RELATIONSHIPS BETWEEN COGNITIVE AND TEMPERAMENT TRAITS AND THE CONCEPT OF "STYLE"[1]

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Abstract

Examines certain cognitive-affective relationships by suggesting that they represent overlapping stylistic consistencies. First, literature is reviewed linking flexibility of closure with the objective test temperamental trait of Independence (U.I.19) as the major source trait underlying Witkin's conventional style of field articulation. Similarly, speed of closure is linked with Inhibition (U.I. 17) as a more broad representation of the cognitive control, extensiveness of scanning. Finally, various fluency factors are linked with the source trait of Exuberance (U.I. 21) underlying much creative activity. It is suggested that these three global styles are also represented by Royce's three "epistemic styles"; namely, rationalism, empiricism, and metaphorism respectively. It is reiterated that multivariate-theoretical analysis is necessary to further substantiate these suggestions of strong substantive and theoretical convergencies across methodologically divergent laboratories.

Any persistent reader of structural research in personality is likely to be haunted by at least two recurrent apparitions: first, the consistent (though low) correlations of some temperament traits with so-called perceptual or ability factors, and second, the consistent suggestion that certain "stylistic" variables, such as field articulation, are necessarily related to many basic personality factors already known. This paper is an attempt to shed some light on such indications, particularly the "links" of the perceptual factors of flexibility and speed

of closure with abilities such as inductive and deductive reasoning, such temperament factors such as "independence" and "inhibition", and styles such as field articulation and extensiveness of scanning.

Enough evidence has now accumulated regarding some traditional factors for one to make some rather definite suggestions. In the following sections, this evidence will be presented which initially concerned the following traditional factors: flexibility of closure (Part 1), speed of closure (Part 2), and word fluency (Part 3).

Part 1. $\underline{C}_f$ (Flexibility of Closure), U. I. 19 (Independence), and Field Articulation

a. Flexibility of Closure

Variables traditionally associated with Witkin's "field independence" construct were originally found to identify a factor in Thurstone's inaugural work on perception (1944). This factor, called factor "E" (now represented $\underline{C}_f$), was concerned with the manipulation of configurations (simultaneously or in succession). Because Thurstone included tests for Primary Mental Abilities (P.M.A.'s, Thurstone, 1938) in his test battery, with perceptual tests, he already discovered a correlation of .76 between $\underline{C}_f$ and the P.M.A. Space and Reasoning factors. Since reasoning tests were included in the composite for factor E, Thurstone recognized that this correlation was probably spuriously high. However, in Thurstone's 1949 study, Inductive Reasoning correlated .63 with $\underline{C}_f$ and Botzum (1951) replicated that finding with a correlation coefficient of .43. While Botzum indicated inductive reasoning to be more highly related to $\underline{C}_f$, Pemberton's (1952a) results suggest that deductive reasoning is more relevant.[3]

In fact, if one can distinguish deductive thinking as "analytic" (i.e., analyzing, abstracting or composing essential features from a largely structured array) and inductive thinking as "synthetic" (i.e., synthesizing, unifying, or constructing from a largely unstructured array), as many psychologists have done (e.g. Duncker, 1945; Burt, 1949), then the theoretical relation

between C_f and deductive reasoning that was suggested by Thurstone (1949) and supported by Pemberton (1952a) is quite viable. Pemberton concludes, "This indicates that there is a connection between perceptual flexibility, the flexibility required to some analytical reasoning problems, and the flexibility needed to solve problems utilizing highly practiced symbols but where meaning is not important (p. 287)."

In this regard we note Baggaley's (1955) study showing that performance (speed and correctness) in acquiring a concept (i.e., discovering the rule for selecting particulars as instances of a concept) was correlated with C_f. Correctness was also correlated with reasoning scores from Thurstone tests. Persons who found concealed figures faster were also more analytical in this problem solving task. Baggaley suggests this is because of relative concentration on one aspect of complex stimulus situations.

b. Field Articulation

Witkin and his associates (1962) have developed the construct of "field articulation", originally termed "field independence", as "...an analytical, in contrast to a global, way of perceiving; (it) entails a tendency to experience items as discrete from their backgrounds, and reflects ability to overcome the influence of an embedding context (p. 57 ff.)". In other words, as Royce (1973) states, "Field articulation..... refers to the extent an individual is able to articulate, specify, and delineate his experience; to be active and analytic as opposed to passive and global (the latter implies accepting experience in an uncritical , diffuse, hazy and ill-defined manner) (p. 333)."

