RISC
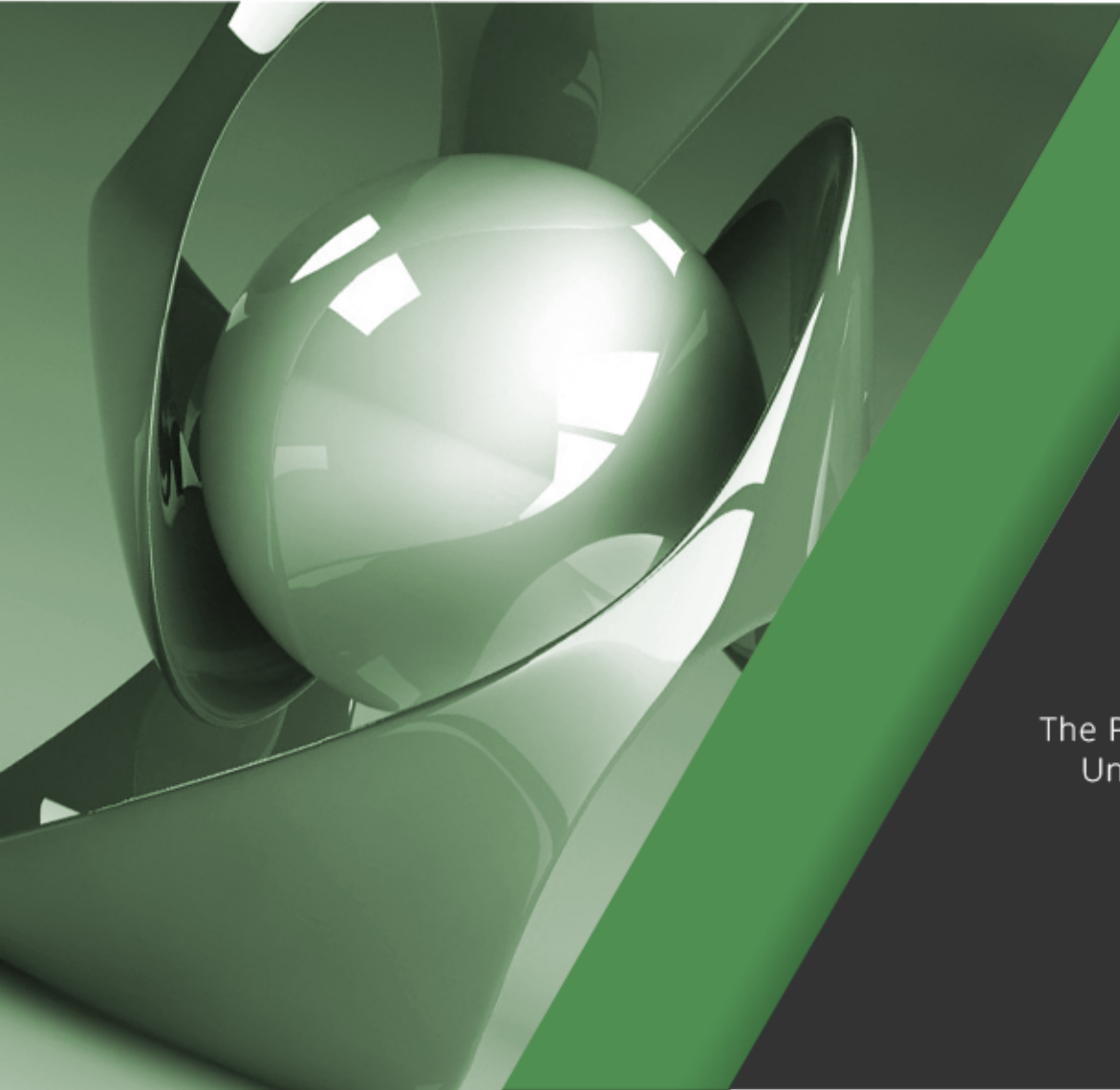
The Rust Inventory of Schizotypal Cognitions

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Handbook of the Rust Inventory of Schizotypal Cognitions

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INTRODUCTION

It has long been argued that the bizarre idea systems of the schizophrenic, the odd ideas of the schizotypal personality, and normal cognition lie on a continuum (Kraepelin, 1919; Chapman, 1966; Heston, 1970; Spitzer et al., 1979, Chapman and Jean, 1980). If this is the case then the position of an individual on this continuum should be psychometrically measurable as with, for example, some sub-scales of the MMPI (Golden and Meehl, 1979). However, the MMPI emphasizes diagnostic discrimination in the psychiatric patient population at the expense of normal population validity.

The Eysenck psychoticism scales (The PEN, PI, PQ, EPQ, and EPQ-R; Eysenck and Eysenck, 1976; Eysenck et al., 1985) were intended to be more applicable to the normal population, but have suffered from an asymmetrical distribution, poor discrimination between psychotics and normal controls, a conceptual confusion with psychopathy and tough-mindedness, poor face and content validity, a heavy sociobiological bias, and a conceptual straightjacket imposed by the pre-existing E and N scales (Claridge and Broks, 1984).

Important developments in our understanding of the factors underlying the schizophrenia borderline were brought together with the publication in 1980 of the third edition of the American Psychiatric Association's Diagnostic and Statistical Manual (DSM-III). This, and related category systems, has now led to the widely held view that the schizophrenic-normal spectrum is not unitary, and it has been postulated by Spitzer et al., (1979), Stone, (1980) and Lanin-Kettering and Harrow (1985) that different dimensions relate different aspects of schizophrenic symptomology to the schizoid personality, to personality disorder, and to the schizotypal personality, respectively. When folk

psychological usage is considered, personality disordered individuals or psychopaths have many attributes associated with "bad" people, whereas schizotypals have attributes associated with "mad" people, and this seems to be an important distinction. Two scales to measure different aspects of schizophrenia proneness have been constructed by Chapman et al. (1976, 1978); however, these have concentrated on anhedonia and body image aberration, and thus emphasize the negative symptoms of schizophrenia. Claridge and Broks (1984) report two scales, the STA and the STB, which look at the positive and the negative symptomology of schizophrenia respectively (Crow, 1980), but these were not psychometrically constructed.

Baron et al. (1981, 1985) report a diagnostic interview specifically designed to diagnose along a spectrum from schizophrenic to normal thought through the schizotypal personality. This instrument is of particular interest as it emphasizes the positive cognitive content of schizotypal ideation rather than the negative aspects of cognitive deficit. It thus has more affinity with popular ideas of "madness" than do other dimensional theories of schizophrenia. This cognitive emphasis for schizotypy also has certain parallels with Beck et al.'s (1979, 1985) cognitive approach to depression and anxiety.

The Rust Inventory of Schizotypal Cognitions (RISC) is designed to tap this cognitive schizotypal dimension in the normal population. It takes as its source the idiosyncratic ideas of those who are seen to be schizotypal or eccentric; DMS-III category A of schizophrenia and DSM-III categories 19 (excluding 2, 6 and 8) of schizotypal personality disorder (APA, 1980). These schizotypal ideas form the extremes of the cognitive schemata of suspicion, magical ideation, ritual, subjectivity, thought isolation and self-delusion, which are not uncommon in the normal population.

BRIEF DESCRIPTION

The Rust Inventory of Schizotypal Cognitions (RISC) is a psychometrically constructed, short questionnaire for assessing the schizotypal cognitions associated with the positive symptoms of acute schizophrenia and schizotypal personality disorder.

It differs from previous scales in having been developed and standardized with special attention to normal distribution in the general population, and in emphasizing cognitive content rather than cognitive deficit.

The scale has good reliability and validity, and can clearly discriminate acute schizophrenics from normals. Although containing no obviously extreme items, its cumulative effects may be used to identify bizarre and eccentric thought patterns, and as an estimate of risk in the general population for schizotypal symptoms phenomenologically related to acute schizophrenia.

The RISC exists in both an English and a Spanish version. The English version is in standard American English. The Spanish version represents a consensus of Puerto Rican, Cuban and Dominican Spanish, and is fully compatible with Venezuelan Spanish.

ADMINISTRATION

The RISC is short, with only 26 items appearing on one side of paper, and is therefore easy and quick to administer. Administration will normally take between 4 and 8 min.

Clients should be introduced to the questionnaire in a relaxed and supportive setting as, clearly, their co-operation is essential in obtaining valid responses. A positive rapport should be developed with the client.

The purpose of the RISC should be carefully explained to them, placing particular emphasis on the fact that it is designed to look at variation in normal personality. If it is felt necessary to mention any form of schizo-related disorder, then the positive (creative) side of schizotypal cognitions should also be emphasized.

Clients should be encouraged to read the instructions carefully, and the administrator should confirm that the instructions have been properly understood. With some clients it may be helpful for the administrator to be on hand to help with any queries. However, special care must obviously be taken not to bias any responding. Please note that the items in the questionnaire have been well piloted, so that none of them should present any special difficulty. All have been shown to be understandable by people from a wide variety of backgrounds and levels of literacy. With clients with very low levels of literacy, the administrator may read the questions to the client.

As with all questionnaires, clients with a thought disorder may experience difficulties. Where the disorder is mild or due to a lack of maintenance of attention or concentration, the administrator may indulge in a reasonable degree of prompting.

The items which appear in the RISC have been selected from a much larger bank partly on the basis of their success in eliciting responses from the client. However, where clients fail to respond to any of the items, their attention should be drawn to this shortcoming and they should be asked to have another go, paying particular attention to the need to give an "inspired" rather than a completely accurate response. If this fails, and three or less items still remain blank, then responses of "agree" or "disagree" should be entered for the missing items on the toss of a coin. Where more than three items are left blank, the administration should be abandoned.

SCORING

The scoring sheet has an easy-to-follow scoring key (see Table 1). You are advised to follow these instructions wherever possible.

The 26 items of the RISC are all responded to on a 4-point scale from strongly disagree, through disagree and agree, to strongly agree. Of these items, 13 are scored positively and 13 negatively. The 13 positive items are items 1, 4, 6, 8, 12, 13, 14, 17, 18, 22, 23, 25 and 26. These are scored by assigning a value of 0 for strongly disagree, 1 for disagree, 2 for agree and 3 for strongly agree, and then adding up all these item scores. The 13 negative items are items 2, 3, 5, 7, 9, 10, 11, 15, 16, 19, 20, 21 and 24. These are scored by assigning values of 0 for strongly agree, 1 for agree, 2 for disagree and 3 for strongly disagree, and then adding up these scores. To obtain the test score the scores from the positive and negative items are added.

The final RISC score will lie between 0 and 78. Higher scores represent a higher incidence of schizotypal cognitions.

An alternative method of scoring the negative items, particularly useful when computer scoring is used, is to first score them in the same way as the positive items and then reverse them by subtracting this score from 3. Thus a score of 3 becomes 3 - 3 = 0, a score of 2 becomes 3 - 2 = 1, a score of 1 becomes 3 - 1 = 2 and a score of 0 becomes 3 - 0 = 3.

Table 1 Transformation table from the scoring sheet

RISC score	Stanine score	Frequency (%)	Interpretation
0 – 20	1	3.80	Extremely low
21 – 26	2	7.40	Very low
27 – 30	3	10.40	Low

31 – 34	4	16.90	Below average
35 – 38	5	21.50	Average
39 – 42	6	19.60	Above average
43 – 46	7	11.80	High
47 – 50	8	5.70	Very high
51 or higher	9	2.80	Extremely high

This table is to be used to transform raw RISC scores to stanine form. Intervals for raw RISC scores appear in the left-hand column. When you have found the appropriate interval for the client, trace along the line until you find the equivalent stanine score - these have values between 1 and 9 inclusive. The next column shows the frequency of occurrence of this score. Thus, for example, a person with a stanine RISC score of 8 is in the top 8.5% (2.7% + 5.8%) of the population. Put another way, less than 1 person in 10 obtains a score this high. For a quick interpretation, the final column gives a verbal label to each stanine RISC score.

INTERPRETATION

Standardization

Table 1 provides the transformation of the RISC to stanine form. The scoring key on the scoring sheet also contains this standardization table, which converts raw RISC scores into stanine equivalents, from 1 to 9. Higher stanine scores represent more schizotypal cognitions. This standardization is based on 1866 subjects.

The relationship between raw and transformed scores

The raw scores on the total sample of 1866 subjects have a mean of 36.159 with a standard deviation of 8.122. The sample consisted of 602 men and 1180 women, who had

a mean age of 26.26 years. Scores range between a minimum of 6 and a maximum of 68, giving an effective range of 62. Kurtosis is 0.741 and skewness - 0.247. The latter is due to a tailing effect among the low scores (below 20), and is eliminated in the stanine transformation. The Kurtosis effect is also further reduced in transformation.

Sampling the general population

The RISC has largely been developed on student subjects. How representative are these student subject groups of the population at large? To answer this question, a comparison was made between student responses and those of a representative sample of the general population. This was obtained by looking at a random sample of 30 men and 48 women who were waiting to see their doctor in a General Practice surgery. All participants had to be over 18 years of age. The investigation was carried out over a 6-month period. As it is estimated that over 40% of those registered with a GP visit the surgery in that period of time (Shepherd et al., 1966), the sample should have been fairly representative of the practice, which was situated in inner London. The occupations of those who took part were wide-ranging, from unskilled manual to professional/managerial. The average age of the men and women was 35.0 years (s.d. 13.10, range 18-67) and 31.8 years (s.d. 9.67; range 18-59), respectively.

The interviews and questionnaire administrations were carried out by three psychological researchers, and each lasted about 15 min. About 18% of those asked in the waiting room refused to take part; however, they did not at this time know anything about the nature of the questions. Only a few subjects (representing about 7% of the sample) subsequently refused to take part after seeing the questions.

