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ABSTRACT

The cognitive style dimension of scanning refers to consistent individual differences in the extensiveness and intensity of spontaneous attention deployment, leading to individual variations in vividness of experience and the span of awareness. The cognitive style of focusing was conceived as an adaptive counterpart to the defense mechanism of isolation, with the expectation that extreme focusers would concentrate their awareness on relevant task features in narrow and discriminating ways. A factor analytic study was conducted to assess scanning and focusing tendencies in a wide variety of perceptual tasks in an effort to document the convergent and discriminant correlations that would clarify the interpretation of the scanning cognitive style. The extensive experimental battery was administered to 122 male and 92 female college students. Separate factor analyses were conducted for males and females. Results of the study leave little doubt that the cognitive style of scanning refers to an organized hierarchy of dimensions exhibiting a qualitatively different structure in males and females. Implications for cognitive style and its measurement are discussed. (Contains 2 figures, 22 tables, and 83 references.) (SLD)

RESEARCH REPORT

COGNITIVE STYLE AND PERSONALITY: SCANNING AND ORIENTATION TOWARD AFFECT

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COGNITIVE STYLE AND PERSONALITY: SCANNING AND ORIENTATION TOWARD AFFECT[1]

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Cognitive styles are individual consistencies in the ways that different people organize and process information and experience. That is, cognitive styles are self-consistent characteristic modes of perceiving, remembering, thinking, judging, and problem solving. Furthermore, as Allport (1961, p. 462) put it, style reflects "the oblique mirroring of personal traits," so we are in actuality speaking about cognitive expressions of personality. In essence, then, cognitive styles are characteristic self-consistencies in information processing that develop in congenial ways around underlying personality trends (Messick, 1984).

As cognitive expressions of personality, cognitive styles are closely tied to affective, temperamental, and motivational structures as part of the total personality. In this regard, Shapiro (1965) maintained that a person's "general style of thinking may be considered a matrix from which the various traits, symptoms, and defense mechanisms crystallize. It seem[s] plausible, in other words, that mode of thinking might be one factor that determines the *shape* or *form* of symptom, defense mechanism, and adaptive trait" (p. 2).

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If cognitive styles influence the form of both symptom and defense as well as of adaptive trait, they operate across the range of both normal and pathological behavior. In the context of psychopathology, for example, four distinctive modes of functioning have been delineated that are associated with various neurotic pathologies and, hence, are often dubbed "neurotic styles" (Shapiro, 1965). These four so-called neurotic styles have been labeled obsessive-compulsive, hysterical, paranoid, and impulsive. Like cognitive styles more generally, they represent organized ways of perceiving, thinking, and acting, of experiencing subjective states in general and emotions in particular. Because a core feature of a neurotic style is its characteristic mode of dealing with intrapsychic conflict, ego threat, and intrusive affects and impulses, they are often referred to as defensive styles. This is the appellation preferred here because it highlights the aspect most pertinent to our present treatment of cognitive style in relation to orientation toward affect.

It must be emphasized that these neurotic or defensive styles are by no means limited to pathology but also represent stylistic trends that may prove adaptive within the normal range of personality, where they operate in the form of rigid, impressionistic, suspicious, and unintegrated cognition, respectively. Neurotic styles, being consistent modes of organizing and channeling affect in cognition and of accommodating anxiety and conflict, are primarily defensive. But they also serve the important adaptive function of maintaining and protecting cognition -- albeit at the price of having it be constrained or distorted cognition -- in the face of intense affects and severe ego threats (Messick, 1987). In contrast, as ordinarily conceived within the normal range of functioning, cognitive styles are primarily

adaptive, but may also serve defensive purposes when faced with intrusive impulses and affects (Hudson, 1966, 1968; Messick, 1984, 1987).

Thus, cognitive styles, including the so-called defensive styles, are conceived as key variables in the organization and control of attention, impulse, thought, and behavior (Gardner, Holzman, Klein, Linton, & Spence, 1959). As controlling variables, styles help regulate the direction, duration, intensity, range, and speed of cognitive processes as well as their initiation, maintenance, disruption, and termination. As organizing variables, styles contribute to the selection, combination, sequencing, and mode of cognitive processes (Messick, 1987). Such stylistic consistencies in the organization and control of information processing will here be examined empirically in connection with a particular cognitive style, namely, scanning or individual consistencies in mode of attention. Consideration will also be given to possible defensive functions of scanning in coping with intrusive impulses and affects.

INCREASING DIFFERENTIATION OF THE SCANNING CONSTRUCT

The cognitive style dimension of scanning refers to consistent individual differences in the extensiveness and intensity of spontaneous attention deployment, leading to individual variations in vividness of experience and the span of awareness. As originally formulated by Schlesinger (1954), the stylistic emphasis was more on focussing than on scanning. The construct was rationally derived in part from Freud's (1926/1936) claim that the defense mechanism of isolation separates an idea from other ideas in consciousness and from their affective concomitants (Gardner et al., 1959; Schlesinger, 1954).

Thus, the defense mechanism of isolation enables one to bring many potentially disturbing ideas to mind without experiencing associated unpleasant feelings or anxiety and without falling prey to associated impulses toward action. According to Freud, this separation of idea from affect is a consequence of concentrated focussing of attention on ideas.

FROM FOCUSSING TO SCANNING TO FOCUSSED SCANNING

The cognitive style of focussing was conceived as an adaptive counterpart to the defense mechanism of isolation, with the expectation that extreme focussers would concentrate their awareness on relevant task features in narrow and discriminating ways while ignoring distracting irrelevancies (Schlesinger, 1954). Hence, where appropriate, extreme focussers were expected to be both more concerned with accuracy and more accurate -- for example, in making psychophysical judgments such as size estimation. Focussing was also expected to be associated with the isolation of affect from ideas.

Indeed, in the initial study of this variable (Schlesinger, 1954), focussing (as inferred from accuracy in size estimation) was found to be significantly related to an index of isolation, namely, a Picture Preferences Test. The interpretation of this latter measure assumes that focussers, as isolators, would be less likely to report clear-cut affective experiences and hence would assign many pictures to an "Indifferent" category as opposed to "Like" or "Dislike" categories. Subsequently, however, a study appeared demonstrating that the magnitude of an object held in the center of the attentional field tended to be overestimated, which is the so-called centration effect (Piaget, Vinh Bang, & Matalon, 1958). Hence, given the

operation of a centration effect, focussers as originally conceived should be subject to overestimation errors. On the other hand, the more accurate judges (or the minimal overestimators) should overcome centration effects by broadly scanning the stimulus field. This expectation that extensive scanning, and not simply focussing, is associated with accuracy in size estimation has indeed been documented in studies of eye movements (Gardner & Long, 1962a, 1962b).

As a consequence, the theory was reformulated so that scanners, and not focussers, were expected to be accurate -- not because they narrow attention and shut out irrelevancies but because they deploy attention extensively to many aspects, both relevant and irrelevant, of the stimulus field (Gardner et al., 1959; Holzman, 1966). Moreover, it is now scanners, and not focussers, who are expected to isolate affect from ideas -- the key feature of isolation to be emphasized being not the concentrated focussing of attention on ideas, but the consequent broadening of awareness by virtue of significant increases in the repertoire of consciously accessible ideas (Schafer, 1948).

Consistent with this re-interpretation, a factor obtained in their male sample linking small errors in size estimation to remoteness of word association and to incidental recall of stimulus fields was interpreted as scanning by Gardner and his colleagues (1959). Furthermore, persons giving many remote or distant responses in a word association test, which was presumed to reflect extensive scanning of the internal fields of meaning surrounding the stimulus words, tended to produce a steady flow of impersonal intellectualized material. One interpretation of this tendency is that these scanners were constantly attending to impersonal material as a means of avoiding contact with personal material and with affect, à la isolators. This

possibility is strengthened by the finding that eight of nine males judged on the basis of Rorschach protocols to be conspicuous isolators received high scores on this scanning factor. In addition, the link between small errors in size judgment and incidental recall of extraneous aspects of the stimulus field has been buttressed by later findings indicating that accuracy in size estimation tends to be coupled with accuracy of peripheral noticing (Holzman, 1966).

Another pertinent finding is that the number of looks at the standard stimulus in size estimation, which provides a relatively direct index of scanning, is significantly associated with low errors (Gardner, 1970; Gardner & Long, 1962b). However, if the number of looks signifies the number of centrations on the standard, which should tend to increase apparent size, the previous appeal to the centration hypothesis to rationalize the relationship between scanning and accuracy of size judgments becomes strained. One needs to interpret large numbers of looks as attempts to overcome the effects of centration. This may be the case, but it seems simpler and more direct to argue that "a larger number of looks at the standard reflects caution, care, a concern with exactness, deliberateness, and even conscientiousness" (Holzman, 1971, p. 950). In addition, this interpretation is consistent with findings that measures of scanning are often associated with careful performance and the avoidance of errors on ability tests in which centration effects per se are unlikely (e.g., Holzman & Rousey, 1971). Furthermore, such a formulation brings back into prominence the kind of meticulousness, preciseness, and concern with detail that Schlesinger (1954) attributed to the cognitive-style counterpart of isolation as a defense, when he stressed the

"underlying preference for experiencing the world in a narrow, discriminating way" (p. 356).

To recapitulate, Schlesinger (1954) interpreted the cognitive-style counterpart of isolation as focussing. Then, the discovery of the centration effect and subsequent eye-movement studies brought a re-interpretation in terms of scanning (Gardner et al., 1959: Gardner & Long, 1962a, 1962b). Next, the link between accuracy of size estimation and accuracy of peripheral noticing as well as incidental recall led to emphasis both on the intensity of focussed attention and on the extensity of attention deployment (Holzman, 1966; Holzman & Klein, 1956), that is, on what might be called ***focussed scanning***. Furthermore, the fact that incidental recall and remoteness of word association were also implicated in the evolving pattern of results suggests that the style applies to the focussed scanning not only of external perceptual fields, but also internal memory fields as well as internal meaning fields or knowledge structures.

DIFFERENT FORMS AND PURPOSES OF SCANNING

But if high scorers on this cognitive style are described as focussed scanners, how should low scorers be described? Are they nonfocussed scanners or focussed nonscanners or, possibly, nonfocussed nonscanners? The concept of focussed scanning implies broadly extensive coverage of stimulus fields with a narrowly intensive attentional focus. Following Wachtel (1967), we appeal for clarification to Hernández-Péon's (1964) metaphor comparing attention "to a beam of light in which the central brilliant part represents the focus surrounded by a less intense fringe. Only the items located in the

focus of attention are distinctly perceived whereas we are less aware of the objects located in the fringe of attention" (p. 167).

Focussing versus nonfocussing refers to the width and intensity of the beam. As the beam widens, it may become relatively unfocussed and diffuse, comprehending more territory but with less intensity and possibly less fidelity. In some instances, however, wider beams -- by virtue of comprehending multiple aspects of a situation simultaneously -- may foster integrative functioning (Wachtel, 1967). Scanning versus nonscanning refers to the movement of the beam, to whether the territory traversed is relatively extensive or relatively limited.

Thus, focussing as opposed to nonfocussing and extensive scanning as opposed to limited scanning are distinct attentional properties and can be variously combined to constitute different stylistic dimensions serving different purposes. This latter possibility seems worth exploring, and a good entry point may be afforded by examining the distinctive functions of scanning in various defensive styles. This approach was suggested by the prior finding of Gardner and Long (1962b) that extreme scanning was significantly associated with Rorschach measures of isolation, projection, and generalized delay. Hence, because extreme scanning is related to defense mechanisms of both isolation and projection, it may be that scanning serves different purposes under different circumstances or, perhaps, that there are two (or more) distinct types of scanning.

Because isolation is a preferred defense of obsessives and projection a preferred defense of paranoids, we will next discuss the role of scanning in obsessive-compulsive and paranoid defensive styles (Messick, 1987; Shapiro, 1965). The obsessive-compulsive style is characterized by extensive scanning

of stimulus fields using a narrow, high-fidelity attentional bandwidth. By virtue of such scanning, obsessive-compulsives are intellectually active, even driven, and are careful to collect a broad array of information before acting or making decisions. In a sense, then, the extensiveness of focussed scanning of the obsessive-compulsive is in the service of information seeking to offset persistent uncertainty and indecisiveness. But the information gathered in this sequential manner consists of sharply focussed, discrete, but unrelated details and ideas, with little attention given to relationships (Wachtel, 1967). Incidently, in sharp contrast to this focussed scanning of obsessives, the mode of attention in the hysterical defensive style is unfocussed, being responsive to the striking and obvious features of the environment, with thinking and judgment dominated by quick impressions, hunches, and vagueness.