The work of Witkin and his associates in deriving and studying this construct has been provocative - as we shall see - but it has also been strongly criticized (Postman, 1955; Holtzman, 1955; Zigler, 1963a,b; Arbuthnot, 1972; Horn, 1974; Wachtel, 1972) particularly for poor operational procedures. Field articulation is typically measured by the subject's ability to quickly find selected figures among others (the embedded figures test, EFT) and/or his ability to assess how vertical he (or an object) is in a field of non-vertical cues. Field articulate individuals can overcome the influence of a tilted frame when judging the perpendicularity of a rod within it (the rod and

frame test, RFT), and they are able to overcome the influence of a tilted room when judging their own perpendicularity (the body-adjustment, BAT, and room adjustment, RAT, tests). However, measures from the EFT (except perhaps the mean time score) can be quite unreliable (Dana and Goocher, 1959), as can RFT scores (Cattell and Hundleby, 1968), and all measures intercorrelate poorly (e.g. Gruen, 1957; Elliot, 1961).[4] Many variations on Witkin's tests have been produced (e.g. Jackson, 1956; Jackson, Messick, and Myers, 1964; Oltman, 1968). Arbuthnot (1972) thoroughly compares the measures of field articulation used in 40 studies and finds "what any one test measures is not reflected to a great extent by another."

More important, Gruen (1957) has made the point that Witkin's construct is based on differences in perception rather than differences among people. In Cattell's (1957) terms, Witkin's construct is a surface trait, rather than a source trait. That is, it is identified by the (high) intercorrelations of a set of (perceptual) tasks, rather than by the best accounting (simple structure) for these intercorrelations (among others). Cattell unequivocally states that Witkin's construct "is defined, i.e., operationally defined, only as a correlation cluster or surface trait, and it can readily be shown that a correlation cluster lacks the non-arbitrary definition needed for a fruitful concept and which is possible only through a simple structure source trait (Cattell, 1969, p. 865)." This very important issue has led Cattell, among others, to consider field articulation to be an expression of source traits rather than a source trait itself. There is, therefore, an urgent need to uncover the source trait(s) that underlie(s) the provocative links between temperament and ability that are suggested by Witkin's work and reinforced by independent replications (e.g. Young, 1959). Most recently, Wachtel (1972) makes an impressive plea for better attempts to identify the underlying construct in field independence research, apart from intelligence, and to distinguish the ability to perform in a field articulate way from the adaptive choice or preferred strategy to do so.

The many factorial identifications of "field articulation" attest to a unitary stable source trait underlying these findings (Gardner et al., 1959, Gardner, Jackson and Messick, 1960; Gardner, 1961; Goodenough and Karp, 1961; Witkin et al., 1962;

Gardner, Lohrenz and Schoen, 1968; Karp, 1963; Gardner and Moriarty, 1968).

On the ability side, Witkin (Witkin, et al., 1962) recounts evidence relating field articulation to P.M.A. Space and Reasoning factors (e.g., Young, 1959; Gardner et al., 1960).[5] As this suggests, there is such strong evidence relating field articulation to flexibility of closure that Witkin admits, "Taken together, these studies provide impressive support for the view that flexibility of closure, spatial decontextualization, and field dependence may be different names for the same dimension (Witkin et al., 1962, p. 52)." More recently, Gardner, Lohrenz and Schoen (1968) concur:

Results of several studies (e.g., Gardner, Jackson, and Messick, 1960) have shown that the number of complex figures subjects correctly checked as containing given simple figures (Thurstone's Concealed Figures Test) is factorially indistinguishable from the scores derived from Witkin's Embedded Figures or Rod-and-Frame Tests to represent this cognitive control dimension (p. 315).

c. Independence

Pemberton (1952b), in her enlightening study of Thurstone's perceptual closure factors in relation to reasoning factors (1952a), also included a large number of temperament variables from self-rating schedules. Higher flexibility of closure related to, among other things, a "lack of sociability and independence of social conventions", and a "dislike for routine and lack of tidiness" which "may also be indicative of these subjects' independence of superficial, rigid rules. This seems to stem from their flexibility, and not from impulsivity, as they do not show any positive association with items dealing with impulsivity, and they say that they think of the consequences before acting."

