

The Referential Thinking Scale as a Measure of Schizotypy: Scale Development and Initial Construct Validation

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This article describes the development of a measure of schizotypic referential thinking. The authors present a 34-item questionnaire that includes a wide variety of referential thoughts and experiences, including both *simple* and *guilty* ideas of reference. The Referential Thinking Scale (REF) displays adequate internal consistency and strong relations with other measures of schizotypy, such as the well-known Perceptual Aberration and Magical Ideation Scales. Item-level factor analysis of the REF suggests that referential thought is multidimensional in nature, including both simple and guilty ideas of reference components. The REF displays minimal relations with acquiescence, social desirability, and sex. The REF does not appear to assess normative personality constructs that involve heightened self-awareness such as self-monitoring, self-consciousness, or social desirability, nor does it appear to be unduly related to psychological state variables. The REF was developed in order to provide an additional schizotypy measure for use in large-scale screening efforts and other schizotypy studies.

Ideas of reference have a long history in descriptive psychopathology. Although they are by no means specific to any one particular form of psychopathology, ideas of reference frequently have been described as a manifestation of schizophrenia-related conditions, such as schizotypic and paranoid pathologies as well as schizophrenia itself (e.g., American Psychiatric Association, 1987, 1994; Arieti, 1955; Bleuler, 1911/1950; Cameron, 1943; Cameron & Margaret, 1951; Hutt & Gibby, 1957; Kraepelin, 1903/1971; Maher, 1988; Maher & Spitzer, 1993; Meehl, 1964; Schulte, 1924; Wing, Cooper, & Sartorius, 1974). John Wing and colleagues, in their now-classic monograph detailing the development of the Present State Examination (PSE), identified both “simple” ideas of reference and “guilty” ideas of reference, both of which are viewed by an individual as originating within himself or herself (see Wing et al., 1974, pp. 153–154). Following Wing et al., in *simple* ideas of reference, a person may feel that others take notice of him or her and that they observe things about him or her that the subject would prefer not be seen; more severe forms find the person thinking that other people are critical of him or her or that they tend to

laugh at him or her. In *guilty* ideas of reference, the subject feels that he or she is blamed for some action or attribute; in more severe cases, the subject may feel that he or she actually is accused of some blameworthy action or attribute. Ideas of reference can also be accompanied by feelings of shame.

The cognitive process that underpins the phenomenology of ideas of reference could be viewed as a manifestation of the more general pathological process of “cognitive slippage,” or subtle disorder of thought, seen in schizotypic conditions (see Meehl, 1962, 1964, 1990). Recalling, in overview, that Meehl (1962, 1990) theorized that schizophrenia is the complex developmental result of a major genetic factor relatively specific for schizophrenia interacting with other genetically determined potentiators (e.g., anxiety, hedonic potential, social introversion) and environmental stressors. He hypothesized that the genetic influence for schizophrenia codes for a functional central nervous system (CNS) synaptic control aberration he termed *hypokrisia*, which results in *schizotaxia*, or extensive “synaptic slippage” throughout the brain. Through social learning experiences, essentially all schizotaxic individuals develop *schizotypy*, a personality organization that harbors the latent liability for schizophrenia (cf. Meehl, 1990, p. 35). As a personality organization, schizotypy cannot be observed directly per se; however, this latent personality organization gives rise to schizotypic psychological and behavioral manifestations (Meehl, 1964), such as ideas of reference, and is also reflected in deviance on laboratory measures (e.g., eye-tracking dysfunction, sustained attention deficits). Individuals who are schizotypic, though not necessarily diagnosable as having schizotypal personality disorder according to the criteria of the revised third edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R)* (American Psychiatric Association, 1987), clinically exhibit cognitive slippage (such as referential phenomena), interpersonal aversiveness, pan-anxiety, and mild depression. The majority remain only schizotypic throughout the life span, whereas a subset go on to develop diagnosable schizophrenia.

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The *DSM-III-R* defined *ideas of reference* as "An idea, held less firmly than a delusion, that events, objects, or other people in the person's immediate environment have a particular and unusual meaning specifically for him or her" (American Psychiatric Association, 1987, p. 399). This definition remains essentially unchanged in the fourth edition (*DSM-IV*; American Psychiatric Association, 1994). Indeed, ideas of reference, conceptualized as a schizotypic symptom, have received greater attention in recent years as they not only constitute an official diagnostic criterion of schizotypal personality disorder (SPD) as defined by the *DSM-III-R* (and *DSM-IV*), but also have been found to discriminate between the schizophrenia-affected biological relatives of schizophrenic probands and the biological relatives of controls (Kendler, McGuire, Gruenberg, & Walsh, 1995) and show an appreciable degree of heritability as a component of the "positive" schizotypy domain ($h^2 = .74$; Kendler et al., 1991).

Despite the increased importance that has been given to referential thinking in the definition of schizotypic psychopathology (e.g., SPD), there are few instruments to assess it. There exists no easily administered self-report scale to assess referential thinking that taps the full range of referential phenomena. For example, the leading structured interview for the assessment of Axis II disorders, the Personality Disorder Examination (PDE; Loranger, 1988), has just one item devoted to ideas of reference, which is understandable given that the PDE assesses all Axis II diagnostic criteria. Kendler's Structured Interview for Schizotypy (SIS; Kendler et al., 1989) is devoted exclusively to the assessment of schizotypic phenomena and provides greater coverage of simple ideas of reference, such as thoughts of being watched, being talked about by others, and special meanings contained in neutral events, but it does not contain probes for guilty ideas of reference. Of course, both the PDE and SIS require administration by clinically experienced and well-trained personnel, a feature that may enhance their validity but one that surely limits their utility for large-scale screening or epidemiologic research. Also, interview-based measures of schizotypic features may suffer from diminished sensitivity given the fairly overt pathological nature of referential phenomena in that participants may adopt a defensive test-taking attitude in the presence of an interviewer.

Raine (1991) developed the Schizotypal Personality Questionnaire (SPQ) as a self-report assessment instrument for screening assessments of the *DSM-III-R* SPD diagnostic criteria. The SPQ, a 74-item scale, contains 9 items tapping ideas of reference, 6 of which concern "others taking special notice of or talking about you" and 3 dealing with "special meanings." The SPQ lacks items concerning the important referential experiences of "thinking others are laughing at you" as well as guilty ideas of reference, ideas involving guilt and shame. Finally, although the Chapmans (Chapman & Chapman, 1985) have developed several excellent measures of schizotypic phenomena, such as the Perceptual Aberration Scale (PAS) and the Magical Ideation Scale (MIS), neither of these measures is devoted to an assessment of ideas of reference; the PAS assesses perceptual and body image distortions, whereas the MIS measures beliefs in forms of causation that by conventional standards are invalid.¹

Given the absence of an easily administered and comprehensive measure of referential thinking, we decided to construct a

self-report measure that covers a broader range of ideas of reference, encompassing both simple and guilty forms. We sought to develop a scale that (a) samples the full domain of referential phenomena to ensure adequate content validity; (b) is reliable and valid while being sufficiently unaffected by response sets (acquiescence and social desirability factors); and (c) could perhaps function as a screening instrument for detecting schizotypic phenomena (and other schizophrenia-related psychopathology) in large-scale screening applications.