Prominent in the paranoid style, on the other hand, is an extensive scanning of stimulus fields by means of highly selective attention. Extensive scanning permits individuals exhibiting this style to garner confirmatory "evidence" in support of their fixed ideas as well as to be alert -- indeed, hyperalert -- to anticipated threats and dangers. But by attending selectively to what is considered pertinent and consistent, all other aspects of the perceptual field are screened out and ignored, thereby assuring that the selected evidence fits (Wachtel, 1967). In contrast to the information-seeking scanning of obsessive-compulsives, the extensive scanning of the paranoid style appears to be in the service of signal detection, especially the detection of confirmatory signals and danger signals.

Thus, scanning may take on different forms, such as the focussed scanning of the obsessive-compulsive defensive style, the unfocussed attention of the hysterical style, or the selective scanning of the paranoid style. And these

formal differences in defensive scanning may appear in less extreme versions within the normal range of functioning as well. Furthermore, different forms of scanning may serve different purposes, such as information seeking and signal detection. Moreover, these different forms and purposes of scanning may function differentially in different fields of application, such as external perceptual fields as opposed to internal fields of memory, meaning, or knowledge.

An important question in conceptualizing the cognitive style of scanning is whether these different forms, purposes, and functions of scanning are organized as a single dimension of individual differences or as separate dimensions. And if the latter, do the dimensions distinguish between focussed and nonfocussed scanning, between information-seeking and signal-detection scanning, between external and internal scanning, or between other aspects of the style? And are these separate dimensions, if they can be discerned empirically, relatively independent of each other as opposed to being organized hierarchically or in some other fashion? We will now review a factor analytic study of scanning behavior that addresses these questions.

MULTIPLE DIMENSIONS OF SCANNING

This factor analytic study assessed scanning and focussing consistencies in a wide variety of tasks (Table 1) in an effort to document convergent and discriminant correlations that would clarify the interpretation of the scanning cognitive style. The experimental procedures included perceptual judgment tasks (such as size and distance estimation), perceptual speed of comparison tasks (such as speed of figural matching and of symbol

TABLE 1

THE BATTERY: DESCRIPTION OF PROCEDURES AND TECHNIQUES*

Cognitive Measures Included in the Factor Analysis

Advanced Vocabulary Test, Form V-4: a meesure of the factor of verbel comprehension from the revised Kit of Reference Tests for Cognitive Factors (French, Ekstrom, & Price, 1963). In each of two separately timed sections of 18 items each (totel 36 items), the respondsnt must select the correct synonym for a given word from a list of five alternative choices. **Right**, Wrong

Mathematics Aptitude Test, Form R-2: a measure of the general reasoning factor from the revised Kit of Reference Tests for Cognitive Factors (French et al., 1963). In each of two separately timed sections of 15 word problems requiring arithmetic or simple algebra (total 30 items), the respondent must select the correct answer from among five choices. **Right**, Wrong

Gestalt Completion Test, Form Cs-1: a measure of the speed of closure factor from French et al. (1963). In each of two separately timed sections of 10 items each (total 20 items), the respondent must write down as quickly as possible the name of an object portrayed in an incomplete drawing. **Right**, Wrong

Shortest Road Test, Form Le-2: a measure of the factor celled "length estimation" (French et al., 1963). In each of two separately timed sections of 28 items (total 56 items), each item consisting of two points with three curved or jagged lines drawn between them, the respondent must indicate the shortest of the three lines. **Right**, Wrong

Hidden Patterns Test, Form Cf-2: a measure of the flexibility of closure factor (French et al., 1963). In two separately timed sections of 200 items each (total 400 items), e single simple line figure is given and the respondent must indicate as quickly as possible whether it is contained in each of 400 complicated patterns. **Right**, Wrong, Omit

Finding As Test, Form P-1: a measure of the perceptual speed factor (French et al., 1963) or the subfactor called speed of symbol discrimination (Guilford, 1967). In each column of 41 words, the respondent must mark as quickly as possible the five words containing the letter "a." There are two separately timed sections of 25 columns each. **Right**, Omit

Nearer Point Test, Form Le-3: a measure of the length estimation factor (French et al., 1963). In each of two separately timed sections of 30 items (total 60 items), for each item consisting of a reference point and two dots with some distracting lines and figures superimposed, the respondent must indicate which dot is nearer to the reference point. **Right**, Wrong, Omit

Thing Category Test, Form Fi-3: a measure of the ideationel fluency factor (French et al., 1963). In two separately timed sections, the respondent must write down as meny things as he or she can think of that share a specified property -- things that are "round" end thinge that ere "blue." Things Round -- **Right**, Things Blue -- **Right**, Totel Right

Doodles: a measure of graphic expansiveness vs. constriction developed by Wallach and Gahm (1960). The respondent is asked to draw two doodles, each on a separate piece of paper. Graphic expansiveness versus constriction is scored by superimposing a grid of 20 two-inch squeres over eech sheet; the score, a possible range of 1 to 40 for the sum of the two doodles, is the minimum number of squares covering the doodling. **Total (Doodle size)**

Table 1 (continued)

Picture Preferences, Black and White, Form B-W: a measure adapted from Schlesinger (1954) of the tendency to react affectively or indifferently to stimulus objects. In each of 60 items, a black-and-white picture is projected onto a screen and the respondent must indicate whether she or he (a) likes the picture, (b) is indifferent to the picture, or (c) dislikes the picture. **Indifferent**, Like, Dislike.

Picture Preferences, Color, Form C: a procedure similar to that for Form B-W above except that 16 colored pictures are projected on a screen. **Dislike**, Like, Indifferent

Estimation Questionnaire: a procedure developed by Pettigrew (1958) to measure consistencies in the use of broad versus narrow conceptual categories. For each of 20 items, the respondent is informed about the average value of a specified category or dimension and must select from one set of four alternatives the largest value of the category and from another set of four alternatives the smallest value of the category. Since Pettigrew (1958) found that this test contained two large factors, one of which was significantly related to quantitative aptitude, a separate score was obtained for each factor by dividing the items into two groups in terms of item loadings reported by Pettigrew. **Estimation Questionnaire 1**, Estimation Questionnaire 2, Estimation Questionnaire Total (broad category width)

Size Estimation: a measure of accuracy in estimating the size of circles developed by Schiffman and Messick as a group-administered analogue of individually-administered size-estimation measures of scanning (Gardner et al., 1959; Gardner & Long, 1962b; Schlesinger, 1954). Each of 30 items consists of a standard circle centered at the top of a page, with a row of five comparison circles below it; the respondent must indicate which comparison circle is closest in size to the standard. **Overestimation**, Accuracy

Spelling Test, Form 1: a measure developed by Carlton and Diederich (1961) in a study of the 430 most commonly misspelled English words. The respondent must indicate whether the spelling of each of 100 words is correct or incorrect. **Right**, Omit

Perceptual Speed, Part IV of the Guilford-Zimmerman Aptitude Survey: a measure of speed of figural matching. For each of 72 items, the respondent must indicate as quickly as possible which of five similar objects is identical to a given object. **Right**

Speed of Color Discrimination Test: a group-administered version of the Stroop (1935) color-word procedure consisting of (a) a color discrimination condition in which the respondent writes as quickly as possible under each of a series of differently colored patches the first letter of the color name and (b) an interference condition in which the respondent again writes as quickly as possible the first letter of the color in which conflicting color names are printed (Messick & Fritzky, 1963). Each of the two conditions consisted of four separately timed 50-second parts; degree of interference was measured as a regressed score -- number right on the interference condition controlling for unattenuated efficiency of color naming (Damarin, Tucker, & Messick, 1966). **Discrimination Speed (color naming)**, **Interference (regressed)**, Wrong plus Omit for each condition

Hidden Figures: a modification of the Gottshaldt figures test developed by Jackson, Messick, and Myers (1964) to measure the analytical versus global mode of perception characterized by Witkin, Dyk, Paterson, Goodenough, and Karp (1962) as field independence versus field dependence. Similar versions of this test have been used to measure the factor of flexibility of closure -- Thurstone (1944) and French et al. (1963). In each of 16 items, the respondent must select which one of five simple geometrical forms is embedded in a given complex pattern. **Right**, Wrong

Mutilated Words Test: a measure of speed of closure developed by Thurstone (1944). In each of 51 items, a word is presented with parts of each letter missing, and the respondent must write down the complete word as quickly as possible. **Right**, Wrong, Omit

Table 1 (continued)

Four-Letter Words: a measure of speed of closure developed by Thurstone (1944). The respondent is presented with a continuous series of capital letters in 22 lines of 46 letters each and must encircle as quickly as possible all groups of four consecutive letters that spell a common English word. Both the Four-Letter Words and the Mutilated Words Test described above may also reflect the factor of verbal closure, or verbal closure speed (Messick & French, 1975; Pemberton, 1952). Right, Omit

Word Meaning Test: a measure of breadth of categorizing, in terms of the consistent use of broad categories of word meanings, developed by Messick and Kogan. Each of 30 items consists of a key word followed by a list of approximately 14 to 17 additional words; the respondent must underline all of the words in the list that may be appropriately substituted for the key word in most useges. The words in each list are synonyms or analogues for the key word, but the respondent is not informed of that fact. The score is the average number of words underlined per completed item.

Hidden Pictures: a measure of flexibility of closure (Thurstone, 1944) that may also reflect speed of closure, particularly with brief time limits (French, 1951; Pemberton, 1952). In each of three pictorial drawings of scenes involving people and objects, the respondent must find and encircle a specified number of faces or people that are concealed somewhere in the drawing. Four scores were obtained: the number of "good" (correct or keyed) faces encircled by the respondent; the number of areas encircled that did not contain a keyed face, i.e., the number of "fabulated" faces (Smith & Klein, 1953); the total number of areas encircled; and, a measure of recall of information about the content of the pictorial scenes upon removal of the stimulus. Good Faces, Fabulated Faces, Content, Total

Incidental Recall: a measure of incidental memory. After a ten-minute break, at the beginning of the second testing session, the respondent is asked to write down the names of all the tests that he or she can remember from the first session (13 tests). Right

Figure Choices: a forced-choice measure of preference for complexity vs. simplicity adapted from the Barron-Welsh (1952) Art Judgment Scale. Each of 20 items consists of a pair of drawings, one simple and one complex, and the respondent must indicate which member of each pair she or he prefers most. Ten set-breaking items containing either two simple or two complex drawings were distributed throughout the test. Preference for complexity

Word Association: a measure of remoteness as opposed to closeness in scanning the meaning fields associated with stimulus words (Klein, 1954). In two separately timed sections of two minutes each, the respondent is asked to write down everything that comes to mind in connection with each of two stimulus words -- "house" and "dry." Number of remote ideas divided by number of ideational units - Dry, Number of ideational units - Dry, Number of words - Dry, Number of remote ideas divided by number of ideational units - House, Number of ideational units - House, Number of words - House

Personality Measures Included in the Extension Analysis

Desirability: a scale of 28 self-descriptive personality items developed by Stricker (1963) to measure the tendency to respond desirably.

Tolerance of Ambiguity: a ten-item scale developed by Saunders (1955; see also Messick, 1962).

Independence: an 18-item scale from Barron's (1953b) and Crutchfield's (1955) independence and yielding items.

Acquiescence: 20 items, all keyed "true," devised by item analysis against the total number of "true" responses on the MMPI (Fulkerson, 1958).

Table 1 (continued)

Complexity vs. Simplicity: a 22-item scale devised by Barron (1953a).

Agreement Response Scale: 15 items, all keyed "true," (Couch & Keniston, 1960).

Agreement Response Factor: 16 items tapping impulsive stimulus acceptance (Couch & Keniston, 1960).

Authoritarianism: a 28-item modification of the California F Scale in which both the number of "true" and "false" items and the number of "extremely-worded" and "tentatively-worded" items are balanced (Clayton & Jackson, 1961). Scores are obtained for the four subparts (extreme true, extreme false, tentative true, tentative false), for their sum (i.e., authoritarianism), for Acquiescence to Extremes (the tendency to agree with the 14 extremely-worded items), for Acquiescence to Tentatives (the tendency to agree with the 14 tentatively-worded items), and for endorsement of extremely-worded versus tentatively-worded items.

