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ABSTRACT

The historical roots of cognitive styles are traced in differential psychology, psychoanalytic ego psychology, gestalt and cognitive-developmental psychology to illuminate the varied theoretical issues that energize (and fragment) style research. Optimal measurement of cognitive styles as information-processing regularities and as intra-individual contrasts of abilities or other attributes is discussed in terms of both typical performance and contrasted performance on measures of opposing ends of bipolar style dimensions, with special emphasis on the contrasted measurement of field independence versus field dependence. The role of styles as both performance variables and competence variables in learning and teaching is examined, as are various critiques of style research that appear to be excessively polarized in either supporting or undercutting styles as meaningful constructs. This polarization appears to reflect different stances not just with respect to scientific evidence but with respect to ideology. Concluding remarks broach the issue of how styles are organized, not just within an information-processing framework, but within the structure of personality. (Contains 1 figure and 128 references.) (Author)

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ABSTRACT

The historical roots of cognitive styles are traced in differential psychology, psychoanalytic ego psychology, gestalt and cognitive-developmental psychology to illuminate the varied theoretical issues that energize (and fragment) style research. Optimal measurement of cognitive styles as information-processing regularities and as intraindividual contrasts of abilities or other attributes is discussed in terms of both typical performance and contrasted performance on measures of opposing ends of bipolar style dimensions, with special emphasis on the contrasted measurement of field independence versus field dependence. The role of styles as both performance variables and competence variables in learning and teaching is examined, as are various critiques of style research that appear to be excessively polarized in either supporting or undercutting styles as meaningful constructs. This polarization appears to reflect different stances not just with respect to scientific evidence but with respect to ideology. Concluding remarks broach the issue of how styles are organized, not just within an information-processing framework but within the structure of personality.

THE MATTER OF STYLE: MANIFESTATIONS OF PERSONALITY IN COGNITION, LEARNING, AND TEACHING[1]

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All human activity displays both substance and style. However, because each act is intrinsically integral, these two aspects may be separated only by means of somewhat arbitrary, if not artificial, distinctions. Nonetheless, this separation is fundamental in psychology because an individual's style of functioning creates a force field affecting both the interpretation of substantive processes and the appraisal of performance levels. This follows from Allport's (1961) dictum that style reflects "the oblique mirroring of personal traits" (p. 462). These personality attributes sometimes extend and enhance the substantive or content aspects of performance and sometimes distort and interfere with substantive functioning, depending on the nature and intensity of the personality characteristics operative stylistically.

The basic distinction between substance and style contrasts the *content* and *level* of performance -- the questions of What? and How much? -- with the *manner* or *form* of performance -- the question of How? Emphasis on performance levels in particular content areas has led to the delineation of psychological dimensions or traits largely in content terms, such as numerical ability,

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This address is dedicated in memory of four mentors and colleagues who taught me, each from his own vantage point -- that is, respectively, from developmental, biosocial, affective, and stylistic perspectives -- that one studies cognition apart from personality only at one's peril: Joseph McVicker Hunt, Gardner Murphy, Silvan Tomkins, and Herman Witkin.

scientific interests, consumer attitudes, religious beliefs, economic values, need for achievement, authoritarianism, and hypochondriasis. Emphasis on the manner or mode of performance has led to the delineation of traits largely in stylistic terms, such as fluency, flexibility, preference for complexity, need for variety, introversion, impulsivity, dogmatism, and paranoia.

In addition to such traits characterized primarily in terms of their salient stylistic features, a number of dimensions have been conceptualized as *being* styles in a more fundamental sense. These styles are self-consistent regularities in the manner or form of human activity, which implies that to some extent styles are both integrative and pervasive. Because these personal styles refer to consistencies in the *way* psychological substance is processed rather than to consistencies in the substance itself, they may entail mechanisms for the organization and control of processes that cut across substantive areas (Messick, 1987). Several kinds of styles have been distinguished, including expressive styles, response styles, cognitive styles, learning styles, and defensive styles.