Before proceeding to a description of the construction and validation of the Referential Thinking Scale, we would like to make three points concerning the pathological nature of the forms of referential thinking in which we are interested. First, we readily acknowledge that ideas of reference are not unique to schizotypic conditions. In fact, recent data suggest that a simple idea of reference such as "the idea of being talked about" is fairly common and, moreover, shows a significant developmental trend (decreasing sharply after adolescence; Abe & Suzuki, 1986). We sought, therefore, to develop a measure that detected relatively severe referential thought that would be considerably less common (i.e., have a lower population base rate) and more likely to be of clinical significance. Second, we would like to distinguish pathological, albeit nonpsychotic, referential thought from two other prominent normative psychological constructs that concern the processing of information directed toward the self, namely normative self-consciousness (Fenigstein, Sheier, & Buss, 1975) and self-monitoring (Snyder, 1974). Self-consciousness (Fenigstein et al., 1975) concerns both awareness of one's inner thoughts and feelings as well as the self as a social object, and self-monitoring (Snyder, 1974) concerns normal awareness of the self in relation to others and subsequent behavioral adaptability. In contrast, referential thinking reflects a process of reality distortion whereby environmental objects, events, or interactions with people, which would be regarded as casual or indifferent by most persons, take on special and significant meaning for the subject (see also discriminant validity data later). Finally, the proposed Referential Thinking Scale assesses ideas of reference that are nonpsychotic; the proposed scale does not assess delusions of reference, which, of course, represent psychotic phenomena.

Study 1: General Test Construction and Initial Psychometric Properties

Method

Participants

The data reported for all studies connected with the development of the Referential Thinking Scale (hereinafter, REF) that follow are based on undergraduate student samples from Cornell University. Although selected initially for academic achievement, available psychiatric data suggest that Cornell undergraduates are generally representative of other young adults on many other psychological and psychopathological di-

¹ One item on the MIS appears to assess a referential phenomenon, namely Item 11: "I have felt that there were messages for me in the way things were arranged, like in a store window" (true; Eckblad & Chapman, 1983; p. 216); however, the scale otherwise is completely devoted to beliefs in unconventional forms of causality.

mensions (see Lenzenweger, Loranger, Korfine, & Neff, 1997). The Cornell University undergraduate student body is typically approximately 73% Caucasian, 17% Asian American, 3.9% African American, 3.9% Latin-Hispanic, 0.4% Native American, and 1.9% from other racial or ethnic groups (see Lenzenweger et al., 1997). The students sampled for the purposes of this research were selected from a wide variety of classes and majors across the Cornell campus; these participants were not drawn from enrollees in introductory psychology courses or departmental participant pools. Participants completed the questionnaire at home in private and returned the inventory materials in sealed envelopes to research assistants.

Development of Initial Item Pool and Procedures

The REF was constructed and evaluated from 1988 to 1996 at Cornell University within an ongoing program of schizotypy research (Lenzenweger, 1993). As noted earlier, the REF was designed to assess the psychopathological experience termed ideas of reference, especially as related to schizotypic psychopathology.

Guided in part by Jackson's (1970, 1971) classic theory-driven approach to scale construction, we initially wrote 60 candidate items for the scale, and this number was ultimately pruned to 34 items through psychometric item analyses. Classic as well as more recent definitions and descriptions of ideas of reference (e.g., American Psychiatric Association, 1987; Arieti, 1955; Bleuler, 1911/1950; Cameron, 1943; Cameron & Margaret, 1951; Hutt & Gibby, 1957; Kraepelin, 1903/1971; Maher, 1988; Meehl, 1964; Schulte, 1924; Wing et al., 1974) were used to inform the initial item-writing process. In this item-writing process, we sought to cover several important domains or dimensions thought to be relevant to referential experiences. These domains included referential experiences with other persons (i.e., interpersonal) or animals in interaction, intrapersonal referential reflections on common or causal experi-

ences, and guilty referential interpretation of either an interpersonal (e.g., being blamed by others) or intrapersonal (i.e., feelings of shame) nature. Furthermore, we sought to construct a number of items in each domain that had relatively positive (e.g., "people wave at me"), neutral (e.g., "people look at me"), or negative (e.g., "people laugh or smirk at me") valences.

An initial set of 60 REF items was administered to a sample of 268 university students (56% female) along with scales for the assessment of acquiescence, social desirability, and random or reckless responding. Social desirability was assessed using the well-known Crowne-Marlowe Social Desirability Scale (Crowne & Marlowe, 1964), and acquiescence was assessed using Jackson and Messick's (1961) scale derived from the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1943) item pool (i.e., MMPI DY-3 scale). Jackson's Infrequency Scale (1974) was used to purge the participant pool of individuals who were demonstrating evidence of random, reckless, or disorganized test-taking patterns; also, all subsequent data sets used in the psychometric development of the REF were purged on the basis of similar criteria. Each candidate item was also evaluated for possible differential association with participant sex; in this instance, it was thought that differential associations with sex might unduly cloud the fidelity of items intended to assess a schizotypic thought process. Finally, because our goal was to develop a measure of clinically significant referential thinking, we sought to set the thresholds for items sufficiently high (e.g., through frequency expressions) to ensure that the scale eliminated false positives at the expense of false negatives (i.e., correctly detects clinically significant referential thought).

Results

The psychometric data for the initial 60-item pool are contained in the first panel of Table 1. The means, standard devia-

Table 1
Psychometric Properties of Referential Thinking Scale in Four Samples

Group	<i>n</i>	<i>M</i>	<i>SD</i>	<i>SE_{meas}</i>	α	Desirability	Acquiescence
Sample 1: Initial item analysis sample (60-item pool)							
Male	93	12.61	6.53	2.61	.84	-.07	.13
Female	151	13.23	6.60	2.56	.85	-.04	.15
Total	268	13.16	6.68	2.59	.85	-.05	.14
Sample 2: Validation sample (34-item scale)							
Male	80	3.58	3.85	1.63	.82	-.08	.18
Female	202	4.33	4.28	1.76	.83	-.01	.10
Total	289	4.14	4.17	1.72	.83	-.02	.13
Sample 3: Cross-validation sample (34-item scale)							
Male	41	4.24	3.95	1.77	.80	.09	.16
Female	107	4.64	4.62	1.79	.85	-.08	.19
Total	151	4.52	4.42	1.77	.84	-.05	.17
Sample 4: Construct validation sample (34-item scale)							
Male	39	3.49	3.86	1.59	.83	-.14	.17
Female	166	4.30	4.43	1.72	.85	-.07	.17
Total	205	4.17	4.32	1.67	.85	-.08	.16

Note. *SE_{meas}* = standard error of measurement; α = internal consistency reliability; Desirability = Crowne-Marlowe Social Desirability Scale; Acquiescence = Acquiescence Response Set Measure (DY-3 Scale). Values for desirability and acquiescence are the median correlations for all Referential Thinking Scale items correlated with the Marlowe-Crowne and DY-3 scales. Total *N*s include cases in which sex was not identified by participants.

tions, standard errors of measurement, and internal consistencies (α) are presented for men and women separately as well as for the total sample, which includes several individuals who did not identify their sex. Also presented are the medians of the correlations between the Crowne-Marlowe Social Desirability Scale and Jackson and Messick's (1961) Acquiescence scale (MMPI DY-3) and the 60 candidate REF items. On the basis of this initial item analysis sample, candidate items were discarded because of poor psychometric performance by virtue of having (a) low item-total correlations (total scale score minus item; i.e., item-total r s $< .20$); (b) correlating more than .25 with the Acquiescence scale; (c) correlating more than $-.25$ with the Social Desirability scale; or (d) demonstrating a significant association with sex ($p < .05$). Items that appeared promising on the basis of their initial psychometric characteristics but were endorsed somewhat frequently were revised to raise their respective criterion thresholds to bring them into alignment with the intended severity level.