Dogmatism: the 20-item short form (Rokeach, 1956,1960).

Self-Sufficiency: a ten-item scale (Saunders, 1955) as revised by Messick (1962).

Impulsiveness: a shortened, 22-item version of the scale developed by Barratt (1959).

Tolerance of Ambiguity: a 16-item scale developed by Budner (1962).

Affective-Effective Orientation: a ten-item scale developed by Stice to measure artistic versus practical interests (see Messick, 1962).

Anxiety: a ten-item scale (Saunders, 1955) as revised by Messick (1962).

Rigidity: 26 items derived from Gough and Sanford (1952).

Unconventionality: a ten-item scale developed by Stice (Messick, 1962).

Extremity of Self-Rating: the tendency to use extreme categories as opposed to moderate ones in endorsing the 280 self-descriptive personality items included in the study in a six-point Likert format.

Early Childhood Recollections: respondents were asked to think as far back as possible and to describe in writing during a ten-minute period three early childhood memories. Scores were obtained for eight affect variables (Plutchik, 1962, 1980) -- Protection, Destruction, Rejection, Incorporation, Deprivation, Reproduction, Exploration, Orientation -- as well as for the total number of Positive Affect Recollections, Negative Affect Recollections, and Total Affect Recollections.

Holtzman Inkblot Technique: 30 inkblots were projected in sequence on a screen; scores were obtained on the following 21 variables (Holtzman, Thorpe, Swartz, & Herron, 1961) -- Rejection, Location, Space, Form Definiteness, Form Appropriateness, Color, Shading, Movement, Pathognomic Verbalization, Integration, Human, Animal, Anatomy, Sex, Abstract, Anxiety, Hostility, Barrier, Penetration, Balance, Popular.

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*Active variables (i.e., those that were factor analyzed) are shown in bold type; all other variables were included in the extension analysis.

discrimination), and perceptual search tasks (in which the respondent must locate in a large perceptual field a specific target stimulus, such as the letter "a" or a particular simple figure, or else identify stimuli of a particular class, such as four-letter words or misspelled words). Other tasks emphasizing speed of closure and flexibility of closure required the active organization and conceptualization of unorganized or incomplete stimulus arrays (as in Four-Letter Words and Gestalt Completion) or the restructuring of organized stimulus configurations (as in Hidden Patterns and Hidden Figures). Given that scanning propensities may be reflected in the manner in which internal meaning and memory fields are surveyed, measures were also included for remoteness of word association as well as for fluency of ideational production of class instances (as in Things Round and Things Blue).

A concerted attempt was made to differentiate between two possible purposes of scanning, namely, scanning for signal detection and scanning for information seeking. This was accomplished using perceptual search tasks in which the respondent was required to find stimuli (that is, signals) embedded in meaningfully organized visual fields -- for example, to locate faces camouflaged in pictorial scenes. In each of three drawings of pictorial scenes involving people and objects, the respondent was asked to find and encircle a specified number of hidden faces or people. Two scores were obtained: one for the number of keyed or good hidden faces encircled and another for the number of areas circled that did not contain a keyed face, that is, the number of "fabulated" faces (Smith & Klein, 1953). The distinction here is that between good form appropriateness as opposed to poor form appropriateness of figures identified as "faces." Upon completion of the

search task, the stimulus materials were removed, and the respondents were then asked specific questions about the content of the scenes. Persons who incidentally take in information about the field in the process of scanning could thus be differentiated from those whose concern is apparently limited to detecting the hidden signals.

Thus, measures were included for facility in detecting signal stimuli or stimulus classes both in unorganized or randomly structured fields (such as locating four-letter words in arrays of letters or finding misspelled words or words containing the letter "a" in long lists of words) as well as in organized fields (such as deciding whether or not a standard pattern is hidden in each of several complex figures or locating faces camouflaged in pictorial scenes). In the variety of search tasks employed, the signals ranged in specificity from a unique target (such as the letter "a" or a standard pattern) to instances of a circumscribed class (such as four-letter words, things round, or things blue) to instances of more open classes (such as faces or misspelled words).

Also pertinent to the distinction between signal scanning and information scanning was the Stroop Color-Word Test, which taps susceptibility to cognitive interference or degree of responsiveness to compelling irrelevant stimuli. Proficiency on this color-word interference task requires both selective deployment of attention to appropriate aspects of the stimulus and response as well as flexible control of inhibition and facilitation of response in moving from one color-word stimulus to another (Gardner et al., 1959; Rand, Wapner, Werner, & McFarland, 1963).

In view of the theoretical as well as empirical link between scanning and isolation of affect, several tasks yielding measures of affect expression and

control were also included, such as the Holtzman Inkblot Test, early childhood memories, and a modification of Schlesinger's (1954) picture preferences procedure. The latter assesses consistent tendencies to like, dislike, or be indifferent to a wide variety of photographs, with a large indifference category being taken to be characteristic of isolators.

The battery also contained measures of other potentially relevant cognitive styles, particularly field independence versus field dependence (Hidden Figures) and broad versus narrow categorizing (Estimation Questionnaire). The former is especially germane to the question of whether attention is articulated as opposed to undifferentiated and the latter to the question of whether scanning occurs with a broad or narrow bandwidth. Also at issue is whether a narrow bandwidth represents high-fidelity as opposed to selective perception and a broad bandwidth represents diffuse as opposed to integrative perception. Finally, marker measures of verbal, quantitative, and other intellective abilities were included, along with several questionnaire scales of personality, a figure-choices index of preference for complexity, and a doodling measure of graphic expansiveness versus constriction.

Furthermore, to appraise the degree to which scanning is associated with carefulness and precision, most of the tests in the battery were scored not only for correctness or goodness of response, but also for the number of incorrect and omitted items. As an aside, a separate factor analysis of these "wrong" and "omit" scores revealed that the determinants of error are relatively complex. Several factors emerged which were interpreted in terms of haste and attendant carelessness, lower intellectual competence, premature

perceptual closure, impulsiveness, and susceptibility to distracting and embedding contexts.

This extensive experimental battery was administered to 122 male and 92 female college students. Separate factor analyses were conducted for males and females by the method of principal axes, with squared multiple correlations inserted in the main diagonals as communality estimates. The factor analyses were based on 28 experimentally independent scores from the perceptual and cognitive tasks, with loadings for the error and omit scores as well as for the inkblot, early memory, and personality scales being estimated by extension methods (Cattell, 1978; Dwyer, 1937). By means of the extension matrices, loadings were estimated on the obtained scanning factors for a wide variety of potential personality correlates as well as for experimentally- or linearly-dependent scores of descriptive interest. especially several from the picture preferences and the word-association tests. Once the factors of the 28x28 active matrices were extracted, examination of breaks in the patterns of latent roots, confirmed by parallel analyses of random data as recommended by Humphreys and Montanelli (1975; Montanelli & Humphreys, 1976), led to the retention of eight factors for the males and six factors for the females.

Analytical rotation to oblique simple structure (Tucker & Finkbeiner, 1981) was followed by second-order factor analyses yielding three second-order factors for the males and two for the females, again confirmed by parallel analyses of random data. Finally, for males and females separately, the first- and second-order factors were converted to the same orthogonal

framework by the Schmid-Leiman (1957) hierarchical transformation, thereby permitting appraisal of the additive contribution of both first- and second-order factors to the test communalities.

Let us now examine the general nature of the factor structure for the males and then for the females. The interpretation of the first-order factors was informed by three types of evidence: the loadings of the directly factor analyzed tests on the first-order dimensions; the first-order factor loadings of the extension variables; and, the correlation of each factor with the other factors, that is, its place in the factor hierarchy. Similarly, the interpretation of the second-order factors was also based on three types of evidence: the loadings of the first-order factors (which have been previously interpreted) on the second-order dimensions; the direct loadings of the tests on the second-order factors derived in the hierarchical analyses; and, the correlates of the second-order factors estimated in the extension analyses.

To provide a reasonably complete picture of the factor structure, loadings of .24 and above are reported for the active tests and extension variables; loadings of .20 and above are reported for the first-order factors on the second-order factors. With the obtained sample sizes, the standard error of a correlation coefficient or factor loading is roughly 0.1, so these cut-offs include values that are two or more standard errors above zero (Cliff & Hamburger, 1967).

In interpreting these factors of perceptual and cognitive tasks in stylistic terms, one must be alert to the possibility that more traditional constructs such as intellective abilities may provide plausible rival

interpretations. However, this tended not to be the case in the present instance, for either the male or the female factors, for a number of reasons: First, marker tests of ability and other potentially ability-saturated tasks did not generally align themselves in ways that clearly correspond to established first- or second-order abilities. Second, the obtained factors tended to be relatively broad, cutting across ability domains and implicating measures of preference and personality in ways that seemed more congenial to interpretations in terms of style or strategy or, perhaps, in terms of ability-personality blends (Cattell, 1971; Messick, 1987). Finally, several of the factors exhibited negative correlations with other factors, which is atypical of the positive manifold ubiquitously found with ability dimensions.

SCANNING IN MALES: SEPARATE EXTERNAL AND INTERNAL DIMENSIONS MEDIATED BY ISOLATION OF AFFECT

Factor 1 for the males (Table 2) was marked by measures of distance estimation, finding hidden patterns and embedded figures, speed of figural matching and of color naming, the perception of fabulated faces in pictorial scenes, mathematics aptitude, incidental recall, and identification of partially obscured words. With few exceptions, these are tasks that entail scanning or perusal of external stimulus fields. However, the extension analysis revealed that not only did scores for correctness of response on these tests load on the factor, but so did many "wrong" and "omit" scores. In addition, high scorers on the factor employed broad category widths and displayed poor form appropriateness on the inkblot test. This pattern of

loadings suggests that the factor reflects ***quick closure via broad estimation*** or approximation strategies.

This interpretation of male factor 1 is consistent with prior findings of a relationship between broad categorizing and approximation strategies facilitative of performance on multiple-choice quantitative tests having typically wide intervals between distractors (Messick & Kogan, 1965). That is, quick approximations are judged by broad categorizers as being "close enough" to the correct answer, which they indeed often are. But this type of broad-bandwidth scanning also often yields incorrect answers and poor form responses, which seems more like ***premature*** (rather than simply quick) closure.

Table 2

Male Factor 1
Quick Closure via Broad Estimation

Test	Reference Vector Loading*
Shortest Road	.60
Nearer Point	.49
Hidden Patterns	.44
Perceptual Speed	.38
Hidden Pictures - Fabulated Faces	.36
Speed of Color Discrimination	.34
Mathematics Aptitude	.33
Hidden Figures	.28
Incidental Recall	.25
Mutilated Words	.24
Extension Measure	
Mutilated Words - Wrong	.39
Estimation Questionnaire - Total	.38
Vocabulary - Wrong	.30
Four-Letter Words - Omit	.27
Shortest Road - Wrong	.25
Inkblot - Form Appropriate	-.46
Inkblot - Hostility	-.27

*Test loadings on the independent part of the oblique factor, i.e., part-correlations of the tests with the factor holding constant the operation of the other (correlated) factors.

Thus, this scanning dimension appears to provide a broad but low-fidelity sweep of the field as opposed to a broad and careful integration of simultaneously perused information.

Factor 2 for the males (Table 3) was marked by scores for finding hidden patterns and embedded figures, detecting four-letter words and the letter "a," distance estimation, speed of figure matching and of color naming, identifying partially obscured words and pictures, correctly identifying hidden faces in pictorial scenes, detecting misspelled words, incidental recall, and mathematics aptitude. Once again, almost all of these tasks entail perusal of external perceptual fields. Unlike male factor 1, however, "wrong" and "omit" scores on these tests received negligible loadings on this factor in the extension analysis, so that high factor scorers appeared to be neither

Table 3

Male Factor 2
Perceptual Closure Speed/Efficiency

Test	Reference Vector Loading*
Hidden Patterns	.59
Four-Letter Words	.59
Nearer Point	.56
Perceptual Speed	.55
Shortest Road	.53
Finding As	.45
Speed of Color Discrimination	.40
Mutilated Words	.36
Hidden Pictures - Good Faces	.36
Hidden Figures	.36
Spelling	.28
Gestalt Completion	.26
Incidental Recall	.25
Mathematics Aptitude	.24
Extension Measure	
Word Association, House - Remote	.24
Four Letter Words - Omit	.24

*Test loadings on the independent part of the oblique factor, i.e., part-correlations of the tests with the factor holding constant the operation of the other (correlated) factor.