The mean RISC score for the population group was 35.98 (N = 61; s.d. = 7.06). This did not differ significantly from the London student group collected as the first testing in the establishment of test-retest reliability (N = 131, mean RISC score = 35.06). Both of these

groups had been administered the RISC in its 26-item final form. The two groups can, in combination, provide a London-based normal control (N = 192). The addition of the London data from the pilot study (in which 140 subjects, mostly London students, had been administered the 120-item, second pilot version of the RISC, which could be scored for the 26 RISC items only), brought this London control group up to a sample size of 332. This earlier sample also did not differ significantly from the other two (mean RISC = 35.67, but see p.19). It should be remembered that the Combined British control group is not exclusively ethnically or culturally Anglo-Saxon, although about 70% is so constituted. About 30% of the inner-London population is immigrant or of immigrant parentage, largely from Ireland, India, Africa and the Caribbean. London student populations have a similar cultural diversity. There is no evidence that members of these minority groups differ in their RISC scores.

US norms

Further data were collected on 365 American students. These were sampled largely from New York University and Columbia University in New York, although a section of the sample (N = 76) was drawn from US students on temporary placement in London, at the Syracuse University Centre and at City University (from a variety of colleges in New York State). None of these groups differed from each other in mean RISC score. The mean RISC score for this US student group was 36.21 (s.d. = 9.16), which did not differ significantly from the British control group (p = 0.27). The fact that the mean score for the US group is one RISC point higher can be accounted for by the age difference, the mean age of the US student group (20.11 years) being somewhat lower than that for the British control group (33.83 years). This small difference was easily eliminated by covariance analysis with age as the covariate.

Sex differences

An analysis breaking down the sample by sex within the various pilot samples showed that there were no important sex differences in the items. Within these samples, however, this was to some extent an artefact of the item selection, which had specifically excluded sex-biased items. A replication of the male/female comparisons with subsequent groups confirmed the absence of sex bias in the RISC. Even taking the whole population available to date, no significant sex differences emerge. On the total set of 1782 subjects available to date, the mean RISC score for the men is 36.15 (N = 602), and for the women 36.21 (N = 1180).

Age differences

The scores of adolescents are of considerable interest because relationships between schizotypal personality and the adolescent identity crisis have been postulated. Positive schizotypal symptoms are associated with idiosyncratic idea systems, and many of these in the adult have their basis in adolescence. Fromm (1946) and Rogers (1961) are among many who have emphasized the role of adolescence in the development of personal identity, while Laing (1959), Erikson (1968) and Aaronson (1977) have further postulated processes of existential growth of awareness which can sometimes develop atypically and lead to mental illness in the adult.

The only RISC data on children of school age comes from a sample of Hong Kong school-children (see p.39/40), and differences between school-age children and adults are therefore confounded with cultural factors. However, within the Hong Kong group there is a tendency for younger school students to have higher scores. For 17-year-olds, the mean RISC score is 39.51 (s.d. = 4.5, N = 64), for 18-year-olds 38.59 (s.d. = 5.34, N = 126), while 19 year- olds have a score of 38.28 (s.d. = 6.00, N = 90). The - 0.14 correlation of RISC score with age in this group of restricted age range suggests that the age effect is particularly

marked during the adolescent years, the RISC score showing a decline of almost 1 scale point per year between the ages of 18 and 20. No data is yet available on subjects of 16 or younger.

Data on people in their early 20s are available from the US student control group (see p.12), and these subjects do indeed have an average RISC score lying between that for the younger Hong Kong sample and the older British sample. In general, all samples show a decrease in RISC score with age. The overall picture is summarized in Fig.1. It can be seen that an initial sharp decline from 17 to 21 slowly tails off to give a general but rather small downward trend with increasing age thereafter, with a kink appearing at about age 28 and a further slow decline. This figure is confounded to some extent by age differences between samples. However, there is a consistent correlation with age across all samples, averaging - 0.18 (P < 0.001) in the control groups. For the complete set of data the age correlation was - 0.10 (N = 1782). This is, of course, significant on samples of this size. However, it is not indicative of a large effect, the r square criterion suggesting that age accounts for only about 1.04% of the variation in RISC scores. Investigation of the within-group means at particular ages suggests that the effect is generally linear after the age of 20. In the London control group there is a difference of 4 scale points between those subjects under 40 (RISC mean = 36.28, s.d. = 8.27, N = 261), and those subjects over 40 (RISC mean = 32.56, s.d. = 7.01, N = 71).
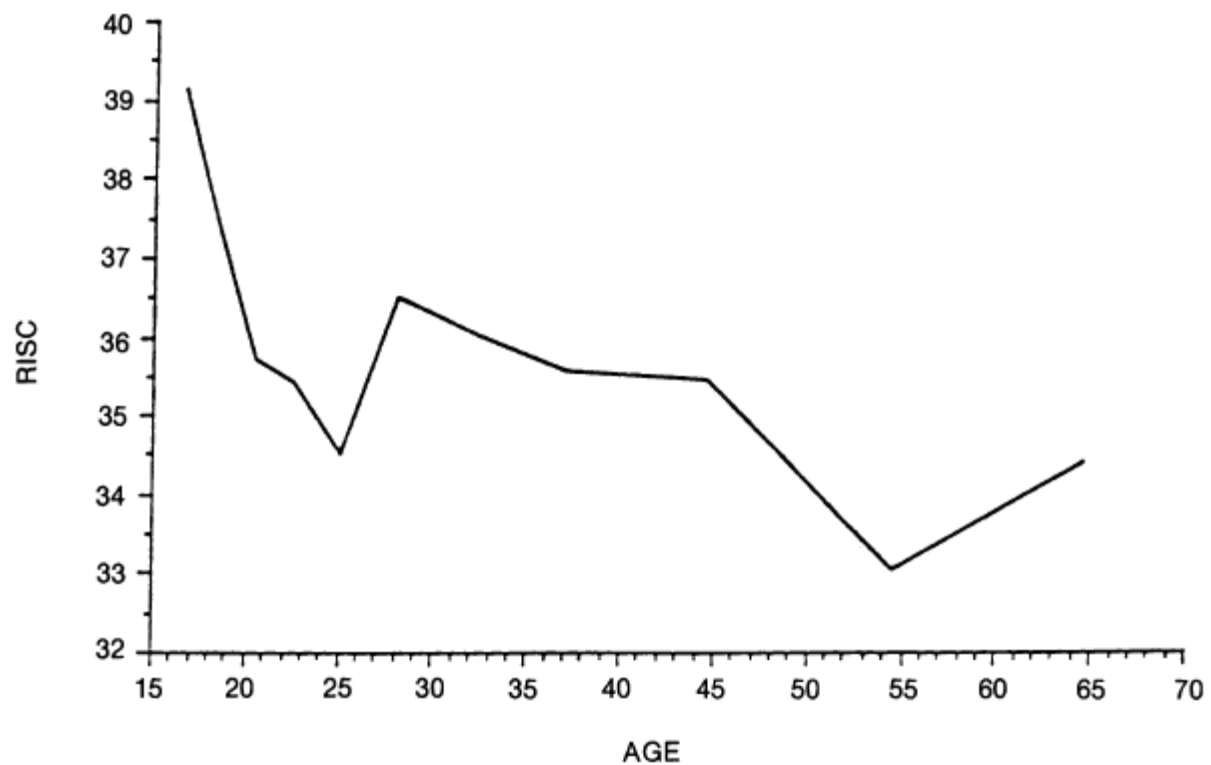
Fig.1 *The relationship between RISC scores and age. Note, in particular, the initial sharp decline between the ages of 17 and 21. Thereafter, there is a steady but relatively small overall decline. The meaning of the "kink" at age 28 is unclear.*

Linguistic differences

The RISC exists currently in two language versions, English and Spanish. Because a Spanish-speaking sample (see pp.29 and 37) was used to reduce linguistic bias during the test's construction, items which have a strong linguistic bias, between these two languages at least, do not appear in the RISC. The mean of the Venezuelan student group was 34.28 (N = 608; s.d. = 7.28). This was marginally lower than that for the equivalent British (35.37) and US (36.21) student groups, but well within the same general range. The point biserial correlation between RISC scores and the two groups (Venezuelan vs English

and US students) was 0.09 (P < 0.01). The squared correlation for this effect is, however, 0.008, showing that less than 1% of the variance in RISC scores is due to language effects.

Differences between religious groups

Religious affiliation was monitored during the Stage 1 pilot study of the RISC's construction. This pilot sample included Atheist, Protestant, Roman Catholic, Greek Orthodox, Moslem, Hindu, Jewish and B'hai subjects. Items with a bias related to religious affiliation were eliminated. Some correlation with religiosity (independently of affiliation) does, however, remain.

Cultural differences

The Stage 2 pilot of the RISC's construction included a sample of 315 English-speaking, Hong Kong school-children. Items behaving idiosyncratically between this group and the British control group were eliminated (see p.28). The mean score for the Hong Kong group is 38.65, somewhat higher than the other control groups. This difference can, however, be fully accounted for by the age effect.

Idiosyncratic response styles

These forms of response style need to be taken very seriously in a questionnaire of this type, particularly in cases where it is administered to sufferers of schizophrenia or schizo-related disorders.

Acquiescence

The RISC eliminates the acquiescence effect by balancing equal numbers of positive and negative answers. Thus, subjects who respond with only agreements or only

disagreements regress to the mean, and are therefore unlikely to confound the results to any large degree. The person who ignores the content of the items and gives the same response to chains of items should approximate a score of 39, which is close to the general population mean. Alternate responding should produce the same result. However, it must be remembered that these response styles, while not generally confounding experimental results or leading to false positives, do not give any estimate as such of the trait being measured. Where these forms of response can be clearly identified the result should be disregarded.

Stereotyped responding

Psychiatrically related questionnaire items are at risk from bias resulting from respondents deliberately attempting to create a positive or a sick image. This effect was counteracted within the construction of the RISC by avoiding items which had an obvious sick or healthy pole, so that in the general population there is no serious problem from this form of bias. There is an increased danger of this effect, however, among psychiatric patients, their relatives, and among psychiatrists and psychiatric support staff. In these cases, knowledge of schizophrenia may lead to a tendency to respond in a "sick" or "healthy" manner, based on a supposed perception of the trait involved. Interestingly, it has been noted that among psychiatric professionals the RISC can be aversive simply because of the difficulty these persons still find in identifying the "sick" and "healthy" poles, and their corresponding inability to control the outcome.

Very low scores

Low scores on the RISC are clearly interesting in their own right. However, extreme low scores should be treated with caution, particularly as these can occur when a person anxious about their own psychiatric well-being represses all awareness (or reporting) of their own schizotypal cognitions through "fear of being found out", or as a defence

mechanism. These very low scores should not, therefore, be taken at immediate face value. It is also worth noting that where these very low scores are produced in combination with stereotyped responses, the knowledge necessary to produce scores as low as this does paradoxically imply a fair acquaintance with, or experience of, schizotypal symptomatology.

Confabulation (lying)

Generally, the effects of lying have been minimized during the questionnaire's construction by eliminating those items which had a clear confabulation effect (shown by correlation with lie items "seeded" into the pilot versions). Apart from the effects noted above, obvious lying effects, where they exist, have been balanced in such a way that lying to give the image of a "good' person should be independent of the RISC score. Rust et al. (1988) found a correlation of - 0.19 between the RISC and the EPQ lie scale (Eysenck and Eysenck, 1976; see p.38).

Norms

Summary norms for various groups used in the Stage 2 pilot appear in Table 2. The actual distribution of the stanine RISC scores for these samples appears in Table 3.

Table 2 The RISC norms, in both raw and stanine form, of the various groups administered the RISC during its construction, standardization and validation.

Standard deviations are also given, as are the means and standard deviations of age for each group, and the number of men and women respectively in each.

Group	Age	N (men)	N (women)	Raw Mean	s.d.	Stanine Mean	s.d.
British, general	36.57	25	36	35.98	7.06	4.90	1.70
British students	33.23	130	131	35.38	8.39	4.81	1.82
US students	20.11	108	227	36.21	9.16	5.02	2.11
Venezuelan students	24.96	102	506	34.28	7.28	4.50	1.71
Hong Kong school-children	18.27	161	154	38.65	5.41	5.56	1.35
Acute schizophrenic	36.42	28	17	47.84	9.87	7.35	1.84
Chronic schizophrenic	32.90	13	18	37.76	9.26	5.18	1.97
Relatives of schizophrenic	54.71	3	14	31.65	7.97	3.94	1.82
Occult groups							
1	33.00	8	7	24.13	6.91	2.33	1.82
2	34.18	4	7	37.36	6.61	5.18	1.60
3	47.97	18	18	39.17	6.92	5.67	1.74
4	55.47	6	11	42.59	8.68	6.41	1.66
5	36.90	4	6	39.00	7.86	5.50	1.72
6	31.82	5	3	46.00	5.76	7.36	1.03

Most of the small differences between the various student and control groups are probably due to age effects. In the targets groups note, in particular, the high score from

the acute schizophrenic sample and also from several occult groups. Several other of the occult groups are characterized by very low scores, representing presumably some form of reaction, denial or coping strategy with schizotypal symptomatology. No figures are given for groups with N < 10.