As can be seen from the top panel of Table 1, the mean score on the REF for the total sample was 13.16 ($SD = 6.68$), with men and women displaying broadly comparable total scores. Standard errors of measurement (SEM) were also highly comparable across the sexes, with the SEM for the sample being 2.59. The initial candidate item pool had an internal consistency reliability of .85 for the total sample, a level of internal consistency generally viewed as adequate for research scales (Nunnally, 1978). By and large, the items in the pool were not strongly related to either social desirability or acquiescence. The item pool was pruned both to shorten the scale as well as eliminate less well functioning items along the lines described previously, and this yielded a final 34-item scale (see Appendix for REF items).

Discussion

The data from Study 1 suggested that the initial item pool for the REF revealed substantial internal consistency reliability. This psychometric feature of the candidate item pool was especially welcome because the pool covered a wide range of referential experiences. The relative comparability of the total scores for male and female participants was suggestive of the item pool being fairly free of sex-biased items. Finally, the relatively low median correlations found between individual REF items and both the social desirability and acquiescence scales indicated that although the item content of the REF is deviant and clearly nonnormative, the items overall were not unduly influenced by such troublesome response biases as desirability and acquiescence. The item-total correlations, endorsement frequencies, and associations with social desirability, acquiescence, and sex were used to prune the REF to a final 34-item version, which is contained in the Appendix along with directions for administration and scoring.

Study 2: Initial Validation Study

A second study was conducted to determine whether the revised 34-item version of the REF would continue to display acceptable internal consistency reliability as well as other desired psychometric characteristics.

Method

The participants for Study 2 were 289 students from Cornell University who had been recruited from a wide variety of classes. The sample consisted of 80 men, 202 women, and 6 participants who did not identify their sex. All participants completed the questionnaire at home in private and returned the inventory materials in sealed envelopes to research assistants.

The data for the 34-item version of the REF were examined for internal consistency, item-total correlations, and associations with social desirability, acquiescence, and sex.

Results

The results for Study 2 are found in the second panel of Table 1. The mean total score on the REF for the overall sample was 4.14 ($SD = 4.17$). Men and women did not differ significantly in terms of REF total scores in Sample 2, $t(280) = -1.37$, *n.s.* The distribution of total scores for the 34-item version of the scale is as one might expect for a measure of psychopathology seeking to detect a relatively low base-rate phenomenon; namely, it is positively skewed (i.e., larger participant frequencies at lower score levels) and leptokurtic (peaked) in form. Internal consistency of the 34-item REF remained above .80 for men, women, and the combined sample. The median associations among REF items and both social desirability and acquiescence remained relatively low. No item in the revised 34-item version was significantly associated with sex (no $p < .05$).

Discussion

The data from Study 2 generally suggest that the revised REF retained acceptable psychometric characteristics. The 34-item version of the scale, despite being shortened by 26 items from the original 60, revealed acceptable internal consistency reliability. Moreover, the associations of REF scale items with the response set measures as well as sex revealed that the items, despite their clearly deviant content, were not unduly related to any of these factors. Given the performance of the revised scale in this study sample, no further revisions were made to the scale.

Study 3: Cross Validation

Study 3 aimed to evaluate the stability of the psychometric characteristics of the final 34-item REF observed in Study 2.

Method

The participants for Study 3 were 151 students from Cornell University who had been recruited from a wide variety of classes. The sample consisted of 41 men, 107 women, and 3 participants who did not identify their sex. All participants completed the questionnaire at home in private and returned the inventory materials in sealed envelopes to research assistants.

Results

The results for Study 3 are found in the third panel of Table 1. The mean total score on the REF for the overall sample was 4.52 ($SD = 4.42$). Men and women did not differ significantly in terms of REF scale total scores in Sample 3, $t(146) = -0.49$, *n.s.* As in the case of the Study 2 data, the distribution of total

scores for the 34-item version of the scale remained positively skewed and leptokurtic. Internal consistency of the 34-item REF remained at or above .80 for men, women, and the combined sample. The median associations among REF items and both social desirability and acquiescence remained relatively low. As with Study 2, no REF item in the revised 34-item version was significantly associated with biological sex (no $p < .05$).

Discussion

The data from Study 3 were highly consistent with those obtained in Study 2. They continued to suggest that the revised REF possessed acceptable psychometric characteristics. In this study, the 34-item version revealed acceptable internal consistency reliability ($\alpha s \geq .80$) as well as minimal associations with the response set measures or sex, corroborating the findings of Study 2. Given the performance of the revised scale in Study 3, it appeared that the internal psychometric properties of the REF were relatively stable and acceptable by traditional psychometric standards (cf. Nunnally, 1978).

Study 4: Test-Retest Reliability

Study 4 sought to evaluate the test-retest reliability of the final 34-item REF. Referential thinking is hypothesized to be a relatively stable and trait-like feature of individuals, and therefore we anticipated that total scores on the REF would be relatively stable over time.

Method

The participants for Study 4 were 45 students from Cornell University who had been recruited from a wide variety of classes. The sample consisted of 5 men and 40 women. All participants completed the questionnaire at home in private and returned the inventory materials in sealed envelopes to research assistants. Participants completed a variety of personality measures, including the REF, at two points in time separated by a period of 4 weeks.

Results

The test-retest correlation for the total REF score was .86. The mean REF score at Time 1 was 5.22 ($SD = 4.83$), and the mean at Time 2 was 4.73 ($SD = 5.44$). A paired t test revealed that the level of the REF scores also remained stable, paired $t(44) = 1.19$, ns , over the 4-week test-retest interval.

Discussion

The test-retest correlation indicated that the REF displays acceptable rank order stability over a 1-month interval. Moreover, the lack of change in the total scores over the same interval is suggestive of adequate mean-level stability. This pattern of results is consistent with the REF's tapping referential thinking in a reliable fashion over at least a relatively short period of time.

Study 5: Construct Validation Through Concurrent Convergent Associations

The principal aims of Studies 1–4 were to establish the psychometric characteristics of the REF and to demonstrate that

the scale displayed adequate internal consistency as well as test-retest reliability. Although the items for the REF display adequate content validity in that they appear to sample the domain of the "ideas of reference" phenomenon, the prior studies did not address issues related to criterion or construct validity (Cronbach & Meehl, 1955). Although the internal consistency values (coefficients alpha) found in Studies 2 and 3 were high and such consistency offers some, albeit weak, evidence of construct validity (Anastasi, 1988), we sought to address the validity issue more directly.