Expressive styles are individual consistencies in facial, gestural, motoric, vocal, or graphic expression, such as speed, tempo, and constriction versus expansiveness (Allport, 1961; Allport & Vernon, 1933; Ekman & Oster, 1979). Response styles operate in self-perception and self-report, such as the tendencies to be acquiescent, critical, extreme, self-deceptive, or other-deceptive in self-presentation (Block, 1965; Messick, 1968, 1991; Paulhus, 1984, 1986). Cognitive styles are individual consistencies in perception, memory, thinking, and judgment, such as field independence versus field dependence and reflection versus impulsivity (Kogan, 1983; Globerson & Zelniker, 1989; Messick, 1984). Learning styles are consistent orientations toward learning and studying, such as comprehension- versus operation-learning and deep- versus shallow-processing styles (Entwistle, 1981; Schmeck, 1988).

Defensive styles are consistent modes of accommodating anxiety and conflict so as to maintain reasonably adaptive cognitive functioning. Although identified in pathology as obsessive-compulsive, hysterical, paranoid, and impulsive neurotic styles, they represent less extreme pathognomonic trends having consequences for cognition within the normal range of personality. Specifically, obsessive-compulsive style is associated with rigid cognition, hysterical style with impressionistic cognition, paranoid

style with suspicious cognition, and impulsive style with unintegrated cognition (Messick, 1987; Shapiro, 1965).

From this point forward, the main emphasis is on cognitive styles and the closely related concept of learning styles. The focus of cognitive styles is on the organization and control of cognitive processes while that of learning styles is on the organization and control of strategies for learning and knowledge acquisition. Although defensive styles are not discussed explicitly, the issue that defensive styles address is recognized as a perennial problem, namely, the organization and control of affect in cognition. This issue remains a persistent prod toward a more integrated treatment of personal styles, indeed, toward a more integrated treatment of cognition and personality.

First, we will consider the various research traditions contributing to the conception of cognitive style and examine some of the salient styles and research issues stemming from each tradition. Next, we will review some research-based refinements in cognitive-style constructs and measures, pointing to the need for a more unified approach to cognitive-style assessment. Finally, the sheer number and variety of cognitive-style dimensions, along with learning and teaching styles that are also briefly discussed, call for both empirical and theoretical integration, not just within an information-processing framework but within the organization of personality.

HISTORICAL ROOTS AND CHANGING CONCEPTIONS OF COGNITIVE STYLE

Cognitive styles are usually conceptualized as characteristic modes of perceiving, remembering, thinking, problem solving, and decision making, reflective of information-processing regularities that develop in congenial ways around underlying personality trends. They are inferred from consistent individual differences in ways of organizing and processing information and experience (Messick, 1984). To the extent that cognitive styles display generality in the organization and control of attention, impulse, thought, and behavior, they bridge cognitive, affective, and social domains of functioning. As an instance, the field-independent person is characterized as analytic, self-referent, and impersonal in orientation and the field-dependent person as

global, socially sensitive, and interpersonal in orientation (Witkin & Goodenough, 1981).

The idea that different individuals have contrasting personalities that differentially influence their modes of cognition and behavioral expression can be traced to ancient classifications of temperament and physique as well as to early 20th-century european notions of type (Vernon, 1973). More recently, three major research traditions have contributed directly to work on cognitive styles.

Perceptual Factors As Precursors of Cognitive Styles

The first was differential psychology, especially the factor analysis of perceptual task performance, as exemplified by the studies of Thurstone and Cattell, both of whom uncovered factorial dimensions similar to field independence. Indeed, the first succinct formulation of the cognitive-style thesis was provided by Thurstone (1944): "The attitudes which the subject adopts spontaneously in making the perceptual judgments in these experiments reflect in some way the parameters that characterize him as a person" (p. 6).

Thurstone (1944) identified two such "perceptual attitudes:" One called ***speed and strength of closure*** involved the structuring of incomplete or unorganized stimulus arrays by synthesizing discrete visual elements into a meaningful pattern; the other called ***flexibility of closure*** involved the breaking up of one closure in order to form another, as in locating a simple figure embedded in a complex design. With respect to their personality correlates, the overall pattern is quite similar to Witkin's portrayal of field-independent and field-dependent persons, those high in flexibility of closure being analytical and socially retiring while those high in speed of closure are sociable and nontheoretical (Pemberton, 1952).