Table 3 Distributions of RISC stanine scores for the various groups

Group	RISC stanine score									
	N	1	2	3	4	5	6	7	8	9
British, general	61	3.3	4.9	13.1	18.0	19.7	24.6	13.1	1.6	1.6
British students	271	4.4	8.9	12.2	14.8	22.1	19.2	12.2	4.1	2.2
US students	365	5.2	8.8	11.2	14.8	17.8	15.9	12.9	8.8	4.7
Venezuelan students	608	4.1	9.5	13.0	22.7	23.2	16.1	11.8	5.7	2.8
Hong Kong school-children	315	0.6	1.0	5.1	12.7	27.0	30.2	16.5	6.7	0.3
Acute schizophrenic	31	0.0	3.2	3.2	3.2	3.2	9.7	19.4	25.8	32.3
Chronic schizophrenic	45	0.0	11.1	6.7	22.2	17.8	20.0	6.7	8.9	6.7
Relatives of schizophrenic	17	11.8	17.6	5.9	23.5	11.8	29.4	0.0	0.0	0.0
Occult groups										
1	15	33.3	20.0	26.7	20.0	0.0	0.0	0.0	0.0	0.0
2	11	(0)	(1)	(1)	(0)	(4)	(4)	(0)	(1)	(0)

3	36	2.8	2.8	8.3	2.8	25.0	25.0	22.2	8.3	2.8
4	17	0.0	0.0	0.0	17.6	11.8	23.5	17.6	17.6	11.8
5	10	(0)	(0)	(0)	(4)	(2)	(1)	(2)	(0)	(1)
6	11	(0)	(0)	(0)	(0)	(0)	(3)	(2)	(5)	(1)
7	4	(2)	(0)	(0)	(1)	(1)	(0)	(0)	(0)	(0)
8	17	0.0	23.5	17.6	23.5	29.4	5.9	0.0	0.0	0.0
9	5	(0)	(0)	(0)	(0)	(2)	(2)	(1)	(0)	(0)

Frequencies for each stanine point are given in percentage form. For those occult groups with less than 12 subjects, the actual frequencies are given in brackets.

2. Psychometric Properties of the RISC

THE DEVELOPMENT OF THE RISC

The RISC was developed in three stages. In Stage 1 an initial item bank of 300 cognitive personality items was established. This item bank was administered in its entirety to 183 individuals and was reduced in Stage 2 to a 120-item version. This was further piloted to produce the 26-item RISC in Stage 3.

Stage 1

The purpose of Stage 1 was to define a personality space where the main sources of individual difference lie in areas of variation in positive cognitive personality attributes. It was felt that this emphasis on positive symptomatology would provide an improved basis for the understanding of most common sense cognitive personality differences; that it would relate more directly to motivating factors relating to cognition, and that in particular it would inform a better understanding of positive psychotic symptomatology.

The test specification

The test specification of this cognitive personality item bank concentrated on ideas, ways of thinking and beliefs which (1) reflect a cognitive basis for variation, and (2) concern those aspects of life where irrationality predominates. There is an implication that personality is closely intertwined with a cognitive personal view of the world. Explanations for differences in personality lie at the cognitive level, within the mind, rather than presupposing any external biological or behavioural causation. Straightforward description of bodily symptoms (as in neuroticism scales), of problem-solving ability or

thought disorder (as in IQ scales), or of behaviour per se are not included. Depressive items are not included because adequate cognitive scales of depression already exist (e.g. Beck et al., 1961).

The test specification covers three aspects of the subject matter. The first aspect defines content, and relates to different modes of thinking at the boundary of the rational. Within it there are three main areas:

1. Areas traditionally associated with psychotic symptomatology: delusion, derealization and depersonalization, ideas of reference, intrusive and extrusive thought, hallucination and persecution.

2. Areas associated with subject matter which might threaten a peaceful, uncomplicated, but relatively mindless existence: death, sex, intimacy, superstition, drugs, self-disclosure.

3. Areas reflecting a personal view of the world at different levels of authenticity: religion, identity, ritual, existence and fantasy.

The second aspect covers ways in which the cognitive variation may manifest itself: insight, emotion, motivation, social observation, distorted reality and defence mechanisms (projection, repression, fixation, regression and reaction formation). The third aspect reflects different functional modes: motor, perceptual, memory, and sensation. Not all combinations of these three aspects within the test specification are filled. Rather, the specification reflects a procedure to ensure that all possible combinations are considered, and avoids an excessive imbalance of item type and content.

The 300-item Stage 1 pilot version was administered to 183 individuals, mostly mature, part-time students at London University. Items were responded to as forced choice agree/disagree. Item analysis reduced this 300-item version to the Stage 2, 120-item version, and emphasized a sub-scale structure suitable for validation. Factor analysis suggested that the data could be best described by 10 factors. Three of these were related to paranoid symptomatology (paranoia, delusions of grandeur, and secretiveness), three to more ordinary schizophrenic symptomatology (hallucination, derealisation and depersonalization, and thought direction), three to defence mechanisms (maintenance of personal identity, avoidance of uncomfortable thoughts, and avoidance of uncomfortable situations) and one to ritual.

The 10 sub-scales suggested by the 10 factors were constructed to four major criteria:

1. The mean for a representative sample of the population should be near to the mid-point of the sub-scale. This prevented random responding having too strong an effect on the scores.

2. The sub-scales should be normally distributed. This simplified subsequent psychometric analysis and ensures that differences between adjacent points at different ends of the scale are of similar statistical significance.

3. The number of positive items should equal the number of negative items. This eliminated acquiescence effects.

4. Sub-scales were validated against extreme scoring items, particularly those reflecting psychotic symptomatology, which were not themselves included in the sub-scales. One common problem with psychoticism scales has been that the

psychotic items do tend to score extremely. Thus the MMPI style item "Do you hear voices", although clearly quite straightforward, would not be marked "agree" by many people outside a psychiatric clinic. Similarly, in paranoia scales, questions about personal enemies are readily identified and denied if too extreme (particularly by the paranoid!). Items for the general population need to reflect ideas which are much more common in everyday thinking. While such items in isolation tend to be far less obviously related to schizotypal thinking, they can be validated by external correlation with obviously schizotypal extreme items. The valid sub-scale will be one which, when all sub-scale items are totalled, shows a powerful relationship with the extreme items in those subjects whose scores approach the extremes.

Results of the Stage 1 pilot

The 10 sub-scales constructed were normally distributed about means centred near the mid-point of the sub-scales. There were 12 items per sub-scale, 6 positive and 6 negative with respect to the sub-scale construct. As has generally been found in tests containing items of schizophrenic symptomatology, many of the items from the 300-item version were scored extremely by our normal sample. Extreme was defined as more than 9 people out of 10 responding to the item in the same way. For the 10 sub-scales, a strong predictive relation with some of these extreme score items was found, although the latter were not included in the sub-scales.

Stage 2

The 12 items from each of the 10 scales generated by Stage 1 were combined randomly within a Stage 2 pilot questionnaire. This randomization prevented the subjects being given obvious cues about the nature of the particular items. The Stage 2 questionnaire

contained 120 statements as items, with the answer options strongly disagree, disagree, agree, and strongly agree.

The nature of the 10 Stage 2 sub-scales

The 10 Stage 2 sub-scales were designated alpha1, alpha2, alpha3, beta1, beta2, beta3, gamma1, gamma2, gamma3, and delta. The three alpha subscales dealt with paranoid symptomatology, the three beta sub-scales and the delta sub-scale with schizophrenic symptomatology, and the gamma subscales with the authentic self.

The reliability of the Stage 2 sub-scales

The test-retest reliability of the 10 Stage 2 sub-scales was estimated on 27 students from the Institute of Education with an average test-retest interval of 8 weeks (minimum 3 weeks). Reliabilities were:

- alpha1 (0.81)
- alpha2 (0.77)
- alpha3 (0.73)
- beta1 (0.89)
- beta2 (0.80)
- beta3 (0.77)
- gamma1 (0.68)
- gamma2 (0.89)
- gamma3 (0.84)
- delta (0.80)

The psychometric characteristics of the Stage 2 version

The means and standard deviations on the 10 sub-scales were calculated on a group of 117 subjects (teachers and part-time students at the University Of London Institute Of Education). The mean age of this sample was 30.49 years, with a standard deviation of 9.66. Of the 117 subjects, 60 were men and 57 women.

The population means and standard deviations (on sub-scales from 0 to 36) were found to be:

- alpha1 (17.31, 3.89)
- alpha2 (18.45, 3.57)
- alpha3 (18.20, 3.10)
- beta1 (17.25, 4.53)
- beta2 (17.88, 4.23)
- beta3 (18.22, 3.56)
- gamma1 (19.37, 3.75)
- gamma2 (16.07, 4.27)
- gamma3 (16.12, 4.21)
- delta (17.54, 4.24).

Thus the Stage 2 pilot sub-scales meet rather well the design requirement that means should be close to 18, the mid-point of the sub-scale. The correlations between the 10 Stage 2 sub-scales appear in Table 4.

Stage 3

The 10 sub-scales were factor analysed and found to produce a 3-factor solution of best fit, the factors representing paranoid ideation, schizoid ideation and experiential ideation,

respectively. This latter factor was ignored during the subsequent development of the RISC. A factor rotation of the first two factors was identified which was able to give a content-valid dimension of schizotypy. This dimension was used as the criterion for the RISC's construction, with the aim of giving its best estimate unbiased for sex, language, culture or religion.

Table 4 Correlations between Stage 2 pilot sub-scales

	α1	α2	α3	β1	β2	β3	γ1	γ2	γ3
α2	0.17								
α3	0.35	- 0.04							
β1	0.23	0.22	0.05						
β2	0.45	0.27	0.23	0.68					
β3	0.53	0.15	0.30	0.43	0.57				
γ1	0.09	- 0.12	- 0.17	0.28	0.18	0.23			
γ2	- 0.19	0.12	- 0.31	0.07	- 0.12	- 0.22	0.29		
γ3	- 0.18	0.11	- 0.42	0.20	0.05	- 0.02	0.49	0.56	
δ	0.27	0.14	0.14	0.29	0.32	0.45	- 0.11	- 0.35	- 0.10

This data is drawn from the British Stage 2 pilot (N 140).

The three Stage 3 pilot samples

The Stage 2 version was administered to three different groups so that an item selection for the single scale could be made which was parallel across differing populations. Group 1 consisted of 70 men and 70 women from a student, academic and support population in London University. This British group was English-speaking but racially and culturally heterogeneous. The mean age of the sample was 33.43 years (most of the students were mature). Group 2 was a rather younger sample (ages between 17 and 22) of 161 male and

154 female oriental Hong Kong students from English-medium colleges. Group 3 consisted of 104 men and 504 women from the University of Venezuela in Caracas (mean age 24.96 years), the questionnaire being administered in Spanish translation. The three groups therefore represented speakers of English as a first language, Chinese speakers with English as a second language, and speakers of a non-English language (Spanish) (see Table 5).

Factor analysis of Stage 3 data

For each group the data were factor analysed (principle axis) separately and a projection scale constructed from equal numbers of positive and negative items taken from the first two factors rotated to eliminate acquiescence effects.

Stage 2 item analysis

Item correlations and adjusted item correlations with this projection scale provided a pool of items which were further selected to balance across the test specification. Items were then reduced by classical item analysis to eliminate those with poor discriminability. A balance of positive and negative items was retained.

Table 5 Adjusted item total correlations on the RISC for the four groups who completed the RISC in its 120-item pilot version

	Group 1	Group 2	Group 3	Group 4	All
Mean age (years)	33.4	18.3	25.0	36.4	24.6
N (men)	70	161	104	13	367
N (women)	70	154	504	18	761

Item					
1	0.19	0.23	0.15	0.59	0.20
2	0.27	0.09	0.07	- 0.05	0.14
3	0.22	0.15	0.13	0.21	0.20
4	0.26	0.25	0.21	0.35	0.28
5	0.32	0.07	0.27	0.57	0.25
6	0.50	0.18	0.29	0.39	0.31
7	0.20	0.08	0.14	0.05	0.17
8	0.02	0.24	0.12	0.09	0.15
9	0.35	0.08	0.23	0.56	0.21
10	0.39	0.16	0.10	0.26	0.19
11	0.09	0.12	0.11	0.01	0.15
12	0.40	0.11	0.26	0.36	0.30
13	0.17	0.28	0.22	0.50	0.24
14	0.38	0.13	0.20	0.37	0.27
15	0.23	0.14	0.33	0.26	0.31
16	0.22	0.04	0.06	0.24	0.11
17	0.47	0.21	0.31	0.28	0.36
18	0.53	0.17	0.12	0.27	0.22
19	0.14	0.08	0.20	0.10	0.18
20	0.33	0.12	0.14	0.33	0.19
21	0.31	0.21	0.25	0.15	0.20
22	0.34	0.27	0.29	0.21	0.28
23	0.53	0.31	0.33	0.57	0.34
24	0.39	0.22	0.11	0.41	0.21
25	0.41	0.17	0.15	0.56	0.20
26	0.39	0.17	0.16	0.42	0.29

Group 1 = British, Group 2 = Hong Kong, Group 3 = Venezuela, Group 4 = British acute schizophrenic. Both British groups were from a multicultural inner-city area. The Hong Kong group were English-speaking Chinese. The Venezuelan group were all Spanish-speaking and the RISC was administered in Spanish translation. The statistics are also given for the total sample, which contained a few additional subjects.

Elimination of sex language and culture bias

Items which were non-parallel across the three samples were additionally excluded to minimize cultural or linguistic bias. Separate analyses by sex were used to eliminate sex bias.

Elimination of ideological and religious bias

With a schizotypal cognitions inventory there is the additional danger of contamination by religious or ideological beliefs. One of the Stage 2 subscales, gamma3, was known to be influenced by religiosity independently of actual religious affiliation, and two questions on this sub-scale were particularly so related. These two items, "Without my religion I would be lost" and "Religion is of no particular importance to me", were combined to give an acquiescence-free estimate of religiosity. Items which showed high correlations with this measure were eliminated; however, some items with a low correlation of this type were retained within the RISC. These were items which, although related to some religious beliefs, were essentially schizotypal in nature, i.e. they generally had much higher correlations with the RISC factor than with religion per se. Generally, such items can be either positively or negatively related to religion, and these items could therefore be balanced within the final version of the RISC. In the overall set of Stage 2 pilot data, the correlation between RISC score and religiosity was - 0.17 (P < 0.03) for normal subjects, which contrasted significantly (P < 0.005) with a correlation of + 0.15 (n.s.) for acute schizophrenic subjects. It thus seems that in the general population a high RISC score is

associated with lower religiosity. In acute schizophrenic samples, on the other hand, those subjects exhibiting more schizotypal cognitions seem to be more religious. This latter result has subsequently been replicated and will be reported elsewhere (Feldman and Rust, in preparation).