The REF was designed to be used in large, unselected populations, most typically in a screening fashion in the tradition of the psychometric high-risk strategy (Lenzenweger, 1994), and therefore the validity of the scale (i.e., construct validity) would be most profitably explored by examining the REF in relation to other well-established measures of schizotypy and psychosis-proneness (cf. Chapman & Chapman, 1985) in a nonpsychiatric population. Furthermore, given that the scale assesses a nonpsychotic phenomenon, examination of REF scores in a group of schizophrenia patients would shed little light on the validity of the scale (see Meehl, 1964, p. 1). Therefore, we initially sought to establish the concurrent validity of the REF by examining it in relation to other well-established measures of perceptual aberration, magical ideation, and psychometrically assessed schizophrenia liability. We anticipated that REF scale scores would be substantially correlated with such measures.

Moreover, we sought to further evaluate the construct validity (Cronbach & Meehl, 1955) of the REF by using a variant of the well-known multitrait-multimethod approach proposed by Campbell and Fiske (1959), in this case a multitrait-monotrait application. Thus, in addition to the other measures of schizotypy or psychosis-proneness completed by the participants in this study, they also completed measures of normative self-awareness as well as measures of anxiety and depression. Within the context of this collection of measures, we predicted that the REF scores would be most closely associated with the schizotypy measures (convergent validity) and considerably less correlated with either the self-awareness, anxiety, or depression measures (discriminant validity). We believed it especially important to examine REF scores in relation to the normative self-awareness measures to determine whether our theoretical conjecture that referential thinking differed from such normal personality constructs received empirical support. The affect-mood measures were included to examine whether referential thinking assessed by the REF was more strongly related to anxiety, depression, or both.

To further explore the relation of the REF to these other measures, we also conducted an exploratory factor analysis on the correlation matrix that derived from the multitrait-monotrait analysis. We anticipated that the REF would load with the other measures of schizotypic phenomena, especially the measures of perceptual aberration and magical ideation, and thereby reveal a schizotypy factor. We did not expect that the measures of normal self-awareness would load substantially on the schizotypy factor. We did anticipate that the affect-mood variables may have secondary loadings on the schizotypy factor given the relation of these variables to the schizotypy, as noted earlier (i.e., hypohedonia in schizotypes can appear as dyspho-

ria; cf. Meehl, 1962, 1990), although the affect–mood variables should, by and large, constitute their own factor.

Method

Participants

The participants for Study 5 were students from Cornell University. The sample consisted of 205 participants (81% female) who had been recruited from a wide variety of classes. All participants completed the questionnaire at home in private and returned the inventory materials in sealed envelopes to research assistants.

Measures

The participants in this sample completed an omnibus questionnaire that contained multiple schizotypy, normative self-awareness, and affect–mood measures. The omnibus questionnaire required approximately 2 hr to complete.

Schizotypy (psychosis–prone) measures. The three measures of schizotypy were chosen on the basis of established validity as measures of schizotypy or schizophrenia liability: the Perceptual Aberration Scale (PAS; Chapman, Chapman, & Raulin, 1978); the Magical Ideation Scale (MIS; Eckblad & Chapman, 1983); and the Rosen Pz Paranoid Schizophrenia Scale (Rosen Pz; Rosen, 1952, 1962), a scale derived from the MMPI. The PAS is a 35-item true–false measure of body image and perceptual aberrations, the MIS is a 30-item measure of magical ideation (i.e., belief in forms of causation that by conventional standards are invalid), and the Rosen Pz scale is a 64-item scale developed to efficiently identify paranoid schizophrenia cases, the overt manifestation of a schizophrenia-liability. Extensive literature reviews bearing on the reliability and validity of the PAS and MIS as schizotypy (or, perhaps more broadly, psychosis–prone) measures can be found elsewhere (Chapman, Chapman, & Kwapil, 1995; Chapman, Chapman, Kwapil, Eckblad, & Zinser, 1994; Lenzenweger, 1993, 1994). The reliability and validity of the Rosen Pz scale is discussed at length in Rosen's (1962) monograph.

Normative self-awareness measures. The three measures of normative self-awareness constructs were the Self Monitoring Scale (Snyder, 1974; see also Gangestad & Snyder, 1985, for a review of the scale's psychometric properties); the Self-Consciousness Scale (Fenigstein et al., 1975); and the well-known Crowne-Marlowe Social Desirability Scale. We used the 18-item true–false version of the Self-Monitoring Scale (Gangestad & Snyder, 1985), a measure of normal awareness of the self in relation to others and subsequent behavioral adaptability. We used the Public and Private Self-Consciousness subscales of the Self-Consciousness Scale (Fenigstein et al., 1975). The Public Self-Consciousness Scale (7 items, true–false) measures an awareness of self as a social object, whereas the Private Self-Consciousness Scale (10 items, true–false) measures awareness of inner or personal aspects of the self, such as a person's feelings and thoughts. For the purposes of this analysis, the Private and Public Self-Consciousness Scales were combined to form a general self-consciousness measure. An extensive review of the reliability and validity characteristics of the Self-Consciousness Scale can be found in Fenigstein and Vanable (1992). The Social Desirability Scale, a 33-item true–false inventory, was used as a third measure of normative self-awareness because it taps into one's level of self-reflection and presentation of the self to the external world.

Affect–mood measures. State and trait anxiety were measured with the well-known 40-item State–Trait Anxiety Inventory (STAI; Spielberger, 1983), and depressive–dysphoric features were assessed using the well-known 21-item Beck Depression Inventory (BDI; Beck, Ward, Mendelsohn, Mock, & Erbaugh, 1961).

Statistical Analyses

Associations among the REF and the other measures were examined using Pearson product–moment correlation coefficients. The exploratory factor analysis was done using a principal-components analysis procedure with a varimax rotation, given the theoretical conjecture that the general schizotypy, self-awareness, and affect–mood constructs should be relatively independent. The number of factors retained for analysis was based on a minimum eigenvalue of 1.0.

Results

The REF continued to display good internal consistency (see bottom panel of Table 1, Sample 4). Men and women did not differ significantly in terms of REF total scores in Study 5 (Sample 4 in Table 1), $t(203) = -0.92$, *n.s.* The median association of REF items with both acquiescence and social desirability continued to be relatively low and resembled closely those obtained in Studies 2 and 3.

The correlational data from the multitrait–monomethod investigation are contained in Table 2. As can be seen from Table 2, the REF was most closely associated with other measures of schizotypy (PAS, MIS, Pz), median $r = .61$. The REF also was associated, to a lesser extent, with depressive features and anxiety, median $r = .43$. Associations between the REF and the normal self-awareness measures were quite low, with correlations ranging between .08 and $-.17$.

The correlation matrix based on the schizotypy, self-awareness, and affect–mood measures (Table 2) was analyzed using principal-components analysis, and this helped to clarify the relative relations among the variables in the multitrait–monomethod matrix. The exploratory principal-components analysis extracted three factors with eigenvalues greater than 1.00, accounting for 68.1% of the variance in the matrix (Table 3). As depicted in Table 3, the three factors were readily identifiable with the substantive domains of schizotypy, normative self-awareness, and affect–mood. The REF loaded heavily, along with the PAS, MIS, and Pz scales, on the Schizotypy factor, whereas it did not load on the other two factors, namely the Affect and Self-Presentation–Self-Consciousness factors (Table 3).