Accumulated studies using various non-factorial questionnaires since Pemberton have shown that more field articulate individuals (however measured) are more autonomous, socially uninvolved, and relatively deliberate. As reported by Witkin et al. (1962) and summarized by Royce (1973):

They are more likely to structure ambiguous stimuli (such as Rorschach ink blots), and less likely to change their views on a particular social issue in the direction of the attitudes of the majority. They are highly autonomous individuals with a stable self-view, socially they show little interest in and need for people, and they manifest a relatively intellectual and impersonal approach to problems. In general, they are influenced little by authority, tending to be guided by values, standards, and needs of their own (p. 334).

Typical of the studies referred to is Linton's (1955) indication that field independent persons are less conforming in autokinetic effect and attitude change situations.

Paralleling this work, since 1949 Cattell and his associates have found a factor in studies of objective tests referred to as U.I. 19 (Independence, originally termed "Promethean Will"). This factor has been matched in at least a dozen factor analyses with adults and eight children (see Hundleby, Pawlik and Cattell, 1965). Cattell reports that among its markers are correctness of perceptual closure, accuracy with Gottschaldt figures , severity of judgment, and accuracy in judgment of spatial relations.

Prominent characteristics of high U.I. 19 test behavior, summarized by Hundleby, Pawlik, and Cattell (1965, p. 166ff.) include: accurate, competent performance (correlations with school grades, for example), ability to concentrate, criticalness of others but not over-confidence, logical flexibility (i.e., in problem solving situations) and flexibility in changing responses, unaffected by suggestion from others, and somewhat conservative estimates of one's own performance.

U. I. 19 (like field articulation) appears to be substantially inherited (Cattell, Stice, and Kristy, 1957), significantly higher for males than females (as is field articulation) and related to school performance (Hundleby and Cattell, 1968), complex clinical syndromes (Cattell, 1957; Cattell and Tatro, 1966) and a more exacting, unaffectionate developmental environment (Hundleby, Pawlik and Cattell, 1965, p. 168ff.) comparatively to findings for higher field articulation (Witkin et al., 1962, p. 346ff.). Cattell and Hundleby (1968) conclude,

"There is good reason to suppose, due to similar patterns of correlations with other variables, that U. I. 19 and Witkin's construct of field independence have much in common and indeed that field independence is the operation of U. I. 19 within a somewhat restricted perceptual variable domain. We know of no proof that field independence is a source trait distinct from U. I. 19."

There is some evidence (Cattell, 1973) that this objective test factor, U. I. 19, is represented in the questionnaire domain by $Q_{\bar{I}}$V, a second-order "Independence" factor from the 16 PF. In questionnaire findings with U. I. 19, Hundleby, Pawlik and Cattell (1965) state:

"In general, a pattern emerges of a free-thinking, active, rather unstable individual with a certain imperviousness and coldness towards the perceptions and behavior of others. These questionnaire findings are consonant with those from objective tests, and add particular confirmation in a more social context to the criticalness and aloofness that appears to characterize this factor (p. 164)."

It can be seen that these traits strongly resemble Pemberton's temperamental correlates of $C_{\bar{f}}$.

Also, there is some direct evidence that $Q_{\bar{I}}$V and field articulation are related: first a significant relation found between the RFT and $Q_{\bar{I}}$V (Johnston, Neville and Workman, 1969, for women Ss), and second, a relation between Guilford-Zimmerman Spatial Orientation and Spatial Vizualization tests (chosen because the definition of these abilities seemed closely parallel to those of field independence) and first order markers for $Q_{\bar{I}}$V (Haynes and Carley, 1970). However, Ohmacht (1968) did not find any relation between $Q_{\bar{I}}$V and the hidden figures test for $C_{\bar{f}}$. As Cattell and Hundleby (1968) counter, since this test only loads about .3 on U. I. 19, one would not expect it to relate particularly strongly to $Q_{\bar{I}}$V. Also, it could be added that $Q_{\bar{I}}$V is only a self-rating factor, a trait based on self-evaluation, which need not correspond well with U. I. 19 at all.

Taken together, the above findings confirm one's intuitions that there is an analytic-rational-independent stylistic nexus in personality (see Royce, 1973, 1974).