Table 4

Intercorrelations Among the First-Order Male Factors

	1	2	3	4	5	6	7	8
1		-.69	.31	.01	-.27	-.40	-.14	.21
2	-.69		-.41	.03	.17	.14	.18	-.14
3	.31	-.41		-.24	-.03	-.14	-.18	.13
4	.01	.03	-.24		-.25	-.38	-.25	.04
5	-.27	.17	-.03	-.25		.22	-.20	.06
6	-.40	.14	-.14	-.38	.22		-.01	-.17
7	-.14	.18	-.18	-.25	-.20	-.01		-.27
8	.21	-.14	.13	.04	.06	-.17	-.27	

meticulously precise nor particularly error prone. However, high scorers evidently were sufficiently critical in their perusal to perform effectively on a variety of closure tasks, such as discerning obscured or hidden figures and detecting four-letter or misspelled words. In addition, this effective-closure factor was substantially negatively correlated with factor 1, with its connotation of premature closure (Table 4). The interpretation suggested by this pattern of results is one of *perceptual closure speed and efficiency* (Messick & French, 1975; Thurstone, 1944).

The third male factor (Table 5) included scores for detecting misspelled words, four-letter words, and the letter "a," for identifying partially obscured words, and for vocabulary and mathematics aptitude. Again, these tasks primarily involved the perusal of external stimulus fields. This pattern of loadings suggests an interpretation in terms of ***verbal or symbolic closure*** facility (Messick & French, 1975; Pemberton, 1952). However, in the extension analysis, not only did measures of fluency in word association load the factor, but so did the expression of affect in early memories and the perception of barriers or boundaries in inkblots. Furthermore, this factor

Table 5

Male Factor 3
Verbal/Symbolic Closure

Test	Reference Vector Loading*
Spelling	.69
Mutilated Words	.46
Vocabulary	.41
Four-Letter Words	.37
Finding As	.35
Mathematics Aptitude	.27
Extension Measure	
Inkblot - Barrier	.32
Word Association, House - Units	.30
Word Association, Dry - Units	.25
Childhood Recollections - Total Affect	.25

*Test loadings on the independent part of the oblique factor, i.e., part-correlations of the test with the factor holding constant the operation of the other (correlated) factors.

was negatively correlated (-.41) with the second factor of perceptual closure efficiency and positively correlated (.31) with the first factor of approximation via broad-bandwidth scanning. This pattern of results suggests a more impressionistic and nonfocussed approach to spotting misspelled words, for example, or to identifying partially obscured words in terms of what vaguely or intuitively "feels" to be right or wrong.

Factor 4 for the males (Table 6) comprised measures of incidental recall, ideational fluency in producing instances of class concepts (things blue and things round), vocabulary, identification of partially obscured words and pictures, recall of information about pictorial scenes, graphic expansiveness, and broad meaning categories. In contrast to the first three factors, these tasks primarily involve the scanning or perusal of internal fields of memory, meaning, or knowledge. Some tasks, such as the identification of synonyms

and of partially obscured words and pictures, evidently require substantial scanning of stimulus fields as well as scanning of memory fields of knowledge or meaning. Tasks entailing this dual processing requirement would be expected to load both externally oriented dimensions (such as factor 3) and internally oriented dimensions (such as the present factor 4), as indeed seems to be the case in this instance.

In the extension analysis, positive loadings were obtained on factor 4 for positive picture preferences, for the perception of color in inkblots, for fluency in word association, for the questionnaire scale of affective orientation, and for errors and omits in embedded figures and speed of

Table 6

Male Factor 4
Expansive Memory Scanning

Test	Reference Vector Loading*
Incidental Recall	.47
Things - Blue	.41
Things - Round	.36
Vocabulary	.34
Mutilated Words	.29
Gestalt Completion	.29
Hidden Pictures - Content	.25
Doodles	.25
Word Meaning	.24
Extension Measure	
Picture Preferences, B & W - Like	.33
Speed of Color Discrimination - Omit + Wrong	.32
Hidden Figures - Wrong	.26
Inkblot - Color	.25
Affective/Effective	.25
Word Association, House - Units	.24
Mutilated Words - Omit	-.33
Picture Preference, Color - Indifferent	-.31

*Test loadings on the independent part of the oblique factor, i.e., part-correlations of the test with the factor holding constant the operation of the other (correlated) factors.

color naming. In Rorschach clinical lore (e.g., Klopfer, Ainsworth, Klopfer, & Holt, 1954), the use of color as a determinant of inkblot perception suggests affective responsiveness as well as positive adjustment to emotional impact. Although the factor loading for the use of color is marginal, an interpretation in terms of acceptance of affect is also consistent with the loadings for the affective orientation scale and for positive picture preferences. Negative extension loadings were obtained for omits on partially obscured words and for indifference in colored picture preferences, the latter suggesting that low scorers on this factor may tend to be isolators. The overall pattern of loadings suggests an ***expansive fluency in memory scanning***, coupled with a positive or comfortable orientation toward affect as opposed to the isolation of affect. Apparently, fluent scanning of meaning or knowledge fields facilitates performance on tasks that require dual internal and external processing (such as locating synonyms on vocabulary items and identifying obscured words and figures), but is disruptive or counterproductive in tasks that primarily require external scanning (such as color naming or finding embedded figures).

The fifth male factor (Table 7) was marked by measures of mathematics aptitude and vocabulary, finding embedded figures and hidden patterns, remoteness of word association, recall of information about pictorial scenes, identifying partially obscured figures, and graphic expansiveness. Along with additional word-association scores, positive extension loadings were obtained for popular and barrier responses to inkblots. The location score for inkblots received a negative loading, which -- since high location scores indicate reliance on small details -- reflects a tendency to give whole or large area responses. Other negative loadings were obtained for questionnaire

Table 7

Male Factor 5
Flexible Adaptive Scanning

Test	Reference Vactor Loading*
Mathematics Aptitude	.40
Hidden Figures	.39
Vocabulary	.36
Word Association, Dry - R/U	.34
Hidden Pictures - Content	.34
Hidden Patterns	.30
Gestalt Completion	.29
Doodles	.29
Extension Measure	
Word Association, Dry - Remote	.59
Word Association, Dry - Units	.36
Inkblot - Popular	.29
Inkblot - Barrier	.28
Vocabulary - Wrong	-.46
Mathematics Aptitude - Wrong	-.44
Mutilated Words - Omit	-.37
Inkblot - Location	-.36
Hidden Figures - Wrong	-.30
Authoritarianism - Extreme True	-.27
Color Word Interference - Omit + Wrong	-.25
Authoritarianism - Total	-.25

*Test loadings on the independent part of tha oblique factor, i.e., part-correlations of the test with the factor holding constant the operation of the other (correlated) factors.

scales of authoritarianism, along with substantial negative loadings for "wrong" scores on the major marker tests for the factor. Unlike any of the previous factors for the male sample, high scores on this dimension reflect the scanning or perusal of both external perceptual fields and internal memory fields of knowledge or meaning. The variety of internal and external task demands that are accommodated and the meticulousness of nonerrorful performance suggests an interpretation in terms of ***flexible adaptive scanning***.

An alternative interpretation for male factor 5, however, is the venerable if timeworn construct of intelligence. The tasks marking the factor traditionally implicate crystallized intelligence (vocabulary and mathematics aptitude), fluid intelligence (hidden figures), visualization (gestalt

completion as well as hidden figures), and memory (recall of pictorial scenes) -- that is, Cattell's (1971) higher-order capacities of g_c, g_f, g_v, and g_m. Also implicated is one of the perennial negative correlates of intelligence, namely, authoritarianism (e.g., Christie & Jahoda, 1954). Furthermore, inkblot responses embracing the entire blot as a whole are clinically deemed to be indicative of intelligence because they reflect "abstracting, surveying and integrating abilities" (Rapaport, Gill, & Schafer, 1945, p. 138). On the other hand, counterarguments to intelligence as a candidate interpretation include the fact that intelligence is ordinarily a large pervasive factor while male factor 5 is moderate in size, that intelligence is typically a higher-order factor while factor 5 appears as one among several first-order factors with loadings for the same or similar ability-saturated tasks, and that remoteness of word association is the factor's highest correlate (.59).

Factor 6 for the males (Table 8) subsumes measures of ideational fluency, incidental recall, perception of fabulated faces, indifference in picture preferences, mathematics aptitude, and identifying partially obscured words. An important contributor to most of these tasks, especially the high-loading memory tasks, is the scanning or perusal of internal fields of memory or meaning. Extension loadings included small dislike categories in picture preferences; poor form appropriateness, pathognomic verbalizations, and few popular responses on the inkblot test; fluency in word association; the expression of negative affect in early memories; broad category width; questionnaire scales of unconventionality and impulsive stimulus acceptance; and, finding incorrect embedded figures. It should be noted that pathognomic verbalizations for normal persons include, not the bizarre perceptions and autistic logic of the mentally disturbed, but "fabulations with notable

Table 8

Male Factor 6
Ideational Scanning

Test	Reference Vector Loading*
Things - Round	.43
Incidental Recall	.36
Hidden Pictures - Fabuleted Feces	.35
Things - Blue	.34
Picture Preferences, B&W - Indifferent	.32
Mathematics Aptitude	.27
Mutilated Words	.27
Picture Preferences, C - Dislike	-.27
Extension Measure	
Hidden Figures - Wrong	.38
Word Association, House - Words	.32
Unconventionality	.32
Childhood Recollections - Destruction	.32
Estimation Questionnaire - Total	.32
Inkblot - Pathognomic Verbelizations	.30
Agreement Response Factor	.28
Estimation Questionnaire, II	.28
Childhood Recollections - Total Negative	.26
Picture Preferences, B&W - Dislike	-.57
Inkblot - Popular	-.34
Inkblot - Form Appropriate	-.31

*Test loadings on the independent part of the oblique factor, i.e., part-correlations of the test with the factor holding constant the operation of the other (correlated) factors.

affectivity, mildly fabulized combinations of otherwise acceptable percepts or even . . . occasional queer responses that are often described in a playful manner" (Holtzman, 1988, p. 583). Another important property of this sixth male factor is that it was correlated negatively (-.38) with the fourth factor of expansive memory scanning which, it will be recalled, conveyed a positive orientation toward affect.

This overall pattern of results, especially the direct implication of indifference in picture preferences as well as the extension correlates for remembering negative affect, suggests a broad-bandwidth scanning of objects

and ideas (including unpleasant and pathognomic ideas) mediated by the isolation of affect. This dimension is here labeled ***ideational scanning*** for short. This factor of broad-bandwidth scanning is internally oriented in contrast with the external orientation of factor 1 (quick closure via broad estimation), with which it correlates -.40. However, these two broad-bandwidth dimensions yield similar results when applied to external tasks such as inkblot perception and finding hidden faces, namely, poor form appropriateness.

Male factors 7 (Table 9) and 8 (Table 10) are best considered in concert because they both exhibit high loadings for the same variable, that is, the Stroop color-word interference score controlling for speed of color naming. As previously indicated, susceptibility to color-word interference is thought to be a function of two processes: one is selective deployment of attention to the appropriate aspects of the stimulus and response, namely, the color and its corresponding color name; the other is flexible and articulated control of both inhibition and facilitation of response in dealing with successive color-word stimuli, that is, active inhibition of the printed color name and simultaneous (or successive) facilitation of the name of the colored ink in which it is printed (Gardner et al., 1959; Klein, 1964; Rand et al, 1963). The conjecture here is that the factor loading for the interference score implicates the flexible control process on male factor 7 and the selective attention process on male factor 8.