Discussion

The central issue in Study 5 was to examine the associations between the REF and other theoretically related schizotypy measures in an effort to examine an aspect of the construct validity of the REF through concurrent convergent relations. REF scale elevations were indeed associated with higher scores on all three schizotypy measures, namely the PAS, MIS, and Rosen Pz scale, and this pattern of associations is consistent with convergent construct validity. The REF displayed relatively weak associations with the theoretically unrelated measures of normative self-awareness, suggesting that the REF taps a form of psychological experience that shares little with these normal personality dimensions. REF scores were associated with the affect–mood dimensions of anxiety and depression, although to a lesser extent than that observed for the schizotypy measures. This pattern of relations was not completely unexpected because other measures of schizotypy (e.g., PAS, MIS) are known to be associated

Table 2
*Intercorrelations Among Multiple Schizotypy, Affect, and Normal
 Self-Awareness Measures for Study 5 (N = 205)*

Scale	1	2	3	4	5	6	7	8	9	10
1. Referential Thinking	.85									
2. Perceptual Aberration	.53	.82								
3. Magical Ideation	.61	.58	.78							
4. Rosen Pz	.62	.65	.57	.77						
5. Depression	.52	.45	.40	.72	.89					
6. Anxiety—State	.36	.30	.22	.49	.62	.94				
7. Anxiety—Trait	.43	.37	.27	.65	.74	.72	.94			
8. Self-Monitoring	.08	.02	.16	-.06	-.02	-.06	-.01	.59		
9. Self-Consciousness	-.10	-.17	-.01	-.01	-.15	.03	.05	-.05	.72	
10. Social Desirability	-.17	-.24	-.13	-.27	-.18	-.26	-.35	-.18	-.19	.76

Note. Values are Pearson product-moment correlation coefficients. Figures in boldface type in the diagonal are the internal consistency reliabilities for the scales (coefficient α).

with both anxiety and depressive features (see Lenzenweger, 1993), and such relations are consistent with Meehl's (1962, 1990) model of schizotypy, in which the schizotype is anxious and hypohedonic.

From the standpoint of construct validity, the data contained in Table 2 reveal a pattern of convergent and discriminant relations (Campbell & Fiske, 1959) that suggest the REF is indeed tapping a relatively schizotypic construct, as intended. The REF is most closely related to the other schizotypy measures and less strongly related to measures to which it should have a diminished connection (i.e., affect-mood) or an almost negligible connection (normative self-awareness). Moreover, the exploratory principal-components analysis revealed three theoretically meaningful constructs that appeared to underlie the matrix of schizotypy, Self-awareness, and affect-mood measures. The REF, as we expected, was most closely linked to an obvious Schizotypy factor that also was defined by magical ideation (MIS), perceptual aberrations (PAS), and schizophrenia-related psychometric deviance (Rosen Pz). The other two compo-

nents extracted each loaded on either the normative self-awareness measures or the affect-mood measures; the REF did not load on either of these other two components. Overall, the results of Study 5 provided important preliminary empirical support for the construct validity of the REF.

Study 6: Construct Validation Replication

The objective of Study 6 was to examine the relative stability of the relations we observed between the other measures of schizotypy used in Study 5 as well as the normative self-awareness and affect-mood measures. We therefore collected data from a new sample of participants using procedures identical to those used in Study 5 to once again examine construct validity issues in relation to the REF.

Method

Participants

The participants for Study 6 were 170 students (82% female) from Cornell University (2 participants did not report their sex) who had been recruited from a wide variety of classes. All participants completed the questionnaire at home in private and returned the inventory materials in sealed envelopes to research assistants.

Measures

The schizotypy, normative self-awareness, and affect-mood measures used in Study 6 were identical to those described earlier for Study 5, and they were administered in an identical fashion.

Procedures and Statistical Analysis

The REF scale was once again examined in relation to the other measures of schizotypy as well as the normative self-awareness and affect-mood measures using both correlational and exploratory factor analytic methods as was done in Study 5. However, in addition, we also conducted a confirmatory factor analysis, using the well-known *LISREL* program (Jöreskog & Sörbom, 1993), on these data to determine whether a three-factor solution provided a superior fit to the data relative to two alternative two-factor models, a one-factor model, and the null model.

Table 3
*Factor Structure Underlying Multitrait Matrix From
 Study 5 Sample (N = 205)*

Scale	Factor		
	Schizotypy	Affect	Normal self-awareness
Referential Thinking	.75	.33	.00
Perceptual Aberration	.75	.28	-.04
Magical Ideation	.83	.11	.06
Rosen Pz	.62	.63	.04
Anxiety—Trait	.25	.84	.22
Anxiety—State	.14	.82	.15
Depression	.44	.75	-.05
Self-Monitoring	.39	-.43	.50
Self-Consciousness	-.31	.10	.64
Social Desirability	-.17	-.23	-.75

Note. Results of a principal components analysis (with varimax rotation). Cumulative percentage of the variance accounted for by this solution is 68.1%.

Table 4
Intercorrelations Among Multiple Schizotypy, Affect, and Normal
Self-Awareness Measures for Study 6 ($N = 162$)

Scale	1	2	3	4	5	6	7	8	9	10
1. Referential Thinking	.86									
2. Perceptual Aberration	.59	.78								
3. Magical Ideation	.66	.70	.82							
4. Rosen Pz	.67	.72	.71	.78						
5. Depression	.41	.34	.35	.45	.84					
6. Anxiety—State	.16	.11	.09	.22	.60	.94				
7. Anxiety—Trait	.34	.36	.33	.47	.75	.65	.92			
8. Self-Monitoring	.21	.16	.25	.12	.01	.04	.07	.63		
9. Self-Consciousness	.00	.04	-.03	.02	.12	.01	.16	.09	.63	
10. Social Desirability	-.25	-.32	-.21	-.35	-.24	-.06	-.30	-.32	-.23	.79

Note. Values are Pearson product-moment correlation coefficients. Figures in boldface type in the diagonal are the internal consistency reliabilities for the scales (coefficient α).

Results

The REF displayed good internal consistency ($\alpha = .86$) for the total sample. Men and women did not differ significantly in terms of REF total scores in Sample 5, $t(166) = -1.48$, *ns*. The results of the correlational analyses are contained in Table 4; this table is based on an n of 162 due to missing data on some of the inventories. Inspection of Table 4 reveals that the REF is most closely associated with the other schizotypy scales (i.e., PAS, MIS, Rosen Pz; median $r = .66$). Relatively speaking, REF scores bear no relationship with self-consciousness ($r = .00$) and diminished relations with either self-monitoring ($r = .21$) or social desirability ($r = -.25$).

The results of the principal-components analysis (with a varimax rotation) are depicted in Table 5. The results of this analysis again suggested that three factors underlie the matrix of schizotypy, normative self-awareness, and affect-mood measures (i.e., eigenvalue 1.0 or higher) and account for 69.7% of the variance in the matrix. The Schizotypy factor loads the REF

as well as the PAS, MIS, and Pz, with all loadings greater than .80. The affect-mood measures of state anxiety, trait anxiety, and depression constitute the second factor, with all loadings greater than .80. Finally, the normative self-awareness measures load on the third factor with very substantial loadings.