Part 2. C_s (Slow Speed of Closure), U. I. 17 (Inhibition), and Extensive Scanning

a. Speed of Closure

Although the genesis of this factor was somewhat confused (originally Thurstone's factor F, not factor A -- see Pawlik, 1966), over years of new factorizations (e.g., Botzum, 1951; Pemberton, 1952a) speed of closure has become well identified by tests such as Gestalt Completion and Concealed Words Test (see French et al., 1963). Speed and flexibility of closure are distinct in that the former involves forming configurations from relatively unorganized presentations, while the latter involves forming other configurations from presentations that are easily and immediately perceived as good configurations (i.e., suppressing organized configurations to produce or recognize others). In parallel with C_f, work began to find similarities between C_s and other abilities, Thurstone's thesis being that, while C_f is related to deductive reasoning ability, C_s is related to inductive reasoning ability. As with C_f, Thurstone (1944) found a correlation of C_s with P.M.A. Space ($r = .38$) and with Reasoning ($r = .35$) factors.

Although the results are not as clear-cut as for C_f, there is a good indication, over several studies (Thurstone, 1944; Yela, 1949; Botzum, 1951; Pemberton, 1951a, b), that C_s is correlated with facility in reasoning tests that can be solved by what Pemberton (1952a) calls "a rapid synthetic process". Yela (1949), for example, found a "synthetic perceptual factor" which formed a second-order factor with Space and Reasoning. In Botzum's (1951) study, as previously reported, C_f formed a second-order "analytic" factor with Space and Reasoning abilities, while C_s formed a second-order "speed of association" factor with low number, word fluency and verbal comprehension abilities.

Whereas Pemberton (1952a) found C_f and (largely deductive) reasoning tests falling together at the first-order, she found C_s and Reasoning (with Space) falling together only when the analysis was taken to the second-order. However, there was some evidence that Thurstone was right in suggesting that C_f and C_s were linked to deductive and inductive reasoning respectfully, in that her Reasoning factor (being, she suggests, "synthetic" or inductive reasoning) correlated highest with C_s ($r = .24$).

So far as can be ascertained, the matter stands there: somewhat equivocal, but suggestive.

On the temperament side, Pemberton (1952b) found a clear-cut pattern of self-ratings with C_s, as with C_f. Overall, high scorers on C_s showed a stronger outward orientation. To quote Pemberton:

> "the high group is not particularly interested in broad implications and conceptualization. They state that they are interested in "doing, not theorizing", they do not like to plan on a large scale or try to get the overall picture of a problem on which they are working" (p. 168).

In addition, Pemberton found that sociability, self-confidence and quick reactivity in temperament were "linked" to high speed of closure in perception.

b. Extensiveness of Scanning

This construct, like speed of closure, has been somewhat reformulated since first investigated by Schlesinger (1954) and developed by workers from the Menninger Clinic (see particularly Holzman and Klein, 1956; Holzman, 1957; Klein, 1958; Gardner, 1959; and Holzman, 1966). Royce (1973) summarizes their findings:

> "Extensiveness of scanning (Gardner et al., 1959; Gardner and Moriarty, 1968) refers to the broad and intensive deployment of attention over stimilus fields. Extensive scanners are characterized not only by intense concentration on the central task, but they also possess a wide ranging peripheral sensitivity which renders many aspects of the field available to conscious

recall. Modal extensive scanners sample a large amount of information before commitment to a response. They seem preoccupied with veridicality, exactness, and the adequacy of their response, and perhaps control over impulses'' (p. 334).

Scanners are less susceptible to illusions (e.g., Gardner and Long, 1960a, b; Gardner, 1961) and more accurate on a variety of size estimation tasks (e.g., Gardner, 1959; Gardner and Long, 1962a, b).

As with field articulation, the ''cognitive control'' dealt with in Part 1, extensiveness of scanning has been the subject of many interesting experiments, far more than can be intimated here. Scanners, for example, have been shown to be more myopic (Klein, 1958), and have exhibited more incidental recall with some aspects of the Muller-Lyer illusion (Holzman, 1966).

Extensiveness of scanning has apparently been under factorial scrutiny only thrice, but has appeared all three times (Gardner et al., 1959; Gardner and Moriarty, 1968). Typically, it is marked by size estimation variables, illusion effects and Stroop color word test variables.

No study known to the present writers has investigated scanning in relation to perceptual or other cognitive abilities.[6] It is suggested that slower speed of closure and less ability at inductive reasoning are indicative of extensive scanning. The extensive scanner, by this analysis, does not quickly form configurations from unorganized perceptual arrays, but rather explores the arrays more thoroughly for their particulars. Similarly, he would not quickly form inductive generalizations, but considers and reconsiders other alternatives, taking in more aspects and possibilities of the data array.