Dimensions such as the closure factors that reflect aspects of both competence and personality have been referred to as stylistic abilities (Messick, 1984) and as ability-personality blends (Cattell, 1971; Messick 1987). In this regard, Frenkel-Brunswik (1949) mentioned speed of closure as potentially relevant to her concept of intolerance of ambiguity as a perceptual and emotional variable. In this context, however, it seems clear that one must distinguish quick closure in terms of fast correct responses from premature closure in terms of fast incorrect responses and from poor

closure in terms of slow incorrect or no responses (Messick & Hills, 1960). Similar distinctions will be introduced in connection with the cognitive style of reflection versus impulsivity.

Klein also referred to Thurstone's closure factors as potential controlling variables in balancing environmental requirements with internal needs (Klein & Schlesinger, 1949). Klein's concern about controlling variables was in the context of the so-called "New Look in Perception," which stressed the influence of needs and values on perceptual organization and perceptual learning (Blake & Ramsey, 1951). Gardner Murphy once captured the spirit of the New Look by proclaiming that each person sees the world through his or her own rose-colored glasses. But Klein's (1954) point was more subtle: He maintained that needs and values do not influence perception directly but, rather, as mediated by intervening personality structures or controlling variables.

Another point about Thurstone's closure factors is that the salient analytic versus synthetic quality of flexibility versus speed of closure has been suggested as a means of anchoring a basic analytic versus synthetic dimension thought to underlie field independence versus field dependence and other cognitive styles (Missler, 1986). However, this notion is complicated by the fact that measures of flexibility and speed of closure tend to correlate positively, not negatively with each other. We will return to this point later.

Cognitive Control As Stylistic Ego Adaptation

The second research tradition, following Klein's lead as well as David Rapaport's (1959), was psychoanalytic ego psychology. In this theoretical framework, stylistic dimensions were conceived as developmentally stabilized structures underlying ego adaptation to the environment, that is, serving to bring into harmony and maintain equilibrium between inner feelings and impulses on the one hand and the demands of reality on the other (Gardner, Holzman, Klein, Linton, & Spence, 1959; Klein & Schlesinger, 1949). Within this tradition, Thurstone's notion of "perceptual attitudes" was generalized first to "cognitive attitudes" and then to "cognitive controls," which are adaptive regulatory mechanisms for coping with both environmental demands and internal strivings. Concern with balancing external requirements with

internal states incorporates some of the functions of defensive styles. This suggests that cognitive controls and defense mechanisms are intertwined in the coping process, the former regulating cognitive processes in adaptation and the latter protecting those processes from affective disruption (Messick, 1987).

The still more general term "cognitive style," which stresses organizing as well as controlling functions, was first used by Riley Gardner (1953) in studying the control processes of equivalence range or ***breadth of categorization***. This cognitive control refers to consistent preferences for broad inclusiveness as opposed to narrow exclusiveness in establishing the acceptable range for specified categories (Fillenbaum, 1959; Pettigrew, 1958). The narrow categorizer is thought to be conceptually conservative and the broad categorizer more tolerant of deviant instances (Bruner & Tajfel, 1961; Wallach & Caron, 1959). Gardner subsequently distinguished category breadth from ***conceptual differentiation***. The latter entails the tendency to categorize perceived similarities and differences among stimuli in terms of multiple differentiated concepts or dimensions, as in generating many categories in free object-sorting tasks (Gardner & Schoen, 1962). Conceptual differentiation refers to the relative multiplicity of distinctions a person makes among concepts, while category width refers to the perceived or preferred extent of a single concept's range of reference.

Other stylistic dimensions delineated in the ego psychology tradition include ***leveling versus sharpening***, which is the tendency to minimize as opposed to exaggerate stimulus differences in memory (Holzman & Gardner, 1959, 1960; Holzman & Rousey, 1971), and ***scanning versus focussing***. Later work has demonstrated that attentional scanning comprises two bipolar second-order factors: One contrasts sharp-focus versus broad-focus scanning; the other is a dimension of signal versus information scanning that is reflective of serial versus parallel processing (Messick, 1989a, 1993). Furthermore, these scanning styles were organized differently in males and females, such gender differences in the structure of intercorrelations being not uncommon in the literature of cognitive styles (Gardner et al., 1959; Kogan, 1983; Vernon, 1973). All but one of the contributing first-order scanning factors for females cut across both perception and memory, whereas for males there were

separate first-order factors for scanning external perceptual fields and internal memory fields, mediated by the isolation of affect (Messick, 1989a).