The results of the confirmatory factor analysis revealed that a three-factor model consisting of Schizotypy, Normative Self-Awareness, and Affect-Mood factors provided a significantly better fit ($p < .01$) to these data (Table 4) relative to all competing nested models: $\chi^2 = 68.904$, normed fit index relative to null model = .91, nonnormed fit index relative to null model = .93.²

Discussion

The results of Study 6 are highly consistent with those obtained in Study 5, our initial construct validation study. The results of this study showed that the REF continued to reveal high internal consistency, relatively substantial relations with theoretically related schizotypy measures and relatively weak associations with theoretically unrelated measures (i.e., normative self-awareness and affect-mood measures). The results obtained from the principal-components analysis in this study were also highly consistent with those obtained in Study 5, namely three theoretically meaningful constructs appeared to underlie the matrix of schizotypy, self-awareness, and affect-mood measures. The REF continued to be closely linked to a Schizotypy factor that was defined also by magical ideation (MIS), perceptual aberrations (PAS), and schizophrenia-related psychometric deviance (Rosen Pz). The relative superiority of this three-factor solution was supported by the results of the confirmatory factor analyses. These data essentially replicate those obtained in Study 5 and are supportive of the construct validity of the REF scale.

Table 5
Factor Structure Underlying Multitrait Matrix From
Study 6 Replication Sample ($N = 162$)

Scale	Factor		
	Schizotypy	Affect-Mood	Normative Self-Awareness
Referential Thinking	.81	.17	.08
Perceptual Aberration	.84	.12	.13
Magical Ideation	.88	.08	.07
Rosen Pz	.84	.27	.10
Anxiety—Trait	.27	.85	.18
Anxiety—State	.01	.87	-.05
Depression	.31	.83	.08
Self-Monitoring	.22	-.12	.63
Self-Consciousness	-.17	.15	.68
Social Desirability	-.27	-.12	-.73

Note. Results of a principal-components analysis (with varimax rotation). Cumulative percentage of the variance accounted for by this solution is 69.7%.

² We have provided an abbreviated summary of the confirmatory factor analytic results in order to conserve space, but an extended description of this aspect of the data analysis is available from Mark F. Lenzenweger on written request.

Study 7: Multidimensionality of the REF Scale: Factor Analysis at the Item Level

The focus of Study 7 was an examination of the factors underlying the REF. As noted previously, the REF was constructed, in part, to be a comprehensive measure of referential thinking, including items indicative of not only simple but also guilty ideas of reference. It was anticipated that the REF would reveal a multidimensional latent structure with some evidence of guilty ideas of reference being a relatively independent and fairly distinct dimension consistent with the descriptive psychopathology literature as reviewed earlier (cf. Wing et al., 1974).

Method

The participants for this study represent the total pool of individuals who completed the REF scale in Studies 2–6. There were 860 (76% female) individuals who provided complete REF data (no missing data on any item) for use in this item-level factor analysis of the scale.

A principal-components factor analysis with a varimax rotation was conducted on the 34 items composing the REF. The scree test (see Gorsuch, 1983) was used to determine the optimal number of factors to retain. A principal-axis, common-factors analysis was also conducted on the 34-item data set, and the results of that analysis were essentially identical to those obtained through the principal-components analysis; therefore, only the principal-components results are presented next.

Results

Following Gorsuch (1983), inspection of the scree plot obtained from the principal-components analysis suggested that five factors should be retained, and these factors explained 35.1% of the variance. Most of the correlations between the items and factors on which they loaded most heavily were higher than .30; however, a few items fell within the .25–.29 range. An item-factor table from the rotated factor matrix is shown in Table 6.

As can be seen from Table 6, Factor 1 was made up of those REF items most closely associated with referential phenomena related to thoughts that one is being laughed at or having their behavior commented on. It accounted for 17.5% of the variance. Factor 2 concerned referential phenomena related to being the object of attention or having one's appearance be scrutinized (5.7% of variance). Factor 3 consisted of items related to guilt and shame associated with referential thoughts (4.4% of variance). This component of the REF appears to reflect the guilty ideas of reference notion that was noted earlier. Factor 4 organized items related to referential ideation linked to songs, newspaper stories, and books (i.e., written and visual media) specifically directed at the subject (3.9% of variance). Finally, Factor 5 grouped essentially two items that concerned the referential interpretation of general external events (presence of others in a class, dogs barking; 3.6% of variance).

A principal-axis, common-factors analysis yielded a highly comparable set of factor loadings on five retained factors after a varimax rotation.

Discussion

The results of this study suggested that the REF is multidimensional in nature as the principal-components analysis re-

Table 6

Factor Loadings of Referential Thinking Scale Items From the Combined Sample (N = 860)

Item	Factor				
	1	2	3	4	5
Factor 1: Laughing, Commenting					
14	.73	.06	.14	.04	-.02
3	.70	.03	.21	.05	-.05
2	.67	.14	.07	.06	.14
9	.63	.29	.13	.13	-.03
1	.57	.03	.35	.10	-.07
7	.51	.00	.07	.13	.10
24	.49	.43	.10	-.01	.09
6	.48	-.22	.13	.05	.35
18	.43	.38	.09	.10	.01
4	.38	.27	.08	.04	.38
Factor 2: Attention, Appearance					
32	.11	.61	.03	.04	.20
25	.00	.59	.05	-.07	.05
8	.17	.53	.00	.12	.07
19	.38	.47	-.01	.16	-.06
26	.07	.40	.25	.16	.10
23	-.02	.39	.24	.25	.27
20	.07	.28	.07	.19	-.25
5	.12	.25	.18	.10	-.19
Factor 3: Guilt, Shame					
31	.21	.10	.69	-.02	.11
33	.37	.11	.57	.04	-.10
28	-.01	-.02	.55	.02	.15
29	.15	.03	.46	.09	.02
30	.29	.08	.41	.05	.03
21	.18	.26	.40	.10	-.03
Factor 4: Songs, Newspapers, Books					
13	.05	-.02	.12	.70	.08
10	.03	.01	.15	.61	-.02
15	.02	.03	-.13	.53	.27
16	.14	.16	.04	.35	-.16
22	.09	.17	.05	.32	-.07
27	.14	.07	-.03	.29	.22
11	.10	.14	.15	.31	.36
Factor 5: Reactions					
34	.07	.15	-.04	.09	.53
17	.02	.01	.16	-.06	.50
12	-.01	.26	.27	.16	.32

Note. Results of principal-components analysis (with varimax rotation). Cumulative percentage of the variance accounted for by this solution is 35.1%.

vealed that the structure underlying the REF consists of several relatively distinct components. Given our intention to include in the REF items that tapped into the guilty ideas of reference domain, it was useful to see that a relatively independent Guilt–Shame factor did, in fact, emerge from the factor analysis. Although additional validation data would be needed to substantiate the use of these factors in defining subscales of the overall REF, we suggest that the construction of subscales could be considered.