There are some broad hints of temperamental manifestations of extensive scanning, in accord with Freud's (1926) theory of the defense mechanism of isolation, particularly in the obsessional or compulsive character pattern (see Holzman and Klein, 1957; Gardner et al., 1960; Benfari, 1966a, b).

For example, Schlesinger's (1954) item analysis of a self-evaluative inventory showed that

''the nonfocusers (i.e. less extensive scanners) clearly described themselves as ''emotional'' people who are aware of

their feelings, who relate themselves to others freely, and who easily become emotionally involved with others. The focusers, on the other hand, described themselves largely in negative terms on these items by indicating that they do not apply to them'' (p. 369).

Similarly, Pemberton (1952b) described high $\underline{C}_s$ scorers in terms of greater emotionality, sympathy, affection and sociability.

Klein (1958) suggests that many traits may be a result of ''secondary adaptation'' to a cognitive control such as extensive scanning. Thus, he suggests, scanners become more doubtful, uncertain, mistrusting as an adaptation to their ''hard cold look'' attitude.

Another, more broad, temperamental aspect of scanning appears in studies by Gardner and Long (1962a, b) in which extensiveness of scanning was related both to ratings of ''generalized delay'' from Rorschach test protocols and to the inhibition of irrelevant motoric responses in the (Stroop) color-word test. Thus, they suggest that some form of ''inhibition'' may underlie differential scanning behaviors. Indeed, Cattell and his associates have isolated a factor of inhibition which appears to be very relevant in explaining individual differences in extensiveness of scanning.

c. Inhibition

However one feels about the relation of extensiveness of scanning to speed of closure -- the relation suggested being that extensive scanning and delay of perceptual closure are linked -- there is more compelling evidence that $\underline{C}_s$ and Cattell's objective test factor U. I. 17 (Inhibition) are closely related.

Until 1965, U. I. 17 was identified in thirteen factor analytic studies with adults and three studies with children (Hundleby, Pawlik, and Cattell, 1965, p. 144). Typical markers for high Inhibition (from Cattell and Warburton, 1967) are greater GSR deflection to threat, less questionable reading preferences, more threatening objects seen in unstructured drawings, and higher basal metabolic rate and involuntary muscle tension.

Although some variables prima facie measure various aspects of fearfulness or timidity, markers for U. I. 17 are taken to indicate a more general source trait of "inhibitedness". Cattell and his co-workers suggest "inhibitability--i.e.: the ability or tendency to react by inhibiting overt behavior-- would be a more correct term (Hundleby, Pawlik, and Cattell, 1965, p. 147)." The markers do not indicate sheer slowness of performance: simple reaction time, speed of routine performances, etc. do not load, and relative accuracy and quality of performance is not affected. Cattell expects both genetic and environmental ontogenetic factors in U. I. 17, the former being "reactivity of the sympathetic system to threat (Cattell, 1957, p. 240)," and the latter being an internalization of cultural values and standards in a restraining early home situation (Hundleby, Pawlik, and Cattell, 1957, p. 150). Silverman (1964) had a similar suggestion for the ontogenesis of scanning, while both Frenkel-Brunswik (1949) and Pemberton (1952b) associated these situational determinants to speed of closure.

Studies have been consistent in showing a steady increase in U. I. 17 (Inhibition) over age and a substantial hereditary determination, both facts practically identical to U. I. 19 and field articulation, previously discussed, except that U. I. 17 rises more rapidly in adolescence while the latter are seen to level off at age 10 or 11 (Witkin et al., 1962, p. 380; Hundleby, Pawlik, and Cattell, 1965, p. 166).

This interpretation is reinforced by the relations of U.I. 17 to questionnaire factors, primarily with H - (Threctia, the degree of constitutional susceptibility to threat), and F- (Desurgency, the actual degree of life experience of inhibiting influences) (see Cattell, 1957; and Gorsuch and Cattell, 1967). However, the evidence for questionnaire correlates of U. I. 17 is generally quite disappointing (e.g., Hundleby, Pawlik and Cattell, 1965, Table 73, p. 151), as one might expect with the self-evaluation of a covert trait such as inhibitedness.