Given multiple dimensions of cognitive control, Klein (1958) suggested that cognitive style might be better conceptualized as an individual's unique profile across these dimensions. Thus, in the research tradition stemming from psychoanalytic ego psychology, cognitive style becomes "a *pattern* of highly mobile, unconscious, discrete cognitive operations that perceive, construe, coordinate, and equilibrate information from both the external environment and the personal world of fantasy and emotions" (Santostefano, 1991, p. 284). Given multiple second-order factors across control dimensions, however, cognitive styles might rather be considered to correspond to these second-order constructs.

Style in Coping with Field Effects and in Developing Conceptual Systems

The third research tradition contributing to cognitive styles was the experimental psychology of cognition, including (but not limited to) an emphasis on regularities in information processing. Within cognitive psychology, the Gestalt movement's focus on issues of form in cognition was particularly influential. It led cognitive-style theorists in general and Herman Witkin in particular, who worked with both Köhler and Wertheimer, to view individual consistencies in the manner or form of perceiving and thinking as critical psychological phenomena (Messick, 1980, 1986).

Specifically, Witkin was struck by the wide range and consistency of individual differences on tasks in which compelling Gestalt field effects were misleading with respect to task demands, as in the Rod-and-Frame Test (RFT) and the Body-Adjustment Test (BAT). In the former, a luminous rod surrounded by a luminous tilted frame is to be set to the true vertical in an otherwise darkened room, and in the latter one's own body is to be set vertical while seated in a tilted room. Individuals highly reliant on visual cues, which here are misleading, did poorly on these tests and were labeled ***field dependent***; individuals less reliant on visual cues and more reliant on gravitational or vestibular cues did well and were labeled ***field independent***.

This construct became elaborated over the years in response to expanding evidence. When the Embedded Figures Test (EFT) was found to correlate substantially with both RFT and BAT, emphasis shifted from field versus body

orientation to overcoming an embedding context. When intellective tasks such as block design and picture arrangement were incorporated into the correlation cluster, analysis and structuring were viewed as complementary aspects of field articulation and the dimension was now described as articulated versus global field approach. When relationships were extended to such diverse areas as body concept, self concept, defense mechanisms, and pathological symptoms the construct was again expanded to subsume individual differences in degree of psychological differentiation.

In Witkin's final version, the emphasis is on autonomy as opposed to reliance on external information sources (as indexed by RFT). Field independence versus field dependence becomes a bipolar dimension of cognitive restructuring skills (indexed by EFT) versus interpersonal competencies, the former associated with greater autonomy and the latter with greater reliance on external referents. Because each stylistic pole now has positive features under different circumstances, the dimension is value-neutral or, rather, value differentiated as opposed to value directional. Although the two contrasting sets of restructuring and interpersonal skills are negatively correlated, the magnitude is deemed to be sufficiently low that some individuals in the middle of the distribution might exhibit characteristics of both poles and be able to change behavior to adapt to different conditions. Such individuals are described as being ***mobile*** as opposed to ***fixed*** in their cognitive style (Witkin & Goodenough, 1981). Wapner (1976) has suggested that individuals are characterized not by a point on this continuum, but by a range. Persons with a broader range might be mobile in their manifest behavior depending on the environmental context.

Another line within the cognitive research tradition -- namely, cognitive-developmental psychology -- also provided fertile ground for cognitive styles. Prominent stylistic constructs from this line include ***conceptualizing styles*** and ***reflection versus impulsivity*** stemming from the work of Kagan and his associates as well as ***cognitive complexity versus simplicity*** deriving from the conceptual systems theory of Harvey, Hunt, and Schroder (1961). The latter style also owes much to George Kelly's (1955) personal construct theory in both conception and measurement (Messick & Kogan, 1966; Miller, 1978).

Styles of conceptualization are differential tendencies to form concepts in terms of thematic or functional relations among stimuli as opposed to analysis of descriptive attributes or the inference of class membership. The emergence of these three conceptual modes is developmentally ordered in the sequence just given, but they remain as alternatives in the individual's cognitive repertoire and are differentially expressed as preferred conceptual styles (Kagan, Moss, & Sigel, 1963; Kogan 1976; Wallach & Kogan, 1965).