General Discussion

The Referential Thinking Scale was shown by this series of studies to provide a reliable and valid measure of the psychopathological thought process known as referential thinking, which is often manifested by the symptom of ideas of reference. As detailed earlier, the REF was constructed to provide a measure of referential thinking that more completely sampled the domain of referential thought processes, particularly through the inclusion of "guilty ideas of reference." Although the REF was constructed to sample the domain of referential thinking widely, it displays a relatively high degree of internal consistency ($\alpha s > .80$) across all of the analyses discussed in this article. The REF contains items that are not differentially related to the sex of the participant, nor are they unduly related to either acquiescence or social desirability factors. The generally strong levels of internal consistency displayed by the REF suggest that the items, by and large, discriminate in the direction of the referential thinking construct as one would expect for a test that possesses some degree of construct validity. More important, however, high scores on the REF are associated with elevated scores on measures of perceptual aberration, magical ideation, and schizophrenia-related psychometric deviance, all measures known to be related to schizotypy (Chapman et al., 1994, 1995; Lenzenweger, 1993, 1994; cf. Meehl, 1964), which is suggestive of convergent construct validity. REF scores are not related to measures of normative self-awareness (e.g., self-monitoring, self-consciousness), a feature of the REF consistent with discriminant construct validity. Taken together, the convergent and discriminant relations data are consistent with appreciable construct validity (cf. Campbell & Fiske, 1959). The factor analytic data derived from both Studies 5 and 6 revealed that the REF not only is associated more closely with the schizotypy measures, but they, as a group, are clearly demarcated from both normative self-awareness measures as well as anxiety and depression. Finally, the item-level factor analysis (Study 7) supports the multidimensional nature of referential thinking as measured by the REF, with clear evidence of a differentiation among simple and guilty ideas of reference components. We suggest that the data contained in this article support the basic psychometric integrity of this scale as well as its place in a theoretical network that links the phenomenon assessed by the REF with the well-known schizotypy construct. Given that the REF is, to our knowledge, the only existing instrument of its kind, we think it represents a useful addition to the existing set of psychometric schizotypy measures in that it is meaningfully related to the schizotypy construct yet not redundant with preexisting measures. Moreover, given its coverage of the full range of referential phenomena, it represents a measure that will yield information on referential thinking above and beyond that available from current inventory and interview measures of schizotypic psychopathology.

Although this program of instrument development research has demonstrated that the REF is reliable and possesses an appreciable degree of construct validity, we emphasize that there is indeed a variety of additional validation studies that should be carried out. For example, the long term stability of the REF remains to be investigated. Given that the REF is conjectured to measure a relatively enduring feature of psychopathological

experience, it would be useful to determine the stability (e.g., level, rank order, structural, and ipsative) of the scale over a period of several years. Application and evaluation of the REF in nonuniversity, community samples would also be welcome. Finally, delineation of the association between the REF and established interview measures of schizotypic conditions (e.g., PDE, SIS) would be desirable. Studies that address these issues currently are being planned in our laboratory.

Referential thinking is but one component of the multidimensional schizotypy construct (cf. Lenzenweger, 1994), and it seems that the REF may be a useful addition to the battery of measures already on hand for measuring other aspects of schizotypy (e.g., perceptual aberration, magical ideation). Studies designed to evaluate the validity and efficiency of the REF as a means of selecting of schizotypic individuals are underway in our laboratory. The referential thinking process, in and of itself, is worthy of basic research, and the REF may prove useful in connection with studies on this form of psychopathologic cognition. It is hoped that this scale will facilitate research in the area of referential thought in relation to schizotypy as well as serve as a measure of referential thinking more generally.

References

- Abe, K., & Suzuki, T. (1986). Prevalence of some symptoms in adolescence and maturity: Social phobias, anxiety symptoms, episodic illusions, and ideas of reference. *Psychopathology*, 19, 200-205.
- American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., rev.). Washington, DC: Author.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- Anastasi, A. (1988). *Psychological testing* (6th ed.). New York: Macmillan.
- Arieti, S. (1955). *Interpretation of schizophrenia*. New York: Robert Brunner.
- Beck, A. T., Ward, C. H., Mendelsohn, M., Mock, J. E., & Erbaugh, J. K. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, 4, 561-571.
- Bleuler, E. (1950). *Dementia praecox or the group of schizophrenias* (J. Zinkin, Trans.). New York: International Universities Press. (Original work published 1911)
- Cameron, N. (1943). The development of paranoid thinking. *Psychological Review*, 50, 219-233.
- Cameron, N., & Margaret, A. (1951). *Behavior pathology*. Boston: Houghton Mifflin.
- Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, 56, 81-105.
- Chapman, L. J., & Chapman, J. P. (1985). Psychosis proneness. In M. Alpert (Ed.), *Controversies in schizophrenia: Changes and constancies* (pp. 157-172). New York: Guilford Press.
- Chapman, L. J., Chapman, J. P., & Kwapil, T. R. (1995). Scales for the measurement of schizotypy. In A. Raine, T. Lencz, & S. Mednick (Eds.), *Schizotypal personality* (pp. 79-106). New York: Cambridge University Press.
- Chapman, L. J., Chapman, J. P., Kwapil, T. R., Eckblad, M., & Zinser, M. C. (1994). Putatively psychosis-prone subjects 10 years later. *Journal of Abnormal Psychology*, 103, 171-183.
- Chapman, L. J., Chapman, J. P., & Raulin, M. L. (1978). Body-image aberration in schizophrenia. *Journal of Abnormal Psychology*, 87, 399-407.
- Cronbach, L. J., & Meehl, P. E. (1955). Construct validity in psychological tests. *Psychological Bulletin*, 52, 281-302.