Cattell (1971, p. 361f.) clearly suggests that slow speed of closure is embraced by the more general factor of timid Inhibition, U. I. 17, extending far beyond perception. Taken together, the research supports this contention. Parallel to the analytic-rational-independent stylistic nexus in Part 1, a style

characterized by a concern for empirical veridicality rather than internal consistency is suggested. This putative style is indicated by slow inductive synthesis, careful generalization and extrapolation, extensive and intensive perceptual scanning, and high temperamental inhibitedness.

Part 3. Ideational Fluency, U. I. 21 (Exuberance), and Creativity

a. Ideational Fluency (and other fluency factors)

Compared to those factors that have already been discussed, the fluency factors have a simple history. Since word fluency (W) was first formulated by Thurstone (1938) as a primary mental ability, a number of fluency factors have evolved to lesser degrees of stability. Associational fluency (F_a) is quite distinct: it involves producing particular words for specific requirements of meaning, i.e., quality rather than quantity of word production. Ideational fluency (F_i) is the psychological equivalent of W at the level of ideas, i.e., rapid production of ideas fitting a given specification. Expressional fluency (F_e) involves finding the suitable verbal expression. There is overlap, of course, between these factors, particularly F_a and F_e, but while W and F_a appear to be relatively pure ability factors (based, perhaps, on accumulated specific verbal learnings), both F_i and F_e appear to have broader manifestations (see Pawlik, 1966). Since F_i is more clearly identified and (present evidence indicates) has broader implications, it will be studied here.

The fluency factors have orectic correlates, as one certainly would expect. Pemberton (1952b) found that "people scoring high on word fluency rated themselves as socially outgoing, energetic, implusive, expansive, generous and unsystematic (p. 174)". Pemberton recognized that these surface characteristics in self-evaluation are represented by Cattell's F (Surgency) factor from questionnaires (cf. the description of F_+ as enthusiastic, heedless, happy-go-lucky, talkative, cheerful, frank, expressive, reflecting group values, quick,

and alert given by Cattell, Eber and Tatsuoka, 1971, p. 87). Pawlik (1966) and Horn (1974) have also pointed out the evidence that F_e and Cattell's F are related.

b. Creativity

No "cognitive control" or "cognitive style" appears to have been found as a further "link" between fluency and the temperament traits mentioned below. However, it is evident, as Horn (1974) points out, that the fluency factors mentioned directly above (particularly F_i and F_e) are indicants or components of creativity.

Horn (1974) also points out that the same kinds of self-ratings and ratings by others that correlate with fluency measures also correlate with criterion judgments of creativity and measures of creativity based upon life works (Barron, 1957; Cattell and Drevdahl, 1955: Drevdahl and Cattell, 1958; Reid, King, and Wickwire, 1959). Indeed, variables particularly related to F_i and F_e and also to variously assessed creativity have been very prominent objective test markers for Cattell's U. I. 21 (Exuberance).

c. Exuberance

U. I. 21 (Exuberance) has been identified in more than 10 studies with adults and four with children. Typical markers are greater verbal fluency on topics, more objects drawn in drawing completion, more hidden objects seen, better immediate memory and faster speed of judgment. Obviously, the pattern includes fluency measures, particularly for F_i. Cattell (1957) suggested that, "it is a kind of mental power (output overtime) -- seemingly not merely lack of restraint--that should have wide consequences. It represents some kind of energy and impetuousness present in people who succeed in a life of action (but evidently not academically!)-- as a Churchill or a John Paul Jones -- more than others of the same intelligence (p. 248)." The major hypothesis has been that U. I. 21+ is a form of nervous energy, perhaps "tied closely to high general activity of the central nervous system, sensitivity of the sympathetic nervous system, and in particular to metabo-

lic rate'' that is modified by the family with age (Hundleby, Pawlik, and Cattell, 1965, p. 193). It has appreciable constitutional determination, but declines steadily with age (see Meredith, 1966).

Exuberance correlates with F, surgency, in the questionnaire domain. The self-evaluative characterization of the high U. I. 21+ individual therefore includes enthusiasm, energy, dominance, and excitability, traits often associated with high ideational fluency.

In this section, it is briefly suggested that there is a third stylistic nexus identifiable from relationships between cognitive and temperamental traits. Rather than ultimately involving an epistemological concern for rational consistency (cf. Part 1) or empirical veridicality (cf.Part 2), this nexus of energetic creativity and temperamental exuberance may be represented in an epistemological orientation towards analogies and metaphors. Thus, Royce's (1974) ''epistemic styles'' (rationalism, empiricism, and metaphorism) appear to represent larger dimensions revealed in the stylistic relationships of cognitive abilities and temperamental traits.