In addition to the color-word interference score, a high factor loading was also obtained on factor 7 (Table 9) for recall of information about pictorial scenes, along with modest loadings for finding the meaning of vocabulary words and of partially obscured words. These tasks entail aspects

Table 9

Male Factor 7
Information Scanning/Articulated Attention Deployment

Test	Reference Vector Loading*
Hidden Pictures - Content	.54
Color Word Interference - Regressed	.50
Vocabulary	.27
Mutilated Words	.24
Extension Measure	
Picture Preferences, B&W - Like	.39
Picture Preferences, C - Like	.27
Word Association, House - Remote	-.40
Word Association, House - R/U	-.37
Mutilated Words - Omit	-.31
Inkblot - Location	-.31
Word Association, Dry - Remote	-.26
Picture Preferences, B&W - Dislike	-.25

*Test loadings on the independent part of the oblique factor, i.e., part-correlations of the tests with the factor holding constant the operation of the other (correlated) factors.

of both external and internal scanning. Extension loadings were exhibited for positive picture preferences, for whole responses on inkblots, for closeness of word association, and for few omits on mutilated words. This pattern of results is consistent with our expectations for ***information-seeking scanning via articulated attention*** that is flexibly deployed to both signals and background, to both salient and peripheral aspects of the field.

Also loading on male factor 8 (Table 10), in addition to the color-word interference score, were detecting words with the letter "a," ideational fluency in producing instances of class concepts (things blue and things round), finding hidden patterns, and speed of color naming. As on factor 7, the tasks loading factor 8 entail perusal of both external and internal stimulus fields. Extension loadings included fluency in word association, few omits on hidden patterns, and narrow category width. This pattern of findings

Table 10

Male Factor 8
Signal Scanning/Selective Attention Deployment

Test	Reference Vector Loading*
Color Word Interference - Regressed	.44
Finding As	.43
Things - Blue	.42
Hidden Patterns	.41
Things - Round	.34
Speed of Color Discrimination	.27
Extension Measure	
Word Association, House - Units	.37
Hidden Patterns - Omit	-.38
Estimation Questionnaire - Total	-.35

*Test loadings on the independent part of the oblique factor, i.e., part-correlations of the tests with the factor holding constant the operation of the other (correlated) factors.

is suggestive of ***signal-detection scanning via selective attention*** deployed with a narrowly focussed bandwidth.

On the first of the second-order factors for the males (Table 11), the first-order factor of perceptual closure speed and efficiency received a high positive loading and expansive memory scanning a moderate loading, while quick closure via broad estimation and verbal/symbolic closure received high negative loadings. The major contrast here is one of efficient closure versus quick or premature closure, which is evocative of critical and refined attention as opposed to approximate and coarse attention. In further clarification, the test scores loading positively on this second-order factor included the locating of good or keyed faces camouflaged in pictorial scenes, the figure-choices measure of preference for complexity, the identification of partially obscured figures, speed of figure matching, and recall of the content of pictorial scenes. Negative loadings were obtained for the

Table 11

Male Factor I_2
Focussed Scanning versus Nonfocussed Scanning

First-Order Factor	Factor Loading*
Perceptual Closure Speed/Efficiency	.75
Expansive Memory Scanning	.26
Quick Closure via Broad Estimation	-.75
Verbal/Symbolic Closure	-.52
Test	
Hidden Pictures - Good Faces	.56
Figure Choices	.40
Gestalt Completion	.40
Perceptual Speed	.30
Hidden Pictures - Content	.25
Hidden Pictures - Fabulated Faces	-.48
Picture Preferences, C - Dislike	-.33
Extension Measure	
Inkblot - Form Appropriate	.42
Complexity/Simplicity	.30
Picture Preferences, C - Like	.25
Things - Total	.25
Gestalt Completion - Wrong	-.38
Picture Preferences, B&W - Dislike	-.33
Finding As - Omit	-.30
Mutilated Words - Wrong	-.29
Rigidity	-.26
Inkblot - Animal	-.26
Authoritarianism - Tentative True	-.25

*Loadings of the first-order factors, the tests, and the extension measures on the second-order (orthogonal) factor.

perception of fabulated faces and for general disliking in picture preferences. With such a pattern of results, this second-order dimension seems interpretable as ***focussed scanning versus nonfocussed scanning*** in the sense of extensive high-fidelity perusal of the stimulus field as opposed to diffuse or impressionistic perusal. In contrast with the discrete, narrowly focussed bandwidth of signal-detection scanning (factor 8), focussed scanning in this instance refers not to a narrow bandwidth but to the verity and clarity of comprehension.

Consistent with this interpretation, negative extension loadings were obtained for a variety of "wrong" and "omit" scores, indicating that focussed

scanners are precise and meticulous in avoiding errors while nonfocussed scanners are more error prone. Moreover, other extension loadings indicated that focussed scanners tend to give form appropriate responses but few animal responses on the inkblot test. On questionnaire scales, focussed scanners scored in the flexible as opposed to the rigid direction and reported a preference for complexity as opposed to simplicity. This latter correlate, along with the direct loading for the figure-choices measure of preference for complexity, suggests that focussed scanners are comfortable in coping with complexity whereas nonfocussed scanners prefer simplicity.

The second of the higher-order factors for the males (Table 12) pitted first-order factors of ideational scanning and flexible adaptive scanning with positive loadings against expansive memory scanning and quick closure via broad estimation with negative loadings. The major contrast is between

Table 12

Male Factor II_2
Isolation of Affect

First-Order Factor	Factor Loading*
Ideational Scanning	.60
Flexible Adaptive Scanning	.47
Expansive Memory Scanning	-.62
Quick Closure via Broad Estimation	-.35
Test	
Picture Preferences, B&W - Indifference	.41
Picture Preferences, C - Dislike	-.40
Extension Measure	
Picture Preferences, C - Indifference	.59
Word Association, Dry - Remote	.38
Size Estimation - Accuracy	.24
Picture Preferences, B&W, - Dislike	-.51
Picture Preferences, B&W, Like	-.32
Mathematics Aptitude - Wrong	-.30
Four-Letter Words - Wrong	-.24

*Loadings of the first-order factors, the tests, and the extension measures on the second-order (orthogonal) factor.

ideational scanning and expansive memory scanning. It will be recalled that the former dimension inherently implicates the isolation of affect, while the latter is marked by a positive acceptance of affect. The possibility that this higher-order factor is primarily reflective of orientation toward affect is underscored by the fact that the test scores loading directly on this second-order dimension are limited to measures of indifference in picture preferences. This pattern of results strongly suggests an interpretation in terms of the ***isolation of affect from ideas***. (Since a large indifference category on the picture preferences test implies either a small "like" category or a small "dislike" category or both, the negative loading for dislike of colored pictures is in this instance another sign of indifference, given the pattern of extension loadings for the remaining picture preferences scores.) Interestingly enough, harking back to Schlesinger's (1954) original formulation, the extension loadings link high scores on this factor (that is, isolation of affect) to accuracy in size estimation and remoteness in word association.

The third second-order dimension for the males (Table 13) pitted first-order factors of signal scanning and, with more moderate positive loadings, expansive memory scanning and flexible adaptive scanning, on the one hand, against a high negative loading for information scanning on the other. Given the salient contrast between information scanning and signal scanning, along with the subsidiary involvement of expansive memory scanning and flexible adaptive scanning in the latter direction, this second-order dimension is interpreted as ***flexible signal-detection scanning versus information-seeking scanning***. Tests loading directly on this second-order

Table 13

Male Factor III_2
Flexible Signal Scanning versus Information Scanning

First-Order Factor	Factor Loading*
Signal Scanning/ Selective Attention	.35
Expansive Memory Scanning	.29
Flexible Adaptive Scanning	.25
Information Scanning/ Articulated Attention	-.65
Test	
Doodles	.36
Things - Round	.28
Word Association, Dry - R/U	.24
Figure Choices	-.30
Hidden Pictures - Content	-.24
Color- Word Interference - Regressed	-.24
Extension Measure	
Word Association, Dry - Remote	.37
Word Association, House - R/U	.36
Word Association, House - Remote	.34
Word Association, Dry - Units	.31
Word Association, House - Units	.31

*Loadings of the first-order factors, the tests, and the extension measures on the second-order (orthogonal) factor.

factor included measures of graphic expansiveness, ideational fluency in producing class instances, and remoteness of word association in the signal-scanning direction, with the figure-choices measure of preference for complexity and the recall of pictorial content going in the information-scanning direction. This dimension of differential attention to discrete signals as opposed to informational context is reminiscent of Pask's (1976) distinction between operation learning and comprehension learning, with its associated serialist versus holist cognitive style.

The first- and second-order factor structure for the males is portrayed in Figure 1.

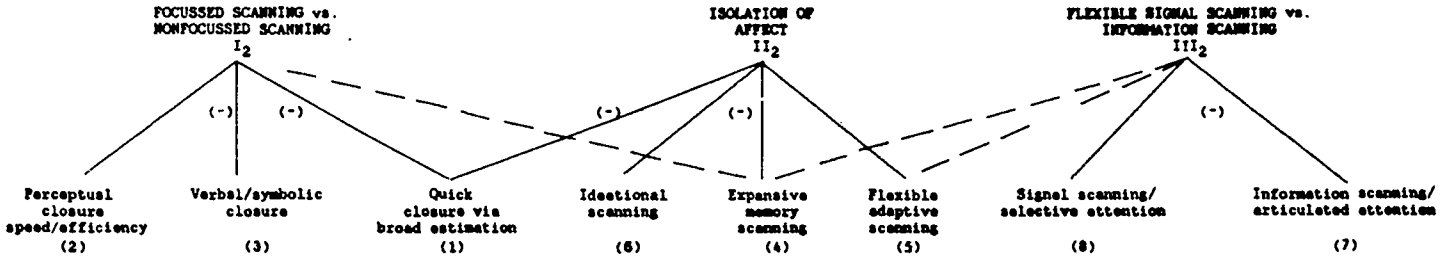

Figure 1

Scanning Factor Structure for Males

SCANNING IN FEMALES: DIMENSIONS CUTTING ACROSS EXTERNAL AND INTERNAL FIELDS

The first factor for the females (Table 14) was marked by the detection of four-letter words, misspelled words, the letter "a," and hidden patterns, by distance estimation, by speed of color naming and of figure matching, by mathematics aptitude, by the identification of partially obscured words, and by overestimation errors in size judgments. All of these tasks require the perusal of external stimulus fields. Extension loadings included closeness of word association, few popular responses but many words or long responses on the inkblot test, and many omits on several of the tests that loaded the factor. On the surface, this dimension seems similar to male factor 2 (perceptual closure speed and efficiency). But the involvement of overestimation errors and of closeness in word association on the female factor gives it a more focussed- or restricted-scanning flavor in contrast with the extensive-scanning cast of its ostensible male counterpart. Thus, this pattern of results suggests an interpretation in terms of ***focussed closure speed***, at least as applied to figural and symbolic materials.

Table 14

Female Factor 1
Focussed Closure Speed

Test	Reference Vector Loading*
Four-Letter Words	.63
Nearer Point	.51
Spelling	.51
Speed of Color Discrimination	.50
Finding As	.40
Hidden Patterns	.38
Mathemetics Aptitude	.35
Mutilated Words	.34
Shortest Road	.27
Perceptuel Speed	.25
Size Estimation - Overestimation	.24
Extension Measure	
Inkblot - Average Number of Words	.28
Four-Letter Words - Omit	.27
Hidden Patterns - Omit	.26
Color Word Interference - Wrong and Omit	.24
Word Association, House - Remote	-.31
Inkblot - Popular	-.26
Word Association, House - R/U	-.24

*Test loadings on the independent part of the oblique factor, i.e., part-correlations of the tests with the factor holding constant the operation of the other (correlated) factors.

Factor 2 for the females (Table 15) was dominated by the figure-choices measure of preference for complexity versus simplicity, along with identifying partially obscured figures, ideational fluency of class instances, detecting misspelled words, broad category width, distance estimation, incidental recall, and mathematics aptitude. These tasks involved scanning or perusal of both external perceptual fields and internal fields of memory or meaning. Among the extension loadings were form definite, hostile, human, movement, and barrier responses to inkblots; fluency in word association; making errors in locating embedded figures but avoiding errors in identifying partially obscured figures; negative affect in early memories; and, questionnaire scales of complexity versus simplicity, of independence, and of nonauthoritarian attitudes.