Additivity and linearity of RISC items

The RISC scale has 13 positive and 13 negative items, whose item character statistics for the samples to date appear in Table 6. The analysis of variance test of non-additivity was non-significant ($F = 0.74$, d.f. = 1.15174). A discriminant functions analysis using the 26 RISC items to discriminate between the 9 RISC transformed stanine points was carried out to check for linearity across different points of the scale. The first Discriminant Function accounted for 95.96% of the variance. A further discriminant function was also significant at the 0.02 level, but only accounted for 1.25% of the variance and was of no special interest. This result is plotted in Fig.2. It can be seen that the different points in the scale are linear and equidistant.

Table 6 Adjusted item total correlations on the RISC for the standardization groups who all completed the RISC in its 26-item final version

	Group 1	Group 2	Group 3	Group 4	Group 5
Mean age (years)	36.56	44.27	32.90	33.03	20.11
N (men)	25	53	28	70	108
N (women)	36	70	17	59	227
Item					
1	0.09	0.17	0.24	0.39	0.29

2	0.08	0.33	0.23	0.23	0.19
3	- 0.21	0.14	0.02	- 0.03	0.07
4	0.26	0.32	0.24	0.38	0.24
5	0.18	0.40	0.29	0.32	0.42
6	0.31	0.47	0.19	0.35	0.42
7	0.10	0.26	0.29	0.24	0.30
8	- 0.03	- 0.05	0.23	0.28	0.17
9	0.25	0.40	0.22	0.29	0.35
10	0.42	0.47	0.41	0.34	0.35
11	- 0.04	0.03	0.40	0.13	0.24
12	0.18	0.51	0.15	0.30	0.28
13	0.15	0.37	0.32	0.29	0.36
14	0.40	0.23	0.37	0.34	0.36
15	0.33	0.39	0.24	0.31	0.30
16	0.20	0.39	0.17	0.27	0.33
17	0.35	0.41	0.27	0.38	0.48
18	0.55	0.52	0.21	0.51	0.36
19	0.22	0.26	0.22	0.27	0.25
20	0.40	0.33	0.32	0.40	0.37
21	0.15	0.30	0.26	0.36	0.43
22	0.33	0.49	0.48	0.37	0.41
23	0.43	0.61	0.59	0.45	0.46
24	0.20	0.38	0.14	0.32	0.39
25	0.16	0.54	0.38	0.43	0.43
26	0.36	0.21	0.38	0.44	0.40
alpha	0.68	0.82	0.75	0.80	0.81

The comparison of the item behaviour of the 26 RISC items within the Stage 2 questionnaire with the final Stage 3 RISC

While the Stage 2 version was of 120 items in length, it contained within it the 26 items which eventually went to make up the RISC. The RISC scores can, therefore, be estimated from those subjects who had been administered the Stage 2 pilot version by scoring only the 26 RISC items. How do these scores from the long version relate to the scores of subjects who are administered the short version? Differences can exist in these circumstances due to differences in motivational effects, which tend to affect the response to items presented later in a long questionnaire. The possibility of such effects was investigated by comparing data from the British pilot group with a similar sample taken of the members of the same population (but different individuals) 2 years later, using the short version of the RISC. This latter data was also the first testing of the sample used for the estimation of test-retest reliability (see p.36). The means for the two groups were 35.67 (N = 140; s.d. = 7.67) for the pilot group, and 35.06 (N = 131; s.d. = 9.11) for the test-retest group. These means were not significantly different from each other, indicating that the two versions of the scale are similar. However, the RISC mean is an average so differences might be expected for some items, and this was indeed confirmed by a multivariate T-test, which was significant at the 0.0001 level. Items showing differences (at the 0.01 criterion) were items 7, 8 and 13. There appeared to be no special reason for these items to be idiosyncratic, but this could of course be dependent on their particular order, and that of adjacent items, in the two versions. The effect for each item appears to be random with respect to the total RISC score, so that the different effects are presumably self-cancelling in the totalling process. In subsequent analysis, it will therefore

be possible to compare results on total scores for the long and short version of the RISC. Item differences must, however, be treated with caution.
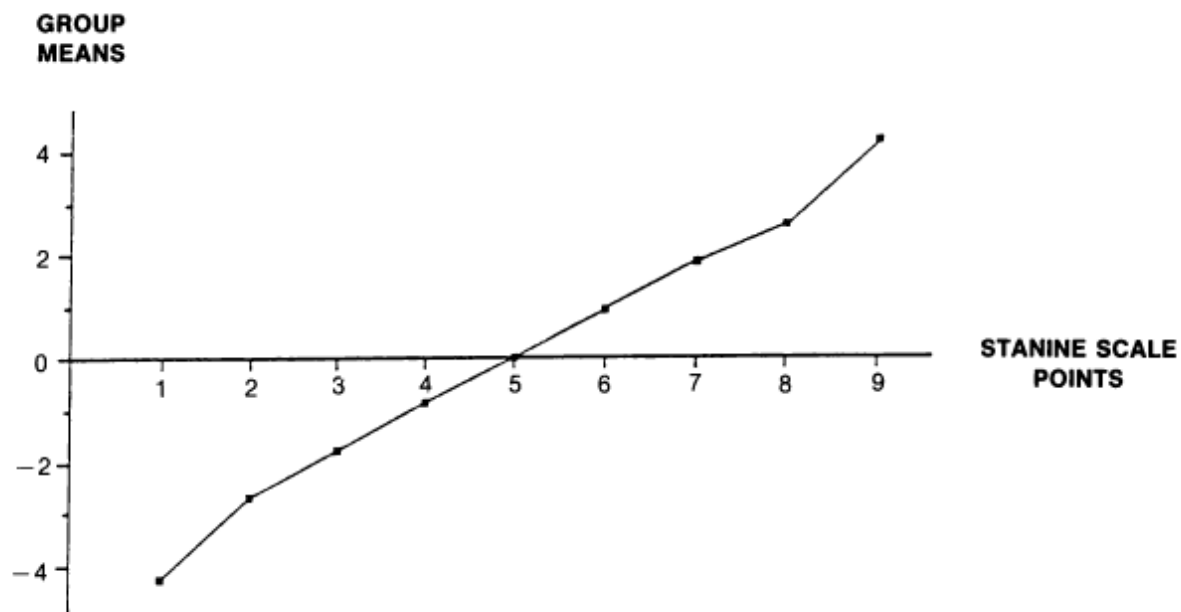
Fig. 2 *Discriminant functions analysis between the nine stanine points of the RISC, the discriminating variables being the 26 RISC items. This analysis indicates the linearity of the RISC scale.*

RELIABILITY

Split-half reliabilities and Cronbach alpha coefficients

For the total sample of 1866 subjects the split-half reliability was 0.71. Cronbach alphas for the various groups are given in Table 6.

Test-retest reliability

A group of 131 subjects, (71 males, 60 females), largely part-time students and their associates in inner-London, was collected for the estimation of test-retest reliability. The

subjects were of mean age 33.03 years (s.d. 12.52), and the split-half reliability was 0.83. A total of 108 of these subjects completed the retest after a mean time lapse of about 1 month, with none greater than 3 months and none less than 2 weeks. The test-retest reliability was 0.87. The mean RISC scores on the two occasions were 36.6 (s.d. = 9.12) for occasion 1, and 36.42 (s.d. = 9.10) on occasion 2. They were not significantly different.

VALIDITY

Comparison with acute schizophrenic presenters

A sample of 61 acute presenters at psychiatric clinics and hospitals (The Royal Bethlem and Maudsley Hospitals, St Mary's Hospital, Dulwich Hospital and St George's Hospital, all in London) meeting the DSM-III schizophrenia category A criteria was obtained to check the discriminative validity of the RISC between this group and non-schizophrenics. However, 19 of these subjects were subsequently eliminated on the basis of DSM-III schizophrenia categories B to F, and 11 additional patients were unable to complete the questionnaire properly. There were 13 men and 18 women in the acute schizophrenic group, with a mean age of 36.41 years. The primary control group was the British Stage 2 pilot group. The British control group and the schizophrenic group were not significantly different in age or sex. Subjects in both groups were administered the 120-item Stage 2 pilot questionnaire which was scored for the 26 RISC items only. Analysis of variance comparing RISC scores in the schizophrenic patient group (mean = 47.83, s.d. = 9.87) with all the other groups who had been administered the RISC through the 120-item pilot also showed very significant differences. For the British control group (RISC mean = 35.67, s.d. = 7.67), the difference between the means was significant at the 0.001 level, as were further separate and combined analyses comparing the schizophrenic group with the Hong Kong group (mean = 38.65, s.d. = 5.41), and the Venezuelan group (mean = 34.27, s.d. = 5.48).

Correlation of the RISC with Eysenck's P scale

Rust et al. (1988) looked at the relationship between the RISC and the psychotism scale of the Eysenck Personality Questionnaire (EPQ). The 608 student subjects from the Venezuelan pilot group (102 males and 506 females, drawn from the Faculty of Humanities of the Central University of Venezuela in Caracas) were administered the EPQ in Spanish translation immediately following the completion of the Stage two 120-item RISC. The mean age of the group was 24.96 years with a standard deviation of 6.47 years. The Central University is a large, prestigious university which draws students from a wide range of cultural and socio-economic backgrounds.

The EPQ (94-item Spanish version; Eysenck and Eysenck, 1976) contains four scales: Extraversion (E), Neuroticism (N), Psychotism (P) and Lie (L). The EPQ is a forced choice questionnaire with two possible responses for each item: yes or no. The reliability of the latest version of the Psychoticism scale (Eysenck et al., 1985) is 0.78 for males and 0.76 for females.

The subjects were given both inventories to complete within the university setting and were asked to answer every question. Testing took place in classes of about 30. The mean RISC score was 34.27 (s.d. = 5.48), and the correlation with age was - 0.08 ($P < 0.05$), the younger subjects tending to have higher RISC scores. There were no significant sex differences. The means and standard deviations for the EPQ were Psychoticism (mean = 6.51, s.d. = 4.27), Extraversion (mean = 16.63, s.d. = 3.99), Neuroticism (mean = 13.60, s.d. = 5.03) and Lie (mean = 11.17, s.d. = 3.66). The correlations between the variables appear in Table 7. It can be seen that the RISC correlates significantly with P ($r = 0.12$, $P < 0.001$), N ($r = 0.38$, $P < 0.001$) and L ($r = - 0.19$, $P < 0.001$), but not with E ($r = - 0.04$). The correlation of 0.12 between the RISC and the EPQ P scale is highly significant, owing to the large sample size. However, given that both scales are related to purported schizoid dimensions its most noticeable feature is its low level. The square of 0.12 is 0.014, thus

less than 2% of the variance of one of the scales is accounted for by the other. The correlations of the L scale with the P scale (- 0.39) and the N scale (- 0.29) were both significant. The correlation of the RISC with the L scale was statistically significant but somewhat lower (- 0.19), suggesting a relatively low contamination of RISC scores with lying.

Table 7 Correlations between the RISC and the Eysenck P, E, N and L scales

	RISC	P	E	N
P	0.12**			
E	- 0.04 (n.s.)	- 0.16**		
N	0.38**	- 0.01 (n.s.)	- 0.21**	
L	- 0.19**	- 0.39**	0.11*	- 0.29*

*P<0.01;   **P< 0.001. From Rust et al (1988).*

Thus, it seems the RISC and the EPQ Psychoticism scales are only slightly related and must therefore be measuring rather different constructs. Inspection of item correlations showed that a common element between the two scales exists only for paranoid items, and inspection of the face validity of the items confirms that this is the only area in which the test specifications overlap. Items other than the paranoid within the EPQ Psychoticism scale seem to be more obviously related to psychopathy and personality disorder than to the schizotypal personality and borderline schizophrenia. Our results confirm those of Claridge and Broks (1984), who found that only their STB scale (related to personality disorder) correlated with EPQ Psychoticism. The STA scale (related to the schizotypal and borderline schizophrenic personality) had no relation with Eysenck's Psychoticism. Claridge and Broks also found that, like the RISC, both of their scales correlated with

Eysenck's Neuroticism scale, and all these results suggests that Eysenck may well have been misguided in attempting to construct a Psychoticism scale completely orthogonal to Neuroticism. In particular, our results show that the dimensions representing the psychopathically and schizotypally inclined are rather more distinct.

A subsequent study carried out with 80 City University students in London found a correlation of the RISC with the Eysenck P scale of 0.24 (P < 0.05, one-tailed), adding confirmatory evidence of the relatively small size of this relationship.

Correlation of the RISC with MMPI sub-scales in an adolescent sample

Watt et al. (1982) have demonstrated a higher score on various measures of the negative symptoms of interpersonal disharmony and emotional instability in the adolescent offspring of schizophrenic parents. Rust and Chiu (1988) examine the relationship between the tendencies towards positive and negative symptomatology in adolescents.

The subjects were 174 Hong Kong English-speaking, pre-University students from four English-medium schools in Hong Kong (these subjects were also part of the larger Hong Kong sample used in the RISC's construction). There were 86 boys and 88 girls. The mean age of the sample was 18.20 years (s.d. = 0.91).

RISC scores extracted from the 120-item Stage 2 pilot questionnaire were correlated with the Minnesota Counselling Inventory (MCI) (Berdie and Layton, 1957; Frederisken, 1965), used to identify the characteristics of interpersonal disharmony and emotional instability identified by the Watt et al. (1982) study. The MCI has been derived from the MMPI to provide a method for teachers, counsellors and others working with high-school youths and college freshmen to acquire information about the personality dynamics, structure and problems of young people. The inventory is designed to identify students in need of therapeutic attention and to sensitize counsellors to students' problems. The validity of

the MCI has been demonstrated in a number of situations (Frederisken, 1965). The sub-scales of conformity, social relations, mood and emotional instability were used in the present study. The test-retest reliabilities of these four scales have been shown to be about 0.75, 0.85, 0.80 and 0.72, respectively.

The subjects were given the two questionnaires to complete within the school setting and were asked to answer every question. Testing took place in classes of about 30. All scales and sub-scales were scored in such a direction that a higher score represented a problem.

The mean RISC score for the group was 39.24 (s.d. = 5.39). This is slightly above the population mean for the London group (mean = 35.67, s.d. = 7.67). The higher mean score is almost certainly due to the lower ages of the Hong Kong group, as the RISC has been shown generally to correlate negatively with age. The smaller standard deviation may be due to the high homogeneity of the sample. There were no sex differences for the RISC ($r = -0.01$, n.s.). The means for the versions of the MCI sub-scales used were: conformity (mean = 14.63, s.d. = 3.53), social relations (mean = 27.79, s.d. = 10.12), mood, (mean = 20.57, s.d. = 5.51) and emotional instability, (mean = 20.15, s.d. = 6.95). For the MCI, there were no sex differences for any of the subscales, and only emotional instability correlated with age ($r = 0.20$, $P < 0.01$).

The correlations between the RISC and the four MCI sub-scales appear in Table 8.

It can be seen that the RISC correlates significantly with all of the MCI sub-scales. The size of the correlations shows that high RISC scorers are particularly high on emotional instability and non-conformity, but correlations with low mood and poor social relations are also significant at the 0.001 level.

It thus seems that those adolescents who exhibit evidence of a predisposition towards the negative symptomatology of schizophrenia as measured by the MCI also exhibit evidence of predisposition towards positive schizotypal symptomatology as measured by the RISC. Those with a higher degree of positive schizotypal symptomatology are found during late adolescence to have poor social relations and poor emotional stability.

There is no clear reason why individuals with idiosyncratic ideas systems (i.e. with high RISC scores), should be poor on social relationships or be emotionally unstable, although the relationship between schizophrenia itself and these latter variables is known. While there is no necessary connection between prediction of the positive symptoms of schizophrenia and prediction of the negative symptoms, this study does find such a relationship. Causal extrapolation is not possible without further data, but there is no obvious reason why negative symptoms should cause positive ones. It seems more likely that certain positive symptoms may sometimes lead to the problems represented by negative symptomatology. Several theorists (e.g. Erikson, 1968) have ascribed an important role in adult mental health to the development of complex cognitive systems such as personal identity during adolescence, and atypical development of the cognitive facility may lead to an unhealthy form in much the same way as this can happen in the anatomical domain during development. Beck et al. (1979) have suggested that in the related illness of depression, complex cognitions may have a causative role in the behavioural, motivational and mood aspects of that condition. Clearly, much more work is required in the investigation of the role of premorbid schizotypal cognitions in the development of schizophrenia and, in particular, further examination within a longer-term study of possible causative links between premorbid positive and negative symptoms would be of considerable interest.

Table 8 Correlations between the Rust Inventory of Schizoid Cognitions (RISC) and the four sub-scales of the Minnesota Counselling Inventory (MCI)

	ST	M	EI	RISC
Non-conformity (NC)	0.06 (n.s.)	0.25**	0.40**	0.40**
Poor social relations (SR)		0.57**	0.38**	0.26**
Low mood (M)			0.53**	0.27**
Emotional instability (EI)				0.45**

** P< 0.001. From Rust and Chiu (1988).

Correlation of the RISC with psychiatrists' ratings of schizotypal symptomatology in chronic schizophrenic patients

Further evidence of validity was obtained from a group of 36 chronic patients at St Mary's Hospital. All 25 men and 11 women patients in this group had been ill for more than 2 years. All patients were administered the RISC and, in addition, their psychiatrist was asked to give a blind rating of the extent of schizotypal symptoms on a 7-point scale:

- 0 - no symptoms
- 1 - very few symptoms
- 2 - one or two symptoms
- 3 - some symptoms
- 4 - quite a number of symptoms
- 5 - many symptoms
- 6 - a very high number of symptoms
- 7 - an extremely large number of symptoms

The patients' mean RISC score was 33.00 (s.d. 10.78). The lower overall RISC score for this group is a reflection of the relative absence of florid schizotypal symptoms in chronic schizophrenic groups. The mean therapists' rating of schizotypal symptoms was 3.00 (s.d. = 9.1), representing a judgement of "some" such symptoms. The mean age of the sample was 39.36 years (s.d. = 14.04), and the mean duration of illness was 12 years and 5 months (s.d. = 10 years). RISC scores were correlated with psychiatrists' ratings of the incidence of schizotypal symptoms. The between-measures score was 0.52 (P < 0.01), representing a high degree of diagnostic validity.

Comparison of RISC scores between acute and chronic schizophrenic patients

The difference in means between these groups is very significant (P < 0.001). However, the existence of these two patient groups facilitates the identification of possible bias effects from the idiosyncratic behaviour of particular items (subject to possible contaminating effects due to the different versions used). On individual T-tests for each item between the groups, only 7 of the 26 items failed to reach significance in the expected direction. None were significant in the opposite direction. To identify idiosyncratic effects, a Hotelling's Multivariate T-test was carried out on the 26 items between the two groups, but with the overall RISC score as a covariate. The multivariate T value was non-significant (P = 0.414). Individual analysis of variance for each item with RISC as a covariate showed 24 of the 26 items to be nonsignificant. The remaining items were significant at a borderline 0.04 level, and in view of the non-significant multivariate result these should be disregarded. While some bias exists within this covariance design, as the RISC score includes the item score, this bias would not be sufficient to eliminate any important confounding effects on the scale which has been found here. It seems clear that the differences between the two groups are much more easily explained in terms of genuine differences in the underlying RISC trait than in terms of idiosyncratic item effects.

The RISC scores of the close relatives of schizophrenic patients

RISC data was collected on 3 men and 14 women who were close relatives of schizophrenic patients (parents or siblings). The mean RISC score for this group was 31.65 (s.d. = 7.97), which did not differ significantly from the control group. However, this mean is somewhat below the control mean and the sample size of 17 is small, so we cannot discount the probability that with more subjects in this group a lower than average RISC score would be found. Individual analysis of variance between the relatives' group and the 26-item version of the British control group on the RISC items showed three items to be significant: items 1, 9 and 17. In all these cases, the relatives' score was lower in terms of schizotypal symptomatology than the normal controls. The possibility exists that a heightened awareness of schizophrenic symptomatology in the relatives' group is leading to a degree of denial. Alternatively, it may be the case that these relatives, from a group genetically at risk, have developed defence strategies against schizophrenic illness. Clearly, more research is needed in this important area.

The RISC scores of members of occult groups

Data was collected on 123 members (53 men and 70 women) of two religious sects and seven occult groups within the South of England. Leaders of the various groups were approached following the Festival of Mind, Body and Spirit held in London in May 1987. Of the 70 groups approached, 19 agreed to co-operate and 9 eventually provided us with completed RISC forms from a selection of their members. The anonymity of the groups was guaranteed in all cases. The mean age of this whole sample was 44.27 (s.d. = 16.65). One of the groups (N = 28) had a rather older membership with eight individuals over the age of 70 and a mean age of 62.35 (s.d. = 19.61). However, the bias from this group was not extreme, the mean age of the sample with this group excluded still being over 40 (mean = 41.39, s.d. = 14.25). Although this may not conform to the popular youthful image of sect membership, there is no particular reason to suppose that it represents a

biased sample. The correlation of RISC with age in the sample overall was - 0.03, clearly nonsignificant.

Analysis of variance comparing the nine groups on their RISC scores showed that they were very significantly different. T-test comparison of each group with the control group showed that three groups were significantly below the control group in their RISC scores with means of 24.13 (s.d. = 6.91, N = 15), 26.75 (s.d. = 12.15, N = 4) and 31.35 (s.d. = 5.45, N = 17), while three groups were significantly above the control group with means of 39.17 (s.d. 6.92, N = 36), 42.59 (s.d. = 8.68, N = 17) and 46.00 (s.d. = 5.76, N = 11). The remaining three groups did not differ significantly from the mean, having group RISC means of 37.36, 39.00 and 39.00. However, the sample size was small for these groups- 11, 10 and 5, respectively. When the three groups were combined and compared with the control group, their mean was significantly higher ($P < 0.05$).

What were the special characteristics of each of these groups which caused them to differ? Guaranteed confidentiality forbids the naming of the groups; however, it can be said that there is no clear division between the groups to account for the difference. Of the two religious groups, one is among the low-scoring sects while the other is among the high-scoring. It is not possible to say that the more "extreme" groups have more extreme scores, because this is not clearly the case, and in any event all groups were extreme in many of their beliefs. The major RISC characteristic of cults and occult groups, therefore, is that the scores are idiosyncratic, with a tendency to be above average, but in some cases being below average. The non-significant overall difference between group members as a whole and the control group is clearly not very meaningful in these circumstances.

Further information was gleaned from a discriminant functions analysis using the 26 items as dependent variables, and including all nine groups and the control as the

discriminated variable. This yielded two significant discriminant functions which are illustrated in Fig.3.

It can easily be seen that a rotation of about +60 degrees on function I gives a RISC factor which discriminates between several of the groups, and between group 1 and group 5 particularly. The second function rotated through 60 degrees sets up a second factor more or less independent of the RISC score but with a particularly strong loading from item 26 which concerns "receiving help from an outside agency". Common sense would suggest that, given the sample, this second factor relates to belief in a personal link with God or his antithesis. Investigation of the correlations of item 26 with the overall RISC score in the various groups showed that, in spite of this, this item was still functioning positively within the scale. Looking at the relationship of the various occult and religious groups to this analysis, we note that the control group has low loadings on both functions. Groups 27 and 28 were also fairly close to the origin. Both these groups were well-established organizations with an interest in the occult going back at least 50 years. All the other organizations were in more extreme positions, and the scale distances do seem to relate to extremity of views. Group 25 has a special interest in gaining illumination from yoga and internal forms of stimulation, and in fact seems to recommend an augmentation of any schizotypal symptomatology in its members. Groups 22, 23 and 29 are dedicated to finding guidance from some outside source, whether it be telepathic messages from the stars, God or Satan. Group 21 seem to be positively "anti-RISC", and indeed their patterning of responses has some similarity to that of the relatives of schizophrenic patients (with items 23 and 26, however, behaving idiosyncratically).

Correlation with creativity scores

A study carried out at City University (Rust et al. 1989) looked at the relationship between the RISC and various measures of creativity. The subjects were 41 men and 39 women with an average age of 21.4 years (s.d. = 2.9 years). The measures of creativity used were

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from the Comprehensive Ability Battery (Hakstian and Cattell, 1976). The sub-tests used were "flexibility of closure", "spontaneous flexibility", "ideational fluency", "word fluency" and "originality", thus replicating the measures used by Kline and Cooper (1985) when they failed to find any consistent relationship between creativity and the Eysenck P scale.

The RISC was found to correlate significantly with spontaneous flexibility (r = 0.19, P < 0.05), ideational fluency (r = 0.22, P < 0.05) and originality (r = 0.28, P < 0.05). The correlations with the other two tests were positive but non-significant. It does thus seem that high RISC scorers perform consistently better on a whole range of measures of creativity.
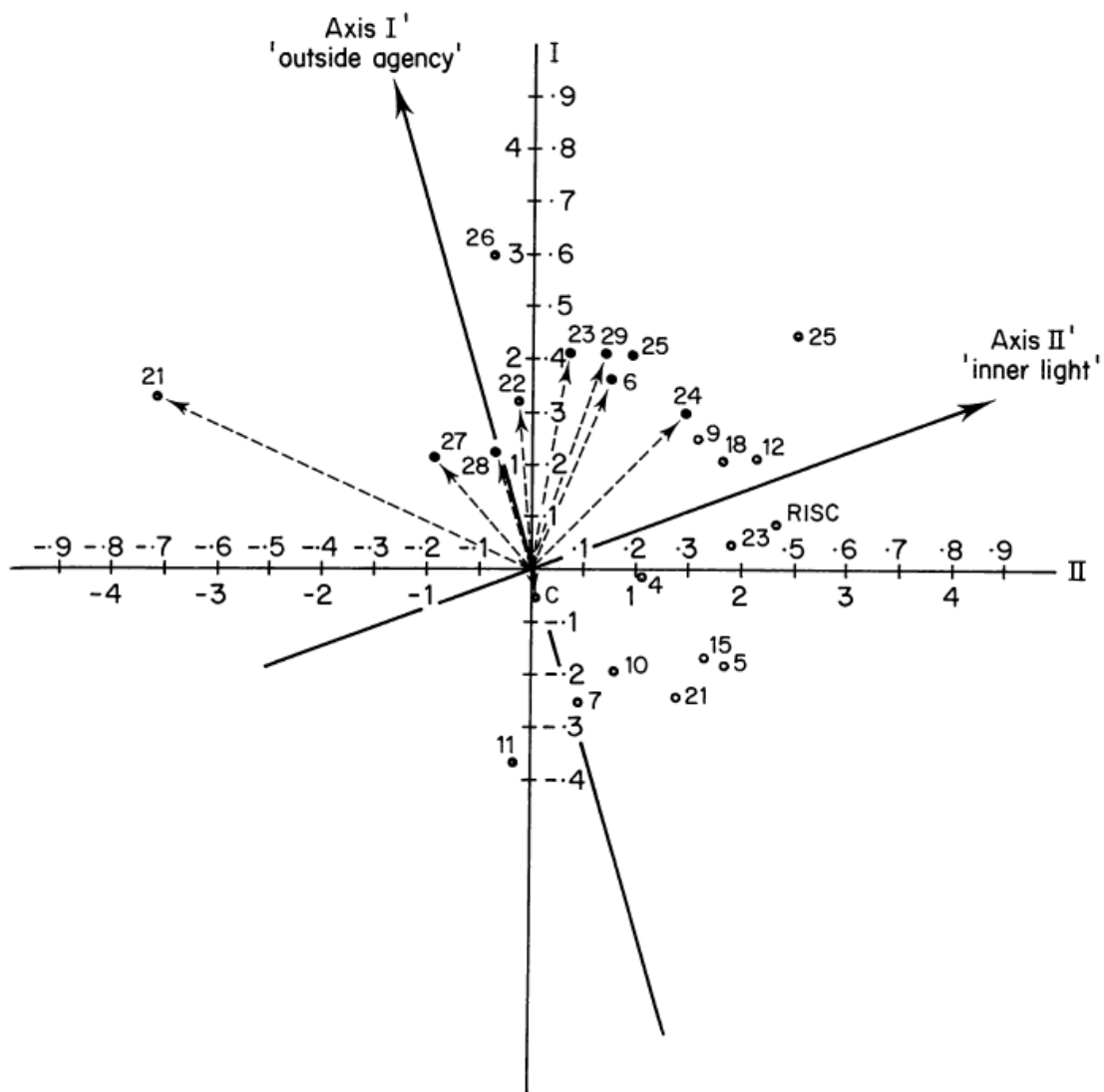
Fig.3 *Graphical representation of the results of a discriminant functions analysis for the occult group data. The RISC and its 26 RISC items were used to generate discrimination between the nine occult groups (•). The position of the groups is represented by a vector (the dotted line), with the group number at the point. The RISC itself and the items with the highest level of significance (°) are also included within the 2 function space to give semantic content. It can be seen that Function II represents a RISC function, with occult groups 25 and 26 being high and occult group 21 being extremely low. Function I is clearly identified with item 26: 'Things sometimes go so well for me that I suspect I may be receiving help from an outside agency." This identifies occult groups 22, 23 and 29. The meaning is obvious, but the "outside agencies" differ for the three groups.*

Construct validity: The RISC and the estimation of schizophrenic risk

It could be argued that estimation of risk for schizophrenia can only be based on biological or genetic studies, as with the Watt et al. (1982) study, and not on results from administration of questionnaires. However, this is by no means as self-evident as it may seem to some. The diagnostic process itself is conceptually related to risk estimation, the specific symptoms increasing the probability of a positive diagnosis being made. Therefore, to the extent that questionnaire items are projections of continua based on the presence or absence of symptoms, they too are estimators of risk. The ultimate test of the power of a risk estimator will be based on the extent to which it is able to make successful predictions, and not on any a priori assumptions about the aetiology of schizophrenia.

To what extent are persons with a high score on the RISC "at risk" for schizophrenia or schizotypal disorders phenomenologically related to it? The items of the RISC have been constructed from downward projections into the normal population of diagnostic symptomatology. Thus, for each positive item response, there is an increased probability of the subject exhibiting a schizophrenic or schizotypal symptom. The cumulative

summation of these items produces a test score which reflects the conceptual framework of normal diagnostic procedure for the positive symptoms. Thus the concept of risk is implicit in the RISC through its content validity, in so far as it measures a schizophrenic/schizotypal/normal continuum (Kraepelin, 1919; Chapman, 1966), and is an emergent property of current diagnostic practice.

Risk for schizophrenia has frequently been viewed within a biological framework, and indeed genetic studies (Heston, 1970; Gottesman and Shields, 1982) have demonstrated that schizophrenic symptomatology has a strong genetic link. Gunderson and Siever (1985) have further argued that this is much stronger for negative symptoms than positive ones, although this is disputed by McGuffin et al. (1987). Medenick et al. (1975), following a family study of genetic links between schizophrenics and criminals, have also argued that it is the psychopathically related symptoms of schizophrenia which dominate in any genetic causality. Generally, studies within the sociobiological approach have emphasized the negative symptoms of schizophrenia at the expense of the positive ones.

Perhaps also because of this sociobiological emphasis, there has been a tendency to view genetic relationships as the only means of identifying a population of persons at risk for schizophrenia. However, since the development of cognitive theories of anxiety and depression (e.g. Beck et al., 1979, 1985), there has been a shift within clinical theory towards cognitive rather than behavioural or sociobiological explanations for the aetiology of these disorders. In schizophrenia research, cognitive aspects have always been considered important, but much of the emphasis has been on cognitive deficit and the negative symptoms rather than on the cognitive content of the positive symptoms. Cognitive content is now receiving more attention, and interest has developed in the manner in which cognitions manifest themselves at different stages of information processing (Frith, 1979). While cognitive research of this type remains compatible with many biological or behavioural assumptions, it does, additionally, allow scope for other forms of explanation for schizophrenic risk. Much of the interest in the schizophrenic-

normal continuum has arisen from the way it relates the positive schizotypal symptoms of bizarre and idiosyncratic thinking to forms of eccentric, religious or creative thought in otherwise normal people. The items of the RISC, although based on premorbid acute schizophrenic and schizotypal borderline symptomatology, measure by degrees ideas which are frequently seen as "risky" by the general population, and which are related to the fear of madness in normal individuals. It is thus sensitive to that part of the normal schizophrenic continuum which is of special interest to those who wish to investigate the relationship between normal cognitive functioning and the very particular forms of cognitive dysfunction found in schizophrenia and its schizotypal borderline.

3. The Theoretical Basis of the Dimensional Construct of Schizotopy

PERSONALITY THEORY AND COGNITIVE PSYCHOLOGY

Dimensions of personality: The classical approach

Dimensional theories of personality have been widely used throughout the last 50 years in psychological theory, research and applications, whether clinical, occupational or educational. However, the majority of the theories for these underlying personality traits have been behavioural and have also tended to take a sociobiological stance for granted (e.g. Eysenck, 1967). This can be put down to the former dominance of behaviourism in psychology and of the continued dominance of the medical model in psychiatry. However, there are a series of symptoms in psychiatry, and of personality characteristics in folk psychology, which resist operationalization in this way. These are the sets of symptoms and ideas associated with forms of thought. These are inadequately described in terms of behaviour (linguistic or otherwise) and do not reduce easily to brain structure or function.

With the advent of the cognitive revolution, however, many perspectives have changed. The systems model, developed largely as an aspect of computer programming, has provided a scientific alternative to behaviourism and biologicalism, and has found widespread popularity across a range of sciences. The general field of psychometrics, in particular, has been shown to be due for major revision in the light of the systems approach (Rust and Golombok, 1989). In its application to personality measurement it has opened up the field of cognitive style to wider analysis.

Cognitive theories of personality: The classical approach

Cognitive systems approaches to psychoanalysis and counselling

Adler and the later social psychoanalysts have often taken a systems approach to personality. Perhaps following this trend, the therapies which have developed out of the counselling movement, owing much in the first instance to Rogers, have progressively turned to the use of cognitive systems explanations. However, this latter group has tended to retain a usage of the biological metaphors of self-actualization and human potential which are still fundamentally based on a pre-cognitive metaphysics.

Kelly's construct system and the repertory grid

Kelly's (1955) cognitive theory has been one of the most influential in personality research. In his notion of "man the scientist", he saw human cognitive development as an active process whereby people develop their own constructs through a hypothetico-deductive approach to the world. In as much as individuals have common, rather than unique, constructs, this is assumed to be based on common experience. Kelly's theory is hierarchical in that, as people develop, their construct systems become more differentiated and are better able to cope with reality. Higher-order constructs evolve from lower-order ones, and provide a more sophisticated interpretation of the world.

Kelly also emphasized the unique aspect of the cognitive construct system of each human individual. On some interpretations of Kelly, an existential meaning for uniqueness is argued which is seen as contradicting the possibility of dimensional analysis for personality traits, and this view of Kelly's cognitive theory is incompatible with a dimensional theory of personality. If individual constructs are unique, it is argued, then it would be meaningless to string them out along dimensions, saying that some people have more, and some less of a particular construct. While this view may represent a

reasonable philosophical position, it is difficult to see how it could be usefully applied. We could, if we wished, argue that each atom or molecule is unique, that no other would be exactly the same, or be in exactly the same relation to the world. But even if this is the case, it has not ruled out the science of chemistry. It follows logically from Kelly's psychology that only to the extent that we share the same cognitive structure with others will we be at all aware of their existence in others. But it is the very process of recognizing the extent of the uniqueness or communality of another's construct system that we create the dimension on which individuals differ. Only by postulating these dimensions are we able to recognize others as different, and to give some significance to a particular difference. The repertory grid technique (Fransella and Bannister, 1977), which owes its origin to Kelly, does, for many of its applications, make dimensional assumptions. The interpretation and use of this technique has been a source of heated argument among Kelly's followers.

Ellis and rational-emotive therapy

Ellis (1962), in his rational-emotive therapy, suggests that emotional problems arise from irrationalities in the client's view of the world. The therapy concentrates on getting the client to work through their belief system in order to see how it might be irrational and how it might relate to their problems. This is quite clearly a cognitive view of personality, placing as it does the major responsibility for emotional problems on a purely cognitive structure. However, there does seem to be some confusion within the theory between the cognitive and the rational. The rational, while a sub-set of the cognitive, is particularly hard to define. Self-deception apart, most people consider their own cognitions to be rational. Only other people, or ourselves in retrospect, can be irrational. But further, rationality is a form of reasoning which is logically independent of motivation. Rationality on its own cannot tell us what to do, merely how to do it. Some aim or purpose has to exist before rationality can come into play and tell us how we might best achieve it. Not all cognition is rational, neither is rationality relevant to all cognition. The model also

presupposes that as soon as a cognitive system is recognized as irrational, it can be changed. This does not necessarily follow. Ellis presupposes a metaphysical higher rational version of humanity. This version of idealism prejudges the issues about who is to define the aims of humanity. Why should we presuppose that the rational is an end in itself?

Beck, Meichenbaum and cognitive behaviour therapy

Through a constructive conflict between the behaviourist background of clinical psychology and practical issues arising from success in therapy, a therapy-based behavioural cognitive theory has developed, the major proposers of which are Beck et al. (1979) and Meichenbaum (1977).

Beck's cognitive theory of depression takes both dimensionalist and cognitive assumptions. It is also, however, influenced by the thinking of the human potential movement. Depression is seen as a habitual way of thinking about the negative aspects of a person's existence. Cognitive therapy consists of changing the way of thinking to a more positive appraisal of one's role in life. However, there is a confusion within Beck's theory, the source of which probably lies in the hierarchical assumptions of human potentialism. Are the depressive and optimistic cognitive habits merely alternative and equally valid ways of interpreting the world? Or does the optimistic cognitive habit have an intrinsic superiority in terms of self-actualization? Beck pays little attention to the positive or functional sides of depression. One is left with the feeling that, from Beck's point of view, an existential crisis would be a condition for treatment, rather than a means of growth.

Meichenbaum, while having much in common with Beck, has a rather different interpretation of cognitive therapy. He prefers to use a problem-solving model, rather than a rationality model. The client learns how to solve explicated problems, using cognitive strategies learned in therapy. This model has the advantage over Beck and Ellis

in that it removes the need to explicitly state what is rational. From Meichenbaum's perspective, much of normal behaviour can be irrational. But irrational cognitions are only relevant to his theory and therapy when they interfere with proper solutions to problems.

Personality traits as attributes

Recent interest in folk psychology, coming largely from philosophy and cognitive science, has led to a renewed interest in functional aspects of personality traits. Within natural language, degrees of attribution exist for many higher-order concepts. There may be more or less "justice" in one situation than another. One person may be more "trustworthy" than another, and indeed another person more "intelligent" than another. Statements about these characteristics inform many of the actions in our everyday lives. It is worth noting that the validity of any such statement does not depend at all on any possible biological theories we might have about the nature of justice or trustworthiness. Nor do we generally concern ourselves with whether justice or trustworthiness are inherited or learned.

The hierarchical fallacy

For all these theories a hierarchical nature of cognition is presupposed, implicitly or explicitly. Even with Meichenbaum's approach, problems still have preferred solutions which are represented as being more rational than the alternatives. Of course, the hierarchical nature of much of cognition cannot be denied. Some solutions are better than others, if better means more likely to succeed. But it would be useful to recognize the limitations of the hierarchical view. Problem solving only becomes applicable once the problem is set. And how problems are set can be just as much a matter for cognitions as are the solutions.

Dimensional theories of personality have usually been associated with reductionism and determinism in psychology. Within this approach it is considered to be a truism that whatever exists can be measured. Both Eysenck and Cattell, in the development of their dimensional personality theories, proceed by attempting to measure a hypothesized source of individual variation. Validation of the existence of the entity measured then depended on the process of construct validation. Eysenck believes that true existence for his hypothesized traits of extraversion and neuroticism requires a biological theory. Personality (including intelligence) was seen as reducible to the structure and function of the nervous system. Further biological respectability was obtained by identifying strong genetic components in twin and family studies. Many have questioned the metaphysics of this view, and by implication the dimensional model. However, the concept of the dimension of personality does not depend on any of these sociobiological views, but rather is independent of them (Rust, 1988). In much of dimensional personality research to date there is an element of confidence trickery. We may ask a person several times over whether they see themselves as a nervous person (this may be called a test of the personality dimension of "anxiety"), then we may attach psychophysiological electrodes and find that they are perspiring, their heart rate and respiration are increased: they seem to be telling the truth. Does this tell us that "anxiety" is biological? Here we have different models for interpreting the same phenomenon. But there is no reason to suppose that one is more scientific than the other.

The hierarchical view of cognition has been a conceptual straightjacket for cognitive psychology. Thus it is better to be more, rather than less, intelligent; it is better to have a positive, rather than a critical, outlook on life; it is better to be creative, rather than "convergent" in one's thought; it is better to externalize, rather than to internalize. Why should it be that cognitive approaches to individual variation produce this hierarchy? This may be because, historically, the basic metaphor and intrinsic assumption underlying cognitive personality theories has been one of growth. Persons progress from the undifferentiated to the differentiated, from ignorance to understanding. This makes good

sense, but is it necessary for all cognitive aspects of individual differences? It is certainly necessary if we take a reductionist stance. If the mind is nothing but a concatenation of behaviours or ideas which evolves through trial and error, the filling in of a blank slate, then development depends on learning how better to deal with the world.

There are always some solutions which are better than others, so that the superseded solutions are lower in the hierarchy, either based on misunderstanding or perhaps straightforward mistakes, or sometimes approximations to higher-order solutions which work for some cases only. Without an alternative to the growth metaphor we cannot postulate cognitive variation which has a merely contingent relationship to development. It seems as if the demands of biology, from where the metaphor is derived, ask us to insist on a biological determinism, the laws of natural selection. And this approach seems to mesh in well with behaviourist reductionism. It is important to remember, however, that we are dealing with a metaphor. Things can be viewed, and interpreted, differently.

Cognitive style

Attempts to construct non-hierarchical frameworks for cognition have been made by psychologists working on "cognitive style", and these attempts have usually been made within a dimensionalist framework. People have been classified "internalizers" or "externalizers", as "augmenters" or "reducers", as "impulsive" or "reflective", or as "field-dependent" or "field-independent", to name but a few of the postulated dimensions. While these approaches have often yielded interesting results, the theoretical framework for dimensions of this type has always been unclear. Without some classification of the nature of the entity being measured it is impossible to know how findings can be generalized. Thus, why should the "field-independent" person, as measured by the rod and frame test, behave "field-independently" in areas outside this particular test. To say that they will be more "independent" in other "fields" can only remain a figure of speech unless we have some idea of the medium of generalization. Where attempts have been

made to explicate this medium, theorists in the area have usually fallen back on biological or social learning metaphors, rather than recognizing the special nature of cognitive constructs. This was understandable, because it seemed as if as soon as the type of constructs postulated by cognitive style theorists were explicated cognitively in terms of systems theory, any grounds for generalization rapidly disappeared. The "internalizer" becomes merely somebody who tends to blame others when things go wrong; the "augmenter", somebody who increasingly comes to underestimate the thickness of rods as time goes on; the "field dependent", someone who is unable to tell whether they are sitting upright or not from their sense of balance alone, and so on. Now, of course, it may be possible to generalize these ideas in other ways, but it is necessary to be far more explicit in defining the test specification for the construct in question. Wherever the removal of the metaphysical element from a construct makes it rather less interesting in this way, the conclusion is inescapable that it was this metaphysical element which was providing the basis for the false interpretation and generalization.

The problems of defining a cognitive style are very similar to the problems of designing a psychometric test. In testing, it has been the metaphysical platonic concepts which have caused most of the application problems the technology has encountered. Within the criterion reference testing movement, some psychometrists have gone so far as to argue that, if tests could be tailored to be directly related to their function, there would be no need for such concepts as "intelligence", "creativity" or "leadership" at all. Certainly the reifying of these concepts through biological metaphors detracts us from the important aspects which they have as cognitive construct systems. Within a systems approach, however, we more readily recognise a role for these trait concepts at the functional level within the system, which obviates any need to treat them as in any way biological (Rust, 1988).

COGNITIVE PERSONALITY THEORY WITHIN A SYSTEMS FRAMEWORK

Difficulties in researching the nature of mind

A particular problem for the psychology of mind is our inability to stand outside the subject and to separate the essential from the superficial. The only minds we know are human ones. While psychology can get some purchase on comparing humans with animals, this cannot provide us with any framework for looking at language, symbolism and the more interesting areas of human thought. The issues here are very familiar to philosophers of mind. Could other minds exist? If they did, what would they have to have in common with ours? Could dolphins perhaps be intelligent but unable to communicate with us because language and mind are unique to a species? If we came across another intelligent species in the universe, how would we communicate? Or would we perhaps not be able to communicate at all, with them seeming like dolphins to us? Philosophers can argue and postulate; however, these are at heart empirical questions, awaiting objective evidence. This is not only a problem about mind, but also an important issue in universal biological theory. For example, we do not know whether carbon-based animal or vegetable matter which had evolved on a different planet would be compatible with Earth life (e.g. would this "foreign" vegetation be edible to Earth animals). Different biosystems may be completely incompatible. With only the produce of the Earth to sample we do not have any evidence from which to even begin to understand this apparently simple issue.

Evidence from parallel evolution

Within the biological systems that we do know about, there are many organic structures which are general across species, and in a way which is not hierarchical in the evolutionary sense. For example, many different animals have developed eyes quite independently from each other, differentiation between the species (insects, mammals, octopus) occurring long before differentiation into significant visual apparatus. Yet all

these eyes have many characteristics in common. First, the evolution has been determined by the need for a function, that is, seeing. Secondly, there seem to be only a limited number of ways of achieving that function. Hence, widely different organisms like the octopus and man find themselves with very similar visual apparatus. Evolution is not always hierarchical and divergent, but can lead to convergent systems.

The conceptual relationship between perception and the eye has parallels with that between the mind and the brain. But while we are aware of how the necessary physical properties of lenses and other apparatus of the eye affect perception, we have no equivalent understanding of the function of the brain. If we explore this analogy further, we can say that the eye epitomizes a non-reducible level of organization which is not explicable purely in terms of its physics and chemistry. The physics of the eye which determines its functional structure is not the physics of reductionism, arising from its constituent parts, but a higher-order imposition of the physical laws of optics. With the brain there may be similar higher-order analogues reflecting an unknown simple structure, but here we may expect the laws to be of the mathematics of systems rather than of optical physics. These higher-order systems may be what we imply by talking of the mind.

The structure of the eye does not evolve in any random fashion, making changes here and there at the micro level to adjust to the world and finishing up in a completely different state. There are significant functional constraints on its development at the macro level which constrain its operation at higher-order levels. In particular, it must have a lens, or something which fulfils the function of a lens. The lens works to physical properties and, consequently, must deal with aspects of the physical universe which would have no meaning outside the existence of lenses. It will need mechanisms able to deal with focal length, with aberration, and so forth. While these may not seem to be a necessary part of perception, they are a necessary part of the functional aspects of the perception. Only as long as we need to see do we need to cope with them. Thus we see

that many organs of the body have a structure defined in terms of a function which is not easily explainable in reductionist terms. We can contrast this with a common assumption by many psychologists that the nature of the mind is totally determined by growth in the environment. For behaviourists in particular, the mind at birth is seen as being like a blank slate, evolving thereafter by trial and error. A little more necessary structure to the mind occurs in Piaget's epistemological model, but here again evolution is interpreted totally in terms of the logical properties of the environment.

Because the human mind is unique we are presented, as in all single case studies, with a phenomenon within which it is difficult to disentangle necessary from contingent properties. If it is postulated that the mind is a functional system, like the eye, there is no certainty about which parts of it are necessary (like the eye's optical physics), and which parts are purely contingent fellow-travellers (such as perhaps single vs. multiple lens structure). It is known that a single-lensed eye is not necessary, as the multiple eyes of insects provide instances in nature of alternatives. Yet all perceiving organisms that we know appear to require a lens of some sort in order to be able to see. Some of the variation in characteristics of eyes, such as colour or size, might be predicted on reductionist principles from the microstructure. Causative links may be shown between atoms, molecules and cells, and the properties in question. But variation in eye characteristics due to the optical properties of lenses is only interpretable in terms of higher-order, non-reductionist aspects. The existence of the lens is determined functionally by the organism's need to perceive its environment. While it may be possible to conjure up a reductionist theory of need in terms of physical drives, the criteria for defining this need do not exist at the level of individual atoms and molecules.

Aberration in eye and perception, brain and mind

As not all the variation in properties of eyes can be determined by a reductionist model, it follows that many problems which occur within the eye, such as chromatic aberration or

short-sightedness, cannot be explained either without recourse to the higher-order optical properties of the lens. If the parallel between the eye and brain, between perception and the mind, is pursued, then by implication it can be postulated that not all aspects of mind are useful. The mind may have higher-order anomalies conceptually equivalent to the forms of optical aberration that are found in the lens of the eye. Some idiosyncrasies of the mind may well arise through attempts to cope - biologically, psychologically or socially - with unknown necessary higher-order properties of mind which do not have survival value. Indeed, it may well be that in adopting a mind as a functional system, an organism inherits an enormous number of problems which mitigate against survival. This model allows the postulation of real aspects of mind with negative or irrelevant survival value. One consequence of this is that we need no longer be hidebound by the cognitive reductionist hierarchy where cognitive psychology can only deal with properties of mind in terms of a direct relationship with the adaptation of the organism to the world.

There are instances where cognitive aspects of the functioning of the mind may vary without any clear rightness of a particular approach from a rational point of view. Taking depression as an example, it is clear that generally deep depression may not have much survival value. But it cannot be said to be logically wrong. If a person decides that life is no longer worth living, as in the end they will in any case be dead, who can fault the logic? The avoidance of such thoughts is just as likely to be an irrational attempt to ensure survival by denying the obvious. Indeed, survival may depend on suppressing many aspects of the intrinsic properties of mind. If it is assumed that a major requirement for the mind is that it should enable better adaptation to the world (including the behaviour of others and of ourselves within the world), then a determining aspect of it will be the extent to which it is rational. But as rational thought does not necessarily have survival value, then where it threatens survival it might be expected that the rational faculty would be suppressed. Hence, if we wish to identify variations between people in the nature of mind (which we may call cognitive dimensions of personality), we need perhaps to look at

those aspects of cognitive behaviour which are irrational or rationally ambiguous. The latter may occur where there are alternative (and sometimes incompatible) views of reality, both of which may aid survival but in different circumstances. It can reasonably be suggested that evidence for these types of structure should be found in personal eccentricity, madness and mental illness.

PSYCHOSIS AND ITS RELATIONSHIP TO PERSONALITY

Psychiatric diagnosis of positive cognitive symptoms of schizophrenia

The positive cognitive symptoms are defined in the 1987 revised version of DSM-III. These all lie within category A, which establishes a diagnosis where there is:

Presence of characteristic psychotic symptoms in the active phase: either (1), (2) or (3) for at least one week (unless the symptoms are successfully treated):

(1) Two of the following:
> *(a) Delusions.*
> *(b) Prominent hallucinations (throughout the day for several days, or several times a week for several weeks, each hallucinatory experience not being limited to a few brief moments).*
> *(c) Incoherence or marked loosening of associations.*
> *(d) Catatonic behaviour.*
> *(e) Flat or grossly inappropriate affect.*

(2) Bizarre delusions (i.e. involving a phenomenon that the person's culture would regard as totally implausible, e.g. thought broadcasting, being controlled by a dead person).

(3) Prominent hallucinations [as defined in (1)(b) above] of a voice with content having no apparent relation to depression or elation, or a voice keeping up a running commentary of the person's behaviour or thoughts or two or more voices conversing with each other.

There are eight diagnostic criteria in all for schizophrenia; the remainder establish exclusion criteria, deal with negative symptomatology, or relate to temporal and prognostic elements of the course of the condition. Of particular importance is the exclusion of the use of the term schizophrenia for conditions of less than 6-months' duration. These shorter episodes are referred to as schizophreniform psychosis (largely in cases where there is no relapse) or psychotic disorders which, in the case of category A symptoms, may be retrospectively diagnosed as brief reactive psychosis or as schizotypal personality disorder.

Psychiatric diagnosis of schizotypal personality disorders

The revised edition of DSM-III (DSM-IIIR) has paid particular attention to the clarification and standardization of diagnosis at the schizophrenia borderline. Borderline personality disorders have been categorized into three clusters:

- Cluster A includes paranoid, schizoid and schizotypal personality disorder;
- Cluster B includes antisocial, borderline, histrionic and narcissistic personality disorder;
- Cluster C includes avoidant, dependent, obsessive compulsive and passive-aggressive personality disorders.

Schizophrenic symptomatology plays a part in several of these categories, but, in particular, positive cognitive symptoms are associated with the schizotypal personality disorder. It is convenient to classify this group of symptoms as schizotypal, because DSM-IIIR is clearly destined to become the standard for the immediate future.

The full criteria for schizotypal personality disorder are:

a) A pervasive pattern of deficits in interpersonal relatedness and peculiarities of ideation, appearance, and behaviour beginning by early adulthood and present in a variety of contexts, as indicated by at least five of the following:

    (1) Ideas of reference (excluding delusions of reference).

    (2) Excessive social anxiety, e.g. extreme discomfort in social situations involving unfamiliar people.

    (3) Odd beliefs or magical thinking influencing behaviour and inconsistent with sub-cultural norms, e.g. superstitiousness, belief in clairvoyance, telepathy, or "sixth sense", "others can feel my feelings" (in children and adolescents, bizarre fantasies or preoccupations).

    (4) Unusual perceptual experiences, e.g. illusions, sensing the presence of a force or person not actually present (e.g. "I felt as if my dead mother were in the room with me").

    (5) Odd or eccentric behaviour or appearance, e.g. unkempt, unusual mannerisms, talks to self.

    (6) No close friends or confidants (or only one) other than first degree relatives.

    (7) Odd speech (without loosening of associations or incoherence), e.g. speech that is impoverished, digressive, vague or inappropriately abstract.

    (8) Inappropriate or constricted affect, e.g. silly, aloof, rarely reciprocates gestures or facial expressions, such as smiles or nods.

    (9) Suspiciousness or paranoid ideation.

b) Occurrence not exclusively during the course of schizophrenia or pervasive developmental disorder.

Further positive cognitive symptoms are included in paranoid personality disorder, but these overlap with schizotypal personality disorder criteria A9.

Not all of these criteria are positive, neither are they all cognitive. However, practically all positive, cognitive, psychotic-like symptomatology in psychiatry is included.