- Crowne, D. P., & Marlowe, D. (1964). *The approval motive: Studies in evaluative dependence*. New York: Wiley.
- Eckblad, M., & Chapman, L. J. (1983). Magical ideation as an indicator of schizotypy. *Journal of Consulting and Clinical Psychology*, 51, 215-225.
- Fenigstein, A., Sheier, M. F., & Buss, A. H. (1975). Public and private self-consciousness: Assessment and theory. *Journal of Consulting and Clinical Psychology*, 43, 522-527.
- Fenigstein, A., & Venable, P. A. (1992). Paranoia and self-consciousness. *Journal of Personality and Social Psychology*, 62, 129-138.
- Gangestad, S., & Snyder, M. (1985). "To carve nature at its joints": On the existence of discrete classes in personality. *Psychological Review*, 92, 317-349.
- Gorsuch, R. L. (1983). *Factor analysis* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Hathaway, S. R., & McKinley, J. C. (1943). *Manual for administering and scoring the MMPI*. Minneapolis: University of Minnesota Press.
- Hutt, M. L., & Gibby, R. G. (1957). *Patterns of abnormal behavior*. Boston: Allyn & Bacon.
- Jackson, D. N. (1970). A sequential system for personality scale development. In C. N. Spielberger (Ed.), *Current topics in clinical and community psychology* (Vol. 2, pp. 61-96). New York: Academic Press.
- Jackson, D. N. (1971). The dynamics of structured personality tests. *Psychological Review*, 78, 229-248.
- Jackson, D. N. (1974). *Personality Research Form manual*. Port Huron, MI: Research Psychologists Press.
- Jackson, D. N., & Messick, S. (1961). Acquiescence and desirability as response determinants on the MMPI. *Educational and Psychological Measurement*, 21, 771-790.
- Jöreskog, K. G., & Sörbom, D. (1993). *LISREL® 8 user's reference guide*. Chicago: Scientific Software International.
- Kendler, K. S., Lieberman, J. A., & Walsh, D. (1989). The Structured Interview for Schizotypy (SIS): A preliminary report. *Schizophrenia Bulletin*, 15, 559-571.
- Kendler, K. S., McGuire, M., Gruenberg, A. M., & Walsh, D. (1995). Schizotypal symptoms and signs in the Roscommon Family Study: Their factor structure and familial relationship with psychotic and affective disorders. *Archives of General Psychiatry*, 52, 296-303.
- Kendler, K. S., Ochs, A. L., Gorman, A. M., Hewitt, J. K., Ross, D. E., & Mirsky, A. F. (1991). The structure of schizotypy: A pilot multitrait twin study. *Psychiatry Research*, 36, 19-36.
- Kraepelin, E. (1971). *Dementia praecox and paraphrenia* (R. M. Barclay, Trans; G. M. Robertson, Ed.). Huntington, NY: Krieger. (Original work published 1903-1913; original translation of selected portions published 1919)
- Lenzenweger, M. F. (1993). Explorations in schizotypy and the psychometric high-risk paradigm. In L. J. Chapman, J. P. Chapman, & D. C. Fowles (Eds.), *Progress in experimental personality and psychopathology research* (Vol. 16, pp. 66-116). New York: Springer.
- Lenzenweger, M. F. (1994). The psychometric high-risk paradigm, perceptual aberrations, and schizotypy: An update. *Schizophrenia Bulletin*, 20, 121-135.
- Lenzenweger, M. F., Loranger, A. W., Korfine, L., & Neff, C. (1997). Detecting personality disorders in a nonclinical population: Application of a 2-stage procedure for case identification. *Archives of General Psychiatry*, 54, 345-351.
- Loranger, A. W. (1988). *Personality Disorder Examination (PDE) manual*. Yonkers, NY: DV Communications.
- Maher, B. A. (1988). Anomalous experience and delusional thinking: The logic of explanations. In T. F. Oltmanns & B. A. Maher (Eds.), *Delusional beliefs* (pp. 15-33). New York: Wiley.
- Maher, B. A., & Spitzer, M. (1993). Delusions. In P. B. Sutker & H. E. Adams (Eds.), *Comprehensive handbook of psychopathology* (2nd ed.; pp. 263-293). New York: Plenum Press.
- Meehl, P. E. (1962). Schizotaxia, schizotypy, schizophrenia. *American Psychologist*, 17, 827-838.
- Meehl, P. E. (1964). *Manual for use with Checklist of Schizotypic Signs*. Minneapolis: University of Minnesota.
- Meehl, P. E. (1990). Toward an integrated theory of schizotaxia, schizotypy, and schizophrenia. *Journal of Personality Disorders*, 4, 1-99.
- Nunnally, J. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.
- Raine, A. (1991). The SPQ: A scale for the assessment of schizotypal personality based on DSM-III-R criteria. *Schizophrenia Bulletin*, 17, 555-564.
- Rosen, A. (1952). Development of some new MMPI scales for differentiation of psychiatric syndromes within an abnormal population (Doctoral dissertation, University of Minnesota, 1952). *Dissertation Abstracts*, 12, 785A.
- Rosen, A. (1962). Development of the MMPI scales based on a reference group of psychiatric patients. *Psychological Monographs*, 76 (8, Whole No. 527).
- Schulte, H. (1924). Versuch einer theorie der paranoischen eigenbeziehung und wahnbildung [An attempt at a theory of the paranoid idea of reference and delusion formation]. *Psychologische Forschungen*, 5, 1-23.
- Snyder, M. (1974). Self-monitoring of expressive behavior. *Journal of Personality and Social Psychology*, 30, 526-537.
- Spielberger, C. D. (1983). *Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press.
- Wing, J. K., Cooper, J. E., & Sartorius, N. (1974). *Measurement and classification of psychiatric symptoms: An instruction manual for the PSE and Catego Program*. Cambridge, England: Cambridge University Press.

Appendix

Referential Thinking Scale (REF)

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Directions. Please read the following statements and answer them *true* (T) or *false* (F) as they apply to you. Do not skip any items and answer them as honestly as possible, giving only your own opinion of yourself. When thinking about yourself and your experiences, do not count as important those attitudes, feelings, or experiences you might have had only while under the influence of alcohol or other drugs (e.g., marijuana, LSD, cocaine).

Administration and scoring. The 34 items on the Referential Thinking Scale clearly concern psychopathological experience; therefore, the items from the scale must be intermixed with a large number of neutral filler items (4:1 filler to scale items ratio recommended) to ensure valid testing. For 33 of the scale items, true responses are scored in the criterial direction; Item 19 must be reversed to be scored in the criterial direction.

T	F	1. When I overhear a conversation, I often wonder if people are saying bad things about me.
T	F	2. I often think that people talk about me when I walk down the street.
T	F	3. If I see someone laughing, I often wonder if they are laughing at me.
T	F	4. Strangers often smirk at me.
T	F	5. People often fidget in their seats when I enter a room.
T	F	6. When I see two people talking at work, I usually think they are criticizing me.
T	F	7. When I hear two people speaking a foreign language, I often think they might be commenting on my behavior.
T	F	8. People I do not know often notice how I dress.
T	F	9. I often feel that people are looking at me.
T	F	10. When I hear a favorite song, I think that it was probably written with me in mind.
T	F	11. I have read books that seem to have been written about me.
T	F	12. Films often seem to be very similar to my life story.
T	F	13. I often wonder if radio DJs play songs just for me.
T	F	14. Quite often I wonder if people are laughing as I walk by.
T	F	15. I sometimes think that newspaper articles contain messages for me.
T	F	16. Traffic lights usually turn red because I am driving in a hurry.
T	F	17. Dogs seem to bark a lot when I am near.
T	F	18. When I am on a train or bus, it seems that people often watch me closely.
T	F	19. I do not think that people on the street pay special attention to me. (R)
T	F	20. Professors (or speakers) often seem to direct their lectures to me.
T	F	21. Even if they do not say it, it seems to me that other people are always wondering how smart I am.
T	F	22. Small animals seem to take special notice of me as I walk by.
T	F	23. I have noticed that people I do not know often wave to me.
T	F	24. I often think others comment to each other about my clothing.
T	F	25. It seems to me that other people often imitate my style of dressing.
T	F	26. I think others often imitate my manner of speaking.
T	F	27. I often wonder why so many people leave the highway using the same exit that I use.
T	F	28. When I feel ashamed, I think others often know why I feel that way.
T	F	29. People almost always notice the parts of my personality or character that I try to hide.
T	F	30. When I see something broken, I often wonder if others blame me for it.
T	F	31. Although I know deep down inside it is not true, I often feel that others blame me for things.
T	F	32. I am not sure why, but people often seem to pay a lot of attention to me.
T	F	33. I often think that people are making accusations about my behavior.
T	F	34. I often wonder if people are in a class because I am there.

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