Reflection versus impulsivity, which is also referred to as cognitive tempo, involves individual consistencies in the speed and accuracy with which alternative hypotheses are formulated and information processed under conditions of uncertainty. Impulsive individuals tend to respond quickly with the first seemingly reasonable answer, while reflective individuals tend to evaluate various possibilities before deciding. The typical assessment task requires the matching of a standard figure to one of a number of alternatives that vary in fine detail (Kagan, Rosman, Day, Albert, & Phillips, 1964; Kogan, 1983).

One theory, that of Zelniker and Jeffrey (1976, 1979), holds that reflective individuals tend to analyze stimuli into component features whereas impulsives treat the stimulus as a whole. Consequently, reflectives should excel on tasks requiring attention to detail, while impulsives should perform better on tasks amenable to a global approach such as template matching. Indeed, reflectives were found to perform significantly better than impulsives on detail items, but the relationship was asymmetrical for global items, on which impulsives exhibited a small but nonsignificant advantage. Another theory, due to Kemler Nelson and Smith (1989), maintains that impulsives are not only holistic but also less strategically oriented and less resource-intensive in using their cognitive repertoire in information processing. In this view, impulsives are not nonstrategic and fast because they are holistic but, rather, are holistic and fast because they are nonstrategic.

Cognitive complexity versus simplicity refers to individual differences in the tendency to construe the world, particularly the world of social behavior, in a multidimensional and discriminating way. A complex individual's conceptual system is highly ***differentiated*** (consisting of a large number of distinct dimensions or concepts), finely ***articulated*** (each dimension capable of discriminating the strength or magnitude of varied instances or

stimuli), and flexibly *integrated* (the dimensions being multiply interrelated and amenable to the formation of alternative perspectives or configurations) (Bieri, Atkins, Briar, Leaman, Miller, & Tripodi, 1966; Harvey, Hunt, & Schroder, 1961; Messick & Kogan, 1966; Miller, 1978). The differentiation aspect of cognitive complexity is tantamount to conceptual differentiation as delineated by Gardner (Gardner & Schoen, 1962) and is an instance of a cognitive control being incorporated into a broader cognitive style.

Legacies of Diverse Roots

With three distinct research traditions contributing to the conceptualization and measurement of cognitive styles, it is no wonder that style research often appears fragmented and disorganized. Key theoretical issues that might help organize the research arise naturally but differently within each tradition. For differential psychology, a salient issue is the distinction between cognitive styles and intellective abilities as well as the nature of their interrelationships. For psychoanalytic ego psychology, it is the relation of styles or cognitive controls to other ego structures such as defense mechanisms and to motivational dynamics. For gestalt psychology, it is stylistic consistency across perceptual tasks having misleading field effects. For cognitive-developmental psychology, it is the disentangling of style as a performance variable from developing competence as well as ascertaining the developmental sources and interplay of competence and style. Only gradually have these issues come to cut across research lines. Indeed, only Witkin through his differentiation theory has treated all of them in systematic fashion, although Riley Gardner at one time or another has also been concerned with each (e.g., Gardner et al., 1959; Gardner, Jackson, & Messick, 1960; Gardner, 1961; Gardner & Moriarty, 1968).

Another legacy of these rich but diverse historical roots is inconsistency in both theorizing and measurement. One consequence of the richness is that cognitive styles are generally conceived as being multifaceted in their behavioral expression and dynamic in their interplay with situational and task requirements. However, a consequence of diverse roots is that different investigators often emphasize different facets in their theorizing and stress different "criterion" features in their measurement. This has led to numerous critiques that have been both

constructive and deconstructive, sometimes being so extreme as to suggest an ideological rather than a scientific basis. We will next consider various research-based refinements in cognitive-style constructs and measures, emphasizing the need for contrasted measurement of both poles of a style. Then we will examine the possible ideological basis of extreme one-sided positions, either supporting or undercutting cognitive styles as meaningful constructs, in contrast to more balanced constructive criticism.

REFINING CONSTRUCTS AND MEASURES OF COGNITIVE STYLES

Over the years, cognitive styles have been characterized in a number of distinct but overlapping ways (Messick, 1984). One way, as has been seen, is to view cognitive styles as self-consistent characteristic modes