td>
<td>N precedes both J and L--JNL</td>
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<td>38</td>
<td>J is not following L--NLJ</td>
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<td>39</td>
<td>L is preceded by N--JNL</td>
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<td>44. J does not precede N--LNJ</td>
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<td>45. L precedes N--LJN</td>
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<td>46. N follows neither J or L--NJL</td>
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<td>47. L is preceded by N--NJL</td>
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<td>48. N is following J--LNJ</td>
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<td>49. J precedes both L and N--JNL</td>
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<td>50. L does not precede N--LJN</td>
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<td></td>
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<td>51. N follows J--JNL</td>
<td>true</td>
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<td></td>
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<tr>
<td>52. J is not preceded by N--NLJ</td>
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<tr>
<td>53. L is preceding J--LNJ</td>
<td>true</td>
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<tr>
<td>54. N does not follow J--JLN</td>
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<tr>
<td>55. J follows N but not L--NLJ</td>
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<td>56. L is preceded by N--JNL</td>
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<tr>
<td>57. N is following J--NLJ</td>
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<tr>
<td>58. J does not precede L--LNJ</td>
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<td>false</td>
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<tr>
<td>59. L precedes neither J nor N--NLJ</td>
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<tr>
<td>60. N follows both L and J--JLN</td>
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<tr>
<td>61. J is not followed by N--LJN</td>
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<tr>
<td>62. L is preceding J--NLJ</td>
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<tr>
<td>63. N does not follow L--LNJ</td>
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<tr>
<td>64. J follows both L and N--NLJ</td>
<td>true</td>
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<td></td>
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</table>
LIFESTYLE QUESTIONS

For each question, please circle the answer that best fits for you.

1a. I believe in the existence of a divine power. (circle one only)

YES NO MAYBE

1b. I have often thought and wondered about the meaning of religion and God.

YES NO

1c. Given the three choices below, I would best describe my church attendance as....

Once a week Once a month Once a year

2. I find I tend either to like individuals entirely or to not like them at all.

YES NO

3. The newspaper I enjoy reading the most is....

The Sun The Province The Globe and Mail

4. I have at least a little of both masculine and feminine aspects to my own personality.

YES NO

5. Would you ever be willing to help out in an experimental study without knowing anything about it?

YES NO
INTRODUCTION--PLEASE READ FIRST

The purpose of this project is to investigate the relationship between personality, lifestyle preferences and preferences for certain types of figures or pictures. Taken as a group, your individual responses to the following sets of items will lead to an increased understanding of personality differences with respect to visual material.

You are asked to complete the following brief questionnaires according to the instructions which precede each one. You are asked to respond honestly, to carefully consider your responses and also to work quickly, as your initial reactions are of the most interest in this study. The first two tasks are timed, so do not begin until are asked to. After that you will have as much time as you want; in all, the booklet should take about 50 minutes to complete. Your name is not required on the booklet; this assures confidentiality. Your age, gender and some educational information only are requested. We assume your consent for participation with your completion of the task, however, you may withdraw from the study at any time.

Thanks very much for your cooperation.
INFORMATION PAGE (Please fill out)

AGE

GENDER: Male ____ Female ____

SCHOOL PROGRAM (IF APPLICABLE): __________________________

YEAR IN PROGRAM __________
APPENDIX O: POST-PARTICIPATION STATEMENT
POST-PARTICIPATION STATEMENT

You have just taken part in a study involving the development of a new type of personality test. The new test is the one in which you were asked to rate each of 30 figures on four rating scales. The figures used were chosen because they are all in some way ambiguous, that is, they can easily have more than one meaning or interpretation. We are using these ambiguous figures, along with the rating scales, to try to assess a personality trait called Tolerance of Ambiguity (the degree to which one is able to tolerate a lack of clarity in a situation or stimulus).

Most previous Tolerance of Ambiguity approaches have been verbal in nature and subject to error arising from differences in people's verbal ability. This study involves an attempt to 'measure' someone's Tolerance of Ambiguity using figures, instead of verbal statements. So as to properly evaluate this new testing approach, we have included one verbal test of Tolerance of Ambiguity, one verbal and one figural test of a related personality trait (authoritarianism) and, in order to see what effects different abilities may have, one test of verbal ability and one test of visual discrimination ability. With the statistical analysis of a large number of test responses, we will be able to determine how successful the new test was, as well as how all the tests relate to one another.

We thank you again for your participation. If you have any questions, feel free to ask them of the experimenter. Since it is important that the full nature of the tests in the booklet not be known beforehand, we ask that you not divulge this information to others who may be taking part in the study.

Warren Weir
Dr. R. Conry
Dr. D. Paulhus