Summary and Conclusion

In Part 1, the perceptual ability, flexibility of closure is linked with the temperament trait of Independence (U. I. 19) and the cognitive style, ''field articulation''. Persons' ability to find figures in embedding contexts, their ability to reason through problems or justify solutions, and their relatively more dominant, aloof, distant, imaginative temperament are linked by the suggestion that these traits all represent a relatively analytic, rational, independent style, an adaptive strategy comparable to a defense mechanism.

In part 2, the perceptual ability, speed of closure is linked with the temperament trait of Inhibition (U. I. 17) and the cognitive control ''extensiveness of scanning''. Persons' proclivity to slowly form figures out of embedding contexts, their slowness in inducing solutions or discovering certain facts in the presence of other possibilities, and their relatively more controlled, ''thinking-before-acting'', dispassionate, doubtful temperament are linked by the suggestion that these traits all represent a relatively broad attentiveness and intensive, con-

centrating and exacting attitude towards the world. This is characterized here by a relatively serious, intense, inhibited style, which appears to extend into the defense mechanism of isolation (with obsessions and compulsive behaviors).

In part 3, various fluency factors are linked with the temperamental trait Exuberance (U. I. 21). Persons' greater production of appropriate ideas or appropriate verbal expressions for ideas (ideational and expressional fluency, respectively) and their relatively more expansive, confident, optimistic, surgent, energetic, enthusiastic, and alert disposition are linked by the suggestion that these traits all represent a relatively "exuberant" temperamental trait.

Underlying these three cognitive-temperamental styles, distinct epistemic orientations are suggested; namely, rationalism, empiricism, and metaphorism respectively.

It was the purpose of the foregoing patchwork-like review to show how prima facie divergent laboratories conceal strong substantive and theoretical similarities under their methodological differences. These similarities can only be revealed through more broad-based multivariate work (e.g., Gardner et al., 1960). As recent reviews of the vast literature on "cognitive styles" point out (e.g., Klein et al., 1967; Wiggins, 1968), there is a vital need for multivariate work to alleviate the "instrument-bound" restrictions of much conventional personality theoretic research. Past efforts to uncover structural associations among personality traits and to establish the nature of those associations in terms of "styles" of functioning, with few exceptions (e.g., French, 1965), have been quite "instrument bound" and therefore necessarily somewhat superficial (see Wardell, 1974).

Cattell has long insisted that research must avoid these pitfalls. For example, with regard to part 1 of this paper, he states:

> "(T)he study that really needs to be done is one administering, say, two or more Witkin tests; at least a six-subtest O-A Battery for U. I. 19; and the 16 P. F. The hypothesis would be that the first two, and the A-, E-, M-, N-, Q_1-, and Q_2- primaries from the 16 PF marking QIV will appear on the same factor. The other P.F. primaries and any other unrelated tests selected are to constitute hyperplane stuff. The question can then be

asked whether the Witkin tests demonstrate a distinct factor or are wholly absorbed into U.I. 19 as was Thurstone's early demonstrated set of variables for this pattern. Then we may ask, if the first seems to occur, whether the extra variance is simply a non-personality perceptual instrument factor... or whether, indeed, perceptual independence is not a redundant concept..." (1969, p. 866).

A more complete statement on the theoretical relationships between styles and well-established factors in the cognitive and affective domains is in progress.

Footnotes

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2. Written while the first author was partially supported by Canada Council Doctoral Fellowship W72-5944.
3. As Pawlik (1966) shows, there has been considerable dispute about the identification of R (Reasoning) relative to Inductive and Deductive reasoning. Various identifications of these factors are still in doubt.
4. The intercorrelations are about .30-.40, not high enough for direct interchangeability of measures, but grounds for a stable factor structure (see Arbuthnot, 1972).
5. Although Gardner et al. find very small correlations between tests of field articulation and tests of reasoning abilities, their factors of field articulation (Factor I) and reasoning (Factor III reflected and probably Factor IV) correlate about .50 (see their Table 22).
6 Unlike some measures of field articulation (see Jackson, 1957; Elliot, 1961), scanning tests do not appear to be related to conventional intelligence measures (e.g., Holzman, 1966). Scanning was not included in Gardner et al.'s (1960) classic study of this problem

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