Table 15

Female Factor 2
Preference for Complexity vs Simplicity

Test	Reference Vector Loading*
Figure Choices	.50
Gestalt Completion	.36
Things - Blue	.33
Things - Round	.30
Spelling	.30
Estimation Questionnaire 1	.29
Shortest Road	.26
Incidental Recall	.25
Mathematics Aptitude	.24
Extension Measure	
Inkblot - Form Definite	.42
Word Association, Dry - Words	.41
Hidden Figures - Wrong	.40
Inkblot - Hostility	.36
Inkblot - Human	.31
Inkblot - Movement	.29
Word Association, House - Words	.28
Complexity/Simplicity	.27
Inkblot - Barrier	.26
Independence	.25
Childhood Recollections - Destruction	.25
Gestalt Completion - Wrong	-.40
Authoritarianism - Extreme True	-.33

*Test loadings on the independent part of the oblique factor, i.e., part-correlations of the tests with the factor holding constant the operation of the other (correlated) factors.

This pattern of loadings for female factor 2 suggests a dimension on which high scorers are tolerant of complexity in both external and internal fields, engaging in broad-bandwidth scanning of the fields so that complexity can be comprehended and responded to. For example, attending to complexity apparently degrades performance on embedded figures but facilitates the identification of partially obscured figures. For short, the dimension is here labeled ***preference for complexity versus simplicity***. This interpretation is enriched by noting that the five inkblot extension loadings (along with integration and popular responses) repeatedly define the first or major factor of inkblot perception (Holtzman et al., 1961). This factor is

generally interpreted in terms of "well-organized ideational activity, good imaginative capacity, well-differentiated ego boundaries, and awareness of conventional concepts" (Holtzman & Swartz, 1983, p. 247).

In contrast with the broad-bandwidth scanning of male factor 1 (quick closure via broad estimation), which appeared to be diffuse and impressionistic, the broad beam in the instance of female factor 2 seems to be comprehensive and integrative. Moreover, the positive orientation toward complexity characterizing this second female factor has no direct counterpart among the first-order factors of males; rather, preference for complexity is associated with the focussed-scanning pole of the first and with the information-scanning pole of the third male higher-order factors.

Factor 3 for the females (Table 16) comprised the identification of partially obscured figures and words, finding hidden patterns and embedded figures, ideational fluency of class instances, speed of figure matching and of color naming, finding the keyed faces in pictorial scenes, detecting four-letter words and words containing the letter "a," distance estimation, and broad meaning categories. Since this dimension brings together scores for the effective perusal of both external perceptual fields and internal memory fields, it is interpreted as ***perceptual and memory scanning*** facilitative of closure speed and fluency.

Extension loadings included form definite, movement, penetration, human, integration, and low rejection responses to inkblots, again implicating the major inkblot factor of integrated ideational activity. Also prominent among the extension loadings were indifference in picture preferences; positive affect in early memories; few errors in identifying partially obscured figures; and, naysaying to extremely-worded items. The overall pattern of

Table 16

Female Factor 3
Perceptual/Memory Scanning

Test	Reference Vector Loading*
Gestalt Completion	.65
Hidden Patterns	.61
Things - Round	.46
Perceptual Speed	.45
Speed of Color Discrimination	.42
Hidden Pictures - Good Faces	.40
Mutilated Words	.40
Four-Letter Words	.39
Shortest Road	.38
Things - Blue	.34
Finding As	.31
Word Meaning	.30
Hidden Figures	.29
Extension Measure	
Inkblot - Movement	.39
Picture Preferences, C - Indifference	.37
Inkblot - Penetration	.35
Childhood Recollections - Exploration	.33
Inkblot - Form Definite	.31
Inkblot - Integration	.29
Inkblot - Human	.26
Inkblot - Rejection	-.30
Gestalt Completion - Wrong	-.29
Picture Preferences, B&W - Dislike	-.27
Acquiescence - Extreme vs. Tentative	-.26

*Test loadings on the independent part of the oblique factor, i.e., part-correlations of the tests with the factor holding constant the operation of the other (correlated) factors.

results suggests critical perusal of both internal and external fields with a high-fidelity attentional beam. The extension loading for indifference in picture preferences, appearing here in the context of positive affect in early memories, suggests that this perceptual/memory scanning in females may be facilitated both by a positive orientation toward affect and by a tinge of isolation to cope with potentially disturbing instances.

Table 17

Female Factor 4
Flexible Adaptive Scanning

Test	Reference Vector Loading*
Mathematics Aptitude	.49
Hidden Pictures - Content	.48
Word Association, Dry - R/U	.41
Hidden Patterns	.39
Word Meaning	.39
Shortest Road	.35
Size Estimation - Overestimation	.33
Hidden Figures	.30
Speed of Color Discrimination	.27
Things - Round	.26
Nearer Point	.24
Extension Measure	
Word Association, Dry - Remote	.61
Word Association, Dry - Units	.37
Word Association, House - R/U	.31
Word Association, House - Remote	.29
Picture Preferences, C - Like	.28
Picture Preferences, B&W - Like	.25
Word Association, House - Words	.24

*Test loadings on the independent part of the oblique factor, i.e., part-correlations of the tests with the factor holding constant the operation of the other (correlated) factors.

The fourth female factor (Table 17) was marked by mathematics aptitude, recall of information about pictorial scenes, remoteness of word association, finding hidden patterns and embedded figures, broad meaning categories, distance estimation, overestimation errors in size judgments, speed of color naming, and ideational fluency. Among the extension loadings were positive picture preferences and several scores for remoteness and fluency of word association. Since the set of external and internal scanning tasks appearing on this dimension overlaps considerably with the set defining male factor 5, the same label is used here for female factor 4, namely, ***flexible adaptive scanning***. It should be noted that the appearance of overestimation errors in size judgments seems anomalous, unless flexible scanning in females leads to multiple centrations on the standard rather than to peripheral scanning that

would overcome the centration effect. This female dimension also appears somewhat less flexible as well as less precise in its application than the corresponding male factor, which also included the identification of synonyms (as opposed to the broad categories of word meaning on the female factor), graphic expansiveness, and the meticulous avoidance of errors. As a consequence, the alternative interpretation of this factor in terms of intelligence appears even less plausible for the female version than it did for the male.

Female factor 5 (Table 18) comprised ideational fluency of class instances, perception of fabulated faces in pictorial scenes, detection of four-letter words, broad meaning categories, speed of figure matching and of color naming, graphic expansiveness, vocabulary, distance estimation, identifying partially obscured figures, and remoteness of word association. This factor bears much similarity to a combination of male factors 4 and 6 (expansive memory scanning and ideational scanning) but without either incidental recall or the isolation of affect. In the presence of isolation as a mediating defence in males, these two factors were negatively correlated. But in the absence of isolation as a prominent mediator in females, the factors apparently converge. Furthermore, both factors primarily entailed internal tasks in males, but female factor 5, in contrast, also included several external tasks. As a consequence, factor 5 in females is interpreted in terms of ***fluent expansive scanning*** of both internal and external fields.

Extension loadings on female factor 5 included movement, human, form definite, and few shading responses on inkblots, the first three being defining variables for the major inkblot factor of well-organized and

Table 18

Female Factor 5
Fluent Expansive Scanning

Test	Reference Vector Loading*
Things - Round	.60
Hidden Pictures - Fabulated Faces	.51
Things - Blue	.45
Four-Letter Words	.43
Word Meaning	.40
Perceptual Speed	.38
Speed of Color Discrimination	.36
Doodles	.34
Vocabulary	.33
Shortest Road	.30
Gestalt Completion	.28
Word Association, Dry - R/U	.25
Estimation Questionnaire 1	-.24
Extension Measure	
Inkblot - Movement	.38
Self-Sufficiency	.37
Inkblot - Human	.35
Complexity/Simplicity	.35
Affective/Effective	.35
Inkblot - Form Definite	.34
Word Association, Dry - Units	.32
Word Association, Dry - Remote	.31
Hidden Patterns - Omit	.30
Childhood Recollections - Exploration	.30
Word Association, House - Words	.30
Independence	.29
Childhood Recollections - Total Affect	.29
Unconventionality	.27
Word Association, House - Units	.26
Word Association, Dry - Words	.25
Tolerance of Ambiguity	.25
Four-Letter Words - Omit	.25
Shortest Road - Wrong	.24
Childhood Recollections - Total Positive	.24
Authoritarianism	-.33
Rigidity	-.31
Inkblot - Shading	-.28
Picture Preferences, C - Like	-.26
Authoritarianism - Tentative True	-.24

*Test loadings on the independent part of the oblique factor, i.e., part-correlations of the tests with the factor holding constant the operation of the other (correlated) factors.

imaginative ideation. Extension loadings also included questionnaire scores for complexity, self-sufficiency, affective orientation, nonauthoritarian attitudes, flexibility, independence, unconventionality, and tolerance of ambiguity; fluency and remoteness in word association; and, total affect,

especially positive affect, in early memories but few positive picture preferences. The overall pattern of results suggests extensive scanning of both perceptual and memory fields with a flexibly- or loosely-bounded attentional beam that facilitates tolerance of ambiguity and of deviant class instances (witness the acceptance of fabulated faces and of multiple synonyms on the word meaning test).

Furthermore, although there is no indication that this expansive scanning of objects and ideas in females is mediated by the defence mechanism of isolation, there are a number of indicators of comfort with or acceptance of affect, at least positive affect. Thus, if female factor 5 corresponds to a merging of male factors 4 and 6, only the positive orientation toward affect characteristic of male factor 4 seems to be carried along.

The sixth female factor (Table 19) was marked by the color-word interference score, ideational fluency of class instances, detecting words with the letter "a," speed of figure matching, vocabulary, identifying partially obscured figures, finding hidden patterns and embedded figures, distance estimation, and mathematics aptitude. This dimension is extremely similar to male factor 8, though implicating several more tests, and is here given the same label, namely, ***signal-detection scanning via selective attention***. Extension loadings included fluency in word association, positive affect (exploration) in early memories, positive picture preferences, barrier or boundary responses and low rejections on inkblots, and questionnaire scales of complexity, tolerance of ambiguity, nonauthoritarian attitudes, and open mindedness. In contrast to the narrow-bandwidth signal scanning of male factor 8, however, this pattern of correlates suggests that the selective

Table 19

Female Factor 6
Signal Scanning/Selective Attention Deployment

Test	Reference Vector Loading*
Color Word Interference - Regressed	.67
Things - Blue	.49
Finding As	.39
Perceptual Speed	.38
Vocabulary	.35
Gestalt Completion	.35
Hidden Patterns	.35
Things - Round	.34
Hidden Figures	.29
Shortest Road	.29
Mathematics Aptitude	.25
Extension Measure	
Word Association, Dry - Words	.54
Childhood Recollections - Exploration	.35
Picture Preferences, B&W - Like	.34
Word Association, House - Words	.34
Complexity/Simplicity	.31
Inkblot - Barrier	.29
Word Association, Dry - Remote	.29
Tolerance of Ambiguity	.26
Word Association, Dry - Units	.26
Authoritarianism - Extreme True	-.49
Authoritarianism	-.47
Authoritarianism - Tentative True	-.28
Hidden Patterns - Omit	-.27
Dogmatism	-.27
Inkblot - Rejection	-.26

*Test loadings on the independent part of the oblique factor, i.e., part-correlations of the tests with the factor holding constant the operation of the other (correlated) factors.

attention of female factor 6 may be more open, exploratory, and tolerant of ambiguity as well as of complexity.

The intercorrelations among the first-order factors for the females are presented in Table 20.

Table 20

Intercorrelations Among the First-Order Female Factors

	1	2	3	4	5	6
1		-.05	-.17	-.32	-.15	.11
2	-.05		-.03	.06	-.19	-.18
3	-.17	-.03		-.01	-.39	-.05
4	-.32	.06	.01		-.21	.05
5	-.15	-.19	-.39	-.21		-.18
6	.11	-.18	-.05	.05	-.18	

Table 21

Female Factor I_2
Focussed Scanning versus Nonfocussed Scanning

First-Order Factor	Factor Loading*
Perceptual/Memory Scanning	.48
Flexible Adaptive Scanning	.33
Fluent Expansive Scanning	-.67
Test	
Hidden Patterns	.36
Hidden Figures	.32
Hidden Pictures - Content	.32
Hidden Pictures - Good Faces	.28
Gestalt Completion	.26
Estimation Questionnaire 1	.24
Hidden Pictures - Fabulated Faces	-.52
Doodles	-.29
Extension Measure	
Authoritarianism	.28
Picture Preferences, C - Like	.28
Rigidity	.24
Hidden Patterns - Omit	-.33
Self-Sufficiency	-.27
Affective/Effective	-.26
Anxiety	-.24

*Loadings of the first-order factors, the tests, and the extension measures on the second-order (orthogonal) factor.