The psychiatric definition of schizotypal cognitions

Schizotypal cognitions can, therefore, be defined in terms of schizophrenia symptomatology (categories A1(a), A1(b), 2 and 3C; categories A1(c), A1(d) and A1(e) deal with negative cognitive, behavioural and mood symptomatology, respectively), and in terms of schizotypal personality disorder symptomatology (categories 1, 3, 4, 5, 7 and 9). Categories 2 and 6 relate to social anhedonia, and category 8 is mood related. The term schizotypal cognitions is used to refer to the positive cognitive symptomatology of both of the above diagnostic categories.

Schizophrenia and the medical model

Most research on schizophrenia in recent years has taken place under the ambit of the medical model. Indeed, many researchers in the area take the extreme position that an eventual biological explanation for schizophrenia is inevitable. Following the successes of the approach in cyclic disorders and, for example, temporal lobe epilepsy, there is certainly room for optimism. However, it is important to remember that the symptoms of all these disorders are predominantly mental. While mental states may or may not be seen as reducible to brain states, depending on the prior philosophical position taken, the fascinating ways in which schizotypal ideation interacts with normal cognition will always remain worthy of study in its own right.

From a cognitive science perspective, schizotypal forms of thought are of particular interest because of their implications for normal cognition. Even within a biological perspective it will always remain necessary to assess the cognitive and psychological aspects of schizophrenia as it is these, after all, which present the problem. This remains true even if biological "causes" are found. Thus, in plant biology, for example, the discovery of growth hormone was a major breakthrough in explaining the "cause" of individual differences in the size of plants. Yet the existence of growth hormone itself only makes sense within a context in which plants need to differ in size. It explains the how, but not the why.

While theories of schizophrenia remain predominantly biological, diagnosis and classification of symptomatology remains stoutly within the mental sphere. Within this sphere a number of theories have been put forward which purport to explain an origin and mode of operation for these symptom clusters.

Psychoanalytic approaches and the "authentic self"

Psychoanalytic theories of schizophrenia, while generally within or related to the cognitive domain, have often been untestable, or have relied on intervening conceptual apparatus (e.g. the id, the bad breast) which seem somewhat removed from everyday thinking. However, some of their ideas may be worthy of further study as they can contribute to an understanding of how psychotic symptoms may function at the systems level. The recent recognition within cognitive science that mental phenomena demand a representational framework if they are to be properly explored has opened up the possibility that some of the hypothetical worlds of psychoanalytic thinkers may actually represent different modes of thinking. Erich Fromm contrasts the routine world within which we are brought up and conditioned, with the subjectively "real" world, the world of authentic being. These ideas, which Fromm puts forward in Fear of Freedom (1946), owe much to existentialist philosophy and have had a major influence on psychological counselling.

Existentialism

Kierkegaard (1980), the founder of existential philosophy, suggests three stages in the evolutions of the person. He refers to the first stage as "being in despair without realizing you are in despair". This is similar to Fromm's stage of unauthenticated existence. Behaviour is seen as being conditioned or completely socialized in the child and adolescent before the onset of self-questioning. Philosophical or religious beliefs at this stage will be factually learned from others, with no insight into any deeper meaning. In the second stage comes an awareness of despair, which might initially take the form of a recognition of the futility of a machine-like existence. In this stage everything is questioned, including fundamental values. There are many similarities here with the adolescent identity crisis, although, of course, such a questioning can occur at any stage of life.

Kierkegaard's third stage involves "a sudden jump to faith". He is referring, of course, to a faith in God (he was Bishop of Copenhagen), but it is not necessary to make this particular interpretation. Perhaps a realization of the essential relativity of most values in life leads to a conceptual jump to acceptance of some beliefs as fundamental. We cannot question everything without throwing our own existence into doubt. Consequently, we have to take something as given in order to be able to question at all. Many theorists who follow Kierkegaard tend to believe that most people never reach stage two, and that hardly anybody reaches stage three. This elitism has parallels with the human potential movement today.

Kierkegaard's second stage of despair is a fundamental concept for all later existential philosophers, including Binswanger and Heidigger, and its influence can be seen in Fromm's stage of the search for authentic existence. The idea of the self-actualizing tendency within humanistic psychology (Maslow, 1955) owes much to these existential origins. Such an existential stage of development, however, is meaningless within

behaviourism, where no distinction can be made between authentic behaviour and simulated or totally conditioned behaviour. Within cognitive systems theory, on the other hand, modes of thought of this type can be represented by forms of schema which are stable across a series of conditions, or as higher-order properties of mind.

Existential psychiatry

Several psychiatrists have been influenced by existentialism. R. D. Laing, for example, has emphasized the existential aspects of conditions such as schizophrenia, following Jaspers (1919) and Binswanger (1963). Psychotic conditions are seen as developing when an extremely unauthentic self has been socialized by the environment and comes into sharp conflict with an emerging authentic self. The total regression of some forms of schizophrenia is thus seen as a breakdown resulting from a failure to integrate these two different selves. Laing (1959) argues that the attempt by classical psychiatry to reimpose the unauthentic self in these circumstances is not only unlikely to succeed but is also immoral. Once this type of breakdown has occurred the only option is to nurse the emerging authentic self through a new but slow process of appropriate socialization - to effectively build a new, but this time genuine, self. He believes that this new growth cannot, however, be imposed: the therapist and the hospital must provide a supportive environment which will enable the client to grow naturally under the guidance of their own self-actualizing tendency. This model of schizophrenia is existential, in so far as it accepts the existence of an authentic self which is more than 21 mere concatenation of learned responses, and cognitive in that it is the cognitive structure of the client which is provided with incentives for growth.

Following this philosophy to its logical conclusion there seems to be obligation to say, paradoxically, that the schizophrenic is more "healthy" than many normal people, having at least begun the first stage of authentication. There are clearly problems with such an approach. The idea that the schizophrenic world view is as acceptable as, and in many

cases an improvement on, any other, is difficult to substantiate on any functional view of human behaviour. If success in living is any criterion, then schizophrenia must be a failure. Similarly, the view that schizophrenia is a mechanism for coping with existential problems resulting from a bad childhood fails to explain why everyone does not go through such an episode. The suggestion that schizophrenics have progressed through a stage of self-actualization denied many people, while essentially unprovable, is not superficially supported by conversations with ex-schizophrenics. However, by opening up an analysis of the alternative views of reality which emerge and conflict within the schizophrenic mind, this approach has demonstrated a role for a cognitive, rather than a medical or a behavioural, analysis of these conditions.

Social theories of schizophrenia

Some theorists have argued that schizophrenia is social in origin. Bateson et al., (1956) put forward a "double-bind" theory. They suggest that schizophrenia results from the habitual use by the mother of conflicting double messages. Litz et al. (1958) argue that irrationality is transmitted by the immersion of the child in the paranoid and illogical reasoning of the parent. Wynne et al. (1958) postulate that constant inconsequential and deviant conversation by the parents is the source of schizophrenic thought. All of these theories are in one sense cognitive, in that they are essentially linguistic in nature. However, there is an emphasis on the surface structure of cognition which gives them all a superficial air. With these theories it is difficult to explain, given the frequency of double-bind, illogicality and inconsequentiality in thought, why we are not all schizophrenic. The real problem would seem to be to understand why, in these circumstances, some people develop schizophrenia and some do not. The answer to this question would be a much firmer theory of schizophrenia than any of those put forward by the social theorists.

Information processing models

Cognitive theories of schizophrenia, within the ambit of information processing psychology, have been put forward by Hemsley (1977) and Frith (1979). Hemsley argues that schizophrenia is associated with inappropriate pigeonholing of information. Frith suggests that it is associated with a deficit in information control: information which should have been filtered out reappears, to interfere with proper cogitation. Both of these theories are well placed within information processing psychology. However, with the advent of connectionism, this model is perhaps not so fashionable as it once was. Both leave one with the feeling that yet another metaphor has been created for the common knowledge that schizophrenics exhibit idiosyncratic modes of thought. These types of theory will remain unconvincing unless some evidence is produced that the brain actually does process information in the way suggested.

Schizotypy within a cognitive systems framework

A general failing of the information processing paradigm is its hierarchical reductionism, so that it finds particular difficulties with emergent properties. These latter are characteristic of schemata and systems approaches to cognitive psychology, which appear to offer more promise. If idiosyncratic ideation is an emergent property of the cognitive system, then there are many possible lines of research which may tell us not just about schizotypal ideation, but about normal cognition as well. One overriding part of the human cognitive system is language, and several linguistic theories of schizophrenia have been put forward. Chaika (1974), for example, suggests that schizotypal thinking is associated with a failure to match semantics with sound. While this would appear to be the casein much schizophrenic thought however, the general loosening of cognitive processes is wider than language alone. One important aspect of schizophrenic thought is its unreality; it appears to come as if from nowhere, and thus has many similarities with inspirational thought.

Genius and madness

Much of the interest in the schizophrenic-normal continuum has arisen from the way it relates the positive schizotypal symptoms of bizarre and idiosyncratic thinking to forms of eccentric, religious or creative thought in otherwise normal people. A postulated relationship between madness and genius predates psychology. Thus Aristotle stated this:

> "Famous poets, artists and statesmen often suffer from depression or insanity, as for example Ajax; in more recent times such tendencies are found in Socrates, Embedacles, Plato and many others, particularly among the poets…"

The French encyclopaedist Diderot, when commenting on the predicament of madmen and geniuses alike, reflected:

> "The one is incarcerated and put in chains, the other has monuments erected to him…"

Shopenhauser remarked that:

> "Genius is closer to insanity than to the average type of intelligence…"

Also worth a mention are Shakespeare (A Midsummer Night's Dream, V, I):

> "The lunatic, the lover and the poet are of imagination all compact…"

and Dryden (in Absalom and Achitophel):

> "Great wits are sure to madness near allied,
> And thin partitions do their bonds divide."

This view of genius in relation to madness also influenced the early psychiatrists. Thus Kretschmer (1925) was convinced that there was evidence of psychopathology in great

poets, artists, statesmen and other "geniuses". Bleuler (1978), when referring to the "pre-schizophrenic", wrote:

> *"The better side of this autism reveals a sturdiness of character, and an inflexibility of purpose, an independence, and a predisposition to creativity..."*

There is also research evidence in support of the link. Thus Heston (1966) found that where no mental pathology developed in schizophrenic "high risk" children, the individuals tended to follow more artistic and creative professions. Karlsson (1968), in a study of the relatives of schizophrenics, demonstrated a higher incidence of persons with "superior intellect or leadership capacity". Hammer and Zubin (1968) argue that those predisposed to schizophrenia are able to style their idiosyncrasies into creative and culturally accepted roles. Barron (1963) reports similarities between schizophrenics and creative artists.

Schizotypal symptomatology also shows some overlap with religious experience, and in many primitive societies schizophrenia is still interpreted within a religious or spiritual, rather than a medical framework. Members of secret cults often show shared evidence of schizotypal symptomatology. This group involvement among religious followers occurs to such an extent that the DSM-III diagnostic criteria specifically exclude this type of symptomatology where it is shared as part of the religious belief system.

The role of positive schizotypal symptoms

Severe schizophrenia necessarily involves thought disorder, and thought disorder can quite appropriately be considered under a classical hierarchical model. It can be seen as a deterioration in intelligence. But at the earlier stages of schizophrenia, or in borderline cases, it is not disorder but eccentricity of thought which is the main characteristic. Many of these eccentricities are not characterized by being irrational, indeed many of the eccentric views may be considerably more rational than the subjects' earlier beliefs.

Rather, the views are uncharacteristic, inappropriate, or inconsistent with their current lifestyles. Some eccentricities held by psychotics might have been quite meaningful in other contexts. Some may well be central to many religions, or successful as metaphors within some areas of science. Others may be necessary parts of success in some occupations.

One consequence of a too-ready acceptance of the medical model is insistence that these eccentric precursors are an early symptom of thought disorder, which may in some cases be true. But may it not be, as the existentialists suggest, that in other cases the thought disorder develops from an inability to cope with the eccentric ideas? This may particularly be the case if they are more rational than the more socially conditioned belief system on which the patient had formally depended as a rationale for his way of life.

A view of schizotypal cognition

While much of the literature reviewed here may appear diverse or even contradictory, there are many common metaphors emerging within different conceptions. Thus, while psychobiologists are convinced that they will ultimately find a biological model for schizophrenia, even for them it is eccentric cognition, not biology, which needs to be explained by this theory. The development of cognitive science should have shown us that a psychological theory does not have to be grounded in biology for it to be scientific. Programming has made respectable the idea that problems can exist in the software, as well as in the hardware. Logicians are now exploring, for eventual use by computer programmers, the varied forms of logic provided by human language. Today we have fuzzy logic and object-oriented programming, tomorrow we may have ways of dealing with intentionality, and the forms of thought which the existential philosophers have examined must certainly be candidates for further study. The issue is essentially nothing less than the nature of mind itself.

The common theme of wit and madness, first enunciated by the ancients, remains with us today, and the looseness of ideas systems found in the poet and the madman remains the thing to be explained, whether through biological, information processing, behavioural or linguistic metaphor and icon. The problem/source of schizotypal cognition is also the source/problem of creativity. An explanation of one, if ever found, must inevitably go some way to explaining the other. A recognition of this parallel is important, because otherwise an artificial distinction is made between the unsuccessful schizophrenic patient and the successful leader or artist. The issue perhaps should not be "How do their cognitions differ", but "Given these forms of cognition, why do some use them to advantage, and others find themselves overwhelmed by them".

Human intelligence has evolved at a rate much faster than would be provided by biological evolution alone. Once humans had developed the ability to reflect on and change their own thinking a whole new concept of evolution was in place: the evolution of ideas. This ability has meant that our mental evolution has far out-run any biological dependence it may have, so that there is nothing in our genes which makes space-flight or literary creation possible over and above the tasks our cave-man ancestors needed to perform. Given this rapid evolution it should not be surprising that there are so many loose ends in human cognition. And those which lead to creative thought, self-analysis and cognitive restructuring, for some, carry their penalties.

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