On the first of the second-order factors for the females (Table 21), the first-order factors of perceptual/memory scanning and flexible adaptive scanning received positive loadings, while fluent expansive scanning received a high negative loading. The major contrast is between perceptual/memory scanning and fluent expansive scanning. This is reminiscent of the kind of high-fidelity or veracious scanning as opposed to tolerant-of-ambiguity or uncritical scanning embodied in the first male second-order factor. Such a conception is underscored and clarified by examination of the test scores loading directly on the first female second-order factor. Positive test loadings included the location of hidden patterns and embedded figures, the finding of good or keyed faces in pictorial scenes, the recall of pictorial

content, and the identification of partially obscured figures; negative loadings were obtained for the perception of fabulated faces and for graphic expansiveness.

The salient test loadings on this dimension appear sufficiently similar to those on the first male second-order factor to warrant the same label of *focussed scanning versus nonfocussed scanning*. Associated with focussed scanning in the extension loadings was positive picture preferences. Associated with nonfocussed scanning were questionnaire scales (appropriately reflected in scoring) of nonauthoritarian attitudes, flexibility, self-sufficiency, affective orientation, and anxiety. This pattern of personality correlates linking, for example, flexibility with nonfocussed scanning in females is counter to the pattern in males, where flexibility was associated with focussed scanning.

The remaining second-order factor for the females (Table 22) pitted the first-order factors of focussed closure speed and signal scanning with positive loadings against flexible adaptive scanning and fluent expansive scanning with negative loadings. The major contrast of focussed closure speed versus flexible adaptive scanning suggests restrictive attention on targets as opposed to adaptive attention flexibly deployed to whatever information is needed to meet task requirements. Once again, however, the conception is considerably clarified by examining the tests that load directly on the second-order factor. Tests loading positively on this second-order dimension included the detection of words containing the letter "a," of misspelled words, and of four-letter words, along with distance estimation; loading negatively was recall of the content of pictorial scenes. The dimension thus

Table 22

Female Factor II_2
Focussed Signal Scanning versus Information Scanning

First-Order Factor	Factor Loading*
Focussed Closure Speed	.60
Signal Scanning/Selective Attention	.20
Flexible Adeptive Scanning	-.33
Fluent Expansive Scanning	-.26
Test	
Finding As	.37
Spelling	.35
Nearer Point	.28
Four-Letter Words	.26
Hidden Pictures - Content	-.26
Extension Measure	
Word Association, Dry - Remote	-.34
Word Association, House - Remote	-.33
Word Association, House - R/U	-.31
Inkblot - Form Definite	-.27

*Loadings of the first-order factors, the tests, and the extension measures on the second-order (orthogonal) factor.

contrasts the detection of target stimuli or stimulus classes, on the one hand, with the broad apprehension of information about the stimulus field, on the other.

Extension loadings included closeness of word association and low form definiteness on inkblots. This second higher-order dimension in females apparently contrasts signal scanning with information scanning, as did the third higher-order factor for males. However, signal scanning seems to be more focussed or less extensive in females and more flexible in males, as witness the opposite pattern of correlations with remoteness of word association. Accordingly, the female second-order factor is labeled ***focussed signal-detection scanning versus information-seeking scanning.***

This distinction between focussed signal scanning in females and flexible signal scanning in males stems from the properties of the first-order factors

that differentially contribute to this higher-order dimension in the two sexes. For females, focussed closure speed (factor 1) loads positively and flexible adaptive scanning (factor 4) loads negatively on this second-order factor. The former links remoteness of word association negatively to signal scanning tasks (e.g., finding As, spelling, four-letter words), while the latter ties remoteness positively to information scanning tasks (Hidden Pictures Content). Thus, on the female second-order factor, signal scanning is associated with closeness of word association and information scanning with remoteness of word association. For males, in contrast, flexible adaptive scanning (factor 5) loads positively on the second-order factor. However, the predominant loading is for information scanning (factor 7) in the negative direction, which strongly links Hidden Pictures Content to closeness of word association. On the male second-order factor, then, signal scanning is associated with remoteness and information scanning with closeness of word association. Thus, at the second-order level, signal scanning appears more focussed or less extensive in females than in males, whereas information scanning appears less extensive in males than in females.

In addition, one of the first-order factors for the females -- namely, preference for complexity versus simplicity (factor 2) -- was not sufficiently correlated with the other female factors to enter into a second-order dimension. Hence, in terms of the hierarchical factor analysis, female factor 2 remains as an independent dimension at the first order.

The first- and second-order factor structure for the females is portrayed in Figure 2.

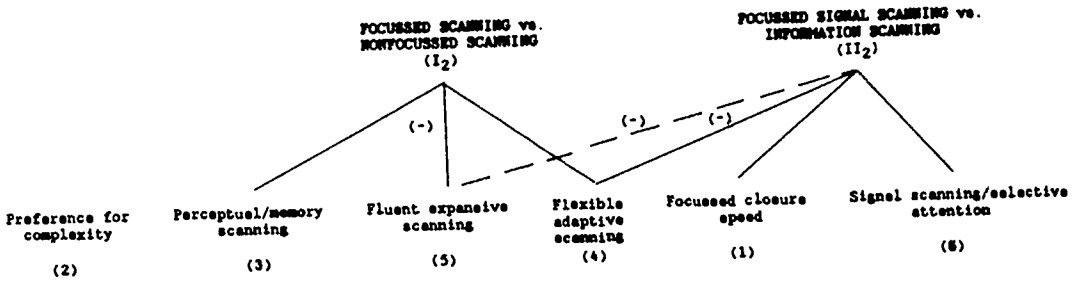

Figure 2

Scanning Factor Structure for Females

GENDER DIFFERENCES IN SCANNING

One of the striking findings of this factor analytic study of scanning behavior is that male and female samples yield very different factor structures. These differences appear not only in the number and nature of the factors, but also in the manner in which they are organized into hierarchical structures. To begin with, as we have already noted, the female factors that have reasonable male counterparts generally appear to be more focussed and less flexible in their application than the corresponding male factors. These factor pairings include female factor 1 (focussed closure speed) with male factor 2 (closure speed/efficiency), female factor 4 with male factor 5 (in both instances, flexible adaptive scanning), the first male and female second-order factors (focussed scanning versus nonfocussed scanning), and female second-order factor 2 (focussed signal scanning versus information scanning) with male second-order factor 3 (flexible signal

scanning versus information scanning). Counter to this trend, signal scanning in males (factor 8) appears to be more narrowly-focussed and less open or exploratory than signal scanning in females (factor 6).

On the other hand, with the exception of one external factor, each of the female factors clearly cuts across both external perceptual fields and internal memory fields of knowledge or meaning. The male factors, in contrast, appear to be more segregated and discrete in their functioning, with three dimensions primarily applicable to external perceptual fields, two dimensions mostly applicable to internal fields, and three dimensions cutting across external and internal tasks.

More importantly, it appears that internal scanning of memory and ideas occurs in males mainly as a function of orientation toward affect. Indeed, internal scanning in males seems to be mediated by a dimension of isolation of affect from ideas as opposed to a positive acceptance of affect, which emerges as a second-order factor in males organizing and facilitating the first-order internal factors. No such second-order factor of isolation of affect appears in the female factor structure. Instead, the various scanning dimensions in females, with the exception of one exclusively external factor, are equally applicable to both external and internal fields.

Because there are eight first-order and three second-order dimensions in the male factor structure and only six first-order and two second-order factors in the female structure, one might be tempted to conclude that males are more differentiated as well as more hierarchically integrated than females in the scanning domain, with all of the value overtones of developmental

advancement that this is often taken to imply. But the female first-order factors may already represent integration of function across external and internal fields, which does not occur fully for the males even at the second-order level. On the other hand, separate external and internal scanning dimensions might not yet be differentiated at the first-order level in females, making it impossible for the two types to be reconfigured into primarily external and primarily internal higher-order clusters, as they are in males.

Moreover, the so-called hierarchical integration typically afforded by second-order factors may be illusory in the instance of the male second-order factor of isolation of affect, which may instead contribute to the compartmentalization of internal from external scanning. What is needed to clarify the meaning of ostensibly different levels of differentiation and hierarchic integration in the two sexes are longitudinal data bearing on the differential development of scanning dimensions in males and females. Thus, with respect to gender differences in scanning, we are left with the age-old conundrum that neither males nor females may be developmentally more advanced or have adaptive advantage uniformly even though their structures are remarkably different.

In any event, the functional import of these observed gender differences in scanning behavior needs to be tempered by the concurrent finding that the two major second-order dimensions -- namely, focussed versus nonfocussed scanning and signal-detection versus information-seeking scanning -- appear to be similar in the two sexes. We will further elaborate these second-order gender similarities in the next section.

IMPLICATIONS FOR INTERPRETATION AND MEASUREMENT

The results of this factor-analytic study leave little doubt that the cognitive style of scanning refers not to a single stylistic dimension of individual consistencies but, rather, to an organized hierarchy of dimensions exhibiting a qualitatively different structure in males and females. The erstwhile scanning style explodes into multiple dimensions because its purported definition (in terms of consistent individual differences in the extensiveness and intensity of spontaneous attention deployment) masks its inherent interaction with individual differences in breadth versus narrowness of attention. Further complicating the interpretation of attentional scanning is the fact that there is more than one kind of broad as well as of narrow attention (Wachtel, 1967).

Broad attention might refer either to extensive scanning of the stimulus field or else to perusal with a broad attentional bandwidth. The broad attentional beam may be unclear and diffuse or clear enough for comprehending multiple stimulus aspects. The extensive scanning may be marked by high scatter or dispersion of attentional fixations or by large jumps from one fixation to the next, or both (Luborsky, Blinder, Schimek, 1965). Furthermore, extensive scanning may reflect unsystematic or anxious roaming of the field, systematic or planful coverage, or flexibly controlled deployment of attention to multiple information sources.

In contrast, narrow attention might refer either to limited scanning of the stimulus field or else to perusal with a narrow attentional bandwidth. The narrow attentional beam may be aimed toward detailed veracity of

perception or toward highly selective perception yielding reduced responsiveness to compelling irrelevancies. The limited scanning may be marked by low scatter of fixations or by small track lengths between fixations, or both. Furthermore, limited scanning may reflect meticulous or repeated examination of details, cautious adherence to central or salient features, or defensive avoidance of the threatening or the unknown.

Moreover, intensity or fidelity of attention may be accomplished with either a broad or a narrow bandwidth. A high-fidelity but narrow attentional beam facilitates the successive apprehension of discrete details, while a high-fidelity broad beam facilitates the integration of simultaneously comprehended stimulus aspects. Another crosscutting variable is scanning speed. Whether broad or narrow bandwidth, whether clear or diffuse, whether veracious or selective, whether extensive or limited, the scanning behavior may in addition exhibit consistent individual differences in rapidity. Furthermore, either slow or rapid scanning may be in the service of precision and comprehensiveness. On the other hand, however, either may instead be reflective of defensiveness, the former cautiously avoiding attention to potentially threatening aspects of the field by only slowly venturing to look around and the latter distracting attention from potential threats by looking rapidly everywhere (Luborsky et al., 1965). Finally, all of these aspects of scanning, in whatever combination, may apply to internal memory fields as well as to external perceptual fields. To take the last example as a case in point, one way to avoid thinking about something unpleasant or threatening is to think rapidly, if not frenetically or hysterically, about numerous other things.

FIRST- VERSUS SECOND-ORDER SCANNING DIMENSIONS:

COGNITIVE CONTROLS ORGANIZED BY COGNITIVE STYLES

Many but by no means all of these distinctions in scanning behavior are exemplified by one or another of the multiple dimensions delineated in the present factor analysis. For example, factors entailing broad attentional bandwidth include male factor 1 (quick closure via broad estimation), male factor 6 (ideational scanning), and female factor 2 (preference for complexity), while male factor 8 (signal-detection scanning) involves a narrow bandwidth. The broad-bandwidth scanning appears to be diffuse and impressionistic for male factors 1 and 6, but comprehensive and integrative for female factor 2; whereas the narrow-bandwidth scanning facilitates selective attention on male factor 8. Selective attention also characterizes female factor 6 (signal-detection scanning), while articulated attention flexibly deployed to multiple field aspects characterizes male factor 7 (information-seeking scanning).

Extensive scanning -- using remoteness versus closeness of word association as one indicator, for example -- appears to be characteristic of male factor 5 and female factor 4 (flexible adaptive scanning in both instances). Rapid scanning seems to be characteristic of male factor 1 (quick closure via broad estimation), male factor 8 as well as female factor 6 (both signal scanning), and female factor 3 (perceptual/memory scanning). On the other hand, male factor 2 (perceptual closure speed/efficiency) and female factor 5 (fluent expansive scanning) appear both rapid and extensive. In contrast, the scanning behavior of high scorers on male factor 7 (information scanning) and on female factor 1 (focussed closure speed) appears to be less

extensive, the former involving articulated and the latter rapid attention deployment. As a final instance, male factors 1, 2, and 3, as well as female factor 1, apply primarily to external perceptual fields; male factors 4 and 6 apply to internal memory fields; and, the remaining male (5, 7, 8) and female factors (2-6) apply to both external and internal fields.

With a few possible exceptions, these various first-order dimensions of scanning behavior are clearly stylistic, in that they refer to individual consistencies in the manner or form of attention rather than to the content or amount of attention. The possible exceptions include, for example, male factors 2 (perceptual closure speed/efficiency) and 3 (verbal/symbolic closure) as well as female factor 1 (focussed closure speed), which may arguably be interpretable more as abilities or enabling variables than as stylistic variables. At the same time, although usually broader than typical ability factors, none of the stylistic first-order dimensions seems to provide the kind of crosscutting contrast in stylistic approach or orientation that characterizes a cognitive style as ordinarily conceived (Messick, 1984). That is, except possibly for female factor 2 (preference for complexity versus simplicity), the first-order scanning factors are unipolar dimensions, in the sense that high (or low) factor scores signify more (or less) of the particular stylistic tendency.

Cognitive styles, on the other hand, are usually conceived as bipolar contrasts between stylistic tendencies or orientations, as in field independence versus field dependence (Witkin & Goodenough, 1981) or field sensitivity (Ramírez & Castañeda, 1974). For cognitive styles, high factor scores signify more of one stylistic tendency and less of an opposing tendency while low factor scores signify the reverse. By indicating not just the

strength or intensity of a stylistic tendency but also which direction of bipolar options is operable, cognitive styles serve not just as regulating variables but also as organizing variables. It thus seems more appropriate to characterize the first-order scanning factors not as cognitive styles but as "cognitive controls" (Gardner et al., 1959), a designation which better underscores that they primarily function as regulating as opposed to organizing variables.

Although refined over the years (Messick, 1984), the basic distinction between cognitive controls and cognitive styles is that the latter refers to an intraindividual pattern or combination of cognitive controls (Klein, 1958) or of intellective abilities (Broverman, 1960a, 1960b). As combinations -- or more specifically, contrasts -- of control dimensions (or abilities), cognitive styles represent a superordinate level of organization and control within the personality system. By combining control dimensions, cognitive styles cut across the specific adaptive requirements linked to each control and hence appear more general and pervasive than control dimensions in their range of functioning.

Another important distinction is that the unipolar dimensions of cognitive control, like ability factors, are largely ***value directional***, in the sense that having more is usually adaptively better than having less. On the other hand, cognitive styles are largely ***value differentiated***, in the sense that neither pole is uniformly more adaptive but, rather, each stylistic extreme has its own adaptive value in different circumstances.

Since the second-order scanning factors for both males and females represent bipolar contrasts between first-order cognitive controls, they seem directly interpretable as cognitive styles. Moreover, two of these

superordinate scanning styles -- namely, focussed versus nonfocussed scanning and signal-detection versus information-seeking scanning -- appear quite similar in the two sexes, whereas a third style emerges in males only. Thus, two of the scanning styles, like higher-order factors in general, appear more similar from one population group to another than do the lower-order factors that contribute to them. This tends to be the case because higher-order factors cut across a variety of task requirements that, in the aggregate, may be similar from group to group even though the tasks are differently configured within each group on lower-order dimensions (MacArthur, 1968; Vernon, 1969).

The third style, operable in males but not in females, contrasts the isolation of affect from ideas with the positive acceptance of affect. It may represent a cognitive style of affect-isolated versus affect-acceptant scanning of ideas and objects. Alternatively, it may represent a defensive style for organizing and controlling affect in attention deployment. It might also be described as an affective style or as a cognitive-affective style. The former label is used by Royce and Powell (1983) for modes of organizing and controlling affective traits and the latter label for modes of integrating cognition and affect. However, the specific dimensions exemplifying these distinctions for Royce and Powell are quite different from the higher-order male factor presently at issue.

Of the two cognitive styles that appear to operate similarly in the two sexes, one contrasts different forms of scanning (namely, focussed scanning versus nonfocussed scanning), whereas the other contrasts different purposes or functions of scanning (namely, signal detection versus information seeking). Both of these styles, that is, the two second-order factors common

to males and females, appear to be applicable in varying degrees to both external perceptual fields and internal memory fields of meaning or knowledge. No style emerged in either sex contrasting external with internal scanning. With respect to value differentiation, neither signal-detection scanning nor information-seeking scanning is uniformly more adaptive -- it all depends on the relative importance of the signals and the information. Nor is focussed scanning uniformly more adaptive, because in many instances the quick impressions and approximate estimates of nonfocussed scanners are both sufficiently on target and highly efficient.

STRATEGIES FOR THE MEASUREMENT OF STYLES

With respect to the measurement of these scanning cognitive styles, we might build on two relevant methodological points. The first is that second-order factors can be estimated directly by composite-scores that combine (standard-score) measures of the contributing first-order factors (Cattell, 1978). This procedure extends one level up in the factor hierarchy the practice of estimating first-order factors by means of composite-scores that combine the contributing test scores, that is, by means of composites of marker tests. Intercorrelations among such first-order composite-scores have sometimes even been factor analyzed to obtain second-order factors directly rather than by the usual two-stage extraction of correlated first-order factors which are in turn factor analyzed (e.g., Cattell, 1971). In this context, the present suggestion of tapping second-order factors directly might be taken to imply the construction of composites of the contributing first-order factors, which themselves are composites of marker test scores. This composite-of-composites strategy is one possibility, to be sure, but

a more straightforward alternative is to form a second-order factor composite-score by combining test scores that load directly on the second-order factor in hierarchical analyses, such as the Schmid-Leiman (1957) solutions obtained in the present study.

The second methodological point is that since cognitive styles represent bipolar contrasts between alternative stylistic orientations, a style composite-score should reflect the *difference* between first-order factors (or test scores) marking the two extremes. Such a difference-score indicates the predominance of one stylistic direction over the other for each individual. That is, high positive scores signify relatively more of one stylistic tendency and high negative scores relatively more of the opposing tendency, while low scores signify little difference in stylistic propensity. In this approach, cognitive styles are expressed in terms of *contrasted* performance, and not just *typical* performance, with the emphasis on the predominant stylistic tendency between opposing options and not just on the person's customary predilection for one of the options (Messick, 1984).

Such contrasted-performance measurement has been used in earlier research studies to assess the cognitive styles of reflection versus impulsivity (Salkind & Wright, 1977), for example, and of convergent versus divergent thinking (Hudson, 1966, 1968). The former style was measured in terms of a contrast between solution errors and response latencies, with impulsives being relatively quick and inaccurate while reflectives are relatively slow and accurate. The relative advantage of either stylistic pole depends on the situational adaptiveness of accuracy as opposed to speed and of associated strategies of detailed as opposed to holistic information processing (Zelnicker & Jeffrey, 1976). The latter style of converging versus diverging

illustrates that cognitive-style scores can be constructed by contrasting intellective abilities as well as cognitive controls and that the opposing tendencies scored in the within-person or ipsative contrast need not correlate negatively with each other.

In the present study, examination of Table 11 for the males and Table 21 for the females suggests that a candidate score-contrast to tap focussed scanning versus nonfocussed scanning would pit the number of good faces found on Hidden Pictures against the number of fabulated faces. That is, a potential indicator of the cognitive style of focussed versus nonfocussed scanning consists of the standard score for good faces minus the standard score for fabulated faces. High positive scores on this composite would indicate focussed scanning and high negative scores nonfocussed scanning, while low scores would indicate little net difference favoring either focussed or nonfocussed perusal.

It should be noted that low scorers on this composite could be either low on both scanning propensities or high on both and that these two possibilities could be distinguished by taking the sum of the contrasted scores as well as their difference. Indeed, in research on reflection versus impulsivity (Salkind & Wright, 1977), sum scores were employed to tap cognitive efficiency (fast and accurate) as opposed to cognitive inefficiency (slow and inaccurate). In research on converging versus diverging (Hudson, 1966), sum scores were used to identify "all-rounders" or "intellectual labiles" who are high on both convergent and divergent thinking.

Examination of Table 13 for the males and Table 22 for the females suggests that a potential score-contrast to tap signal-detection scanning versus information-seeking scanning would pit Finding As, Spelling, and Things

Round on the one hand against the recall of information about pictorial scenes (Hidden Pictures Content) on the other. In view of the more focussed quality of signal scanning in females, however, a composite of Finding As plus Spelling minus Hidden Pictures Content might be a better index for females, whereas a composite of Things Round minus Hidden Pictures Content might be a better index for males. This distinction between flexible and focussed signal scanning would be elaborated even further by adding remoteness of word association to the composite, positively for the males and negatively for the females.

Examination of Table 12 for the males suggests that the higher-order factor of isolation of affect would be indexed primarily by the indifference score from the Picture Preferences Test. Or in more refined fashion, one might construct a contrast between indifference on the one hand and both liking and disliking on the other (assessed, of course, on independent item sets).

Finally, female factor 2, preference for complexity versus simplicity, may represent a cognitive style even though it emerged as a first-order rather than a second-order factor. After all, the level or "order" at which a dimension appears in a factor analysis is determined by the sampling of test variables in the battery and may or may not reflect the level -- or in Cattell's (1978) terms, the "stratum" -- of personality influence entailed. From Table 15, it seems clear that female factor 2 would be indexed by the Figure Choices score which, in the way the scoring key is constructed, already represents a contrast between preference for complex figures and preference for simple figures. Once this Figure Choices score is added to this small battery of scanning markers, one can also check that Figure Choices, although

marking a relatively independent factor in females, is related positively to both focussed scanning (Table 11) and information-seeking scanning (Table 13) in males.

This strategy of contrasted-performance measurement assumes that the contributors to a given composite difference-score are good indicators of both poles of the stylistic contrast in question. Since goodness of measurement can hardly be affirmed by a single factor analytic study, the style scores suggested on the basis of the present analysis are offered as hypotheses to be evaluated in further research, not as recommended measures. It would be valuable, as an instance, if the complex tasks of the present battery could be analyzed through further research into more elementary information-processing operations that could be assessed by controlled component tasks. The relation of such information-processing measures to the complex tasks as well as to the scanning factors should illuminate the meaning of the dimensions. It should also contribute to (or undercut) the construct validity of interpretations in terms of cognitive controls and cognitive styles (Messick, 1989).

For example, the Hidden Figures Test used here -- in which the respondent must select which one of five simple figures is embedded in each complex pattern -- involves extensive scanning of the complex pattern in relation to the five candidate simple targets, along with restructuring to disembed the appropriate simple figure. But it may also involve feature analysis of the simple figures combined with scanning of the complex pattern for feature matching, some combination of feature analysis and propositional logic, or a mixture of processing strategies. As a consequence, the obtained complex factor pattern for the Hidden Figures Test may reflect, among other things,

multiple component processes needed for task solution or alternative strategies employed by different respondents, or both. Controlled tasks that disentangle target location, feature analysis, restructuring, solution strategies, and other processes should greatly clarify the meaning of relationships. Although ultimately such controlled tasks may form the basis for refined measurement of scanning styles, the suggestion here is that they be used not instead of but, rather, in addition to complex tasks. Some degree of complexity may be needed to engage the scanning cognitive styles and to reveal their variety.

Further research on scanning should also continue to include measures of personality as well as cognition and, within the latter domain, measures of both perception and memory. This should be the case because one of the important implications of the present study is that cognitive styles of scanning help organize and control not only external signal detection and information search but internal retrieval of meaning and knowledge. Furthermore, this organization and regulation of inward as well as outward attention appears to serve both adaptive and defensive purposes. Hence, scanning styles bear directly on central issues of both personality and cognitive psychology (Messick, 1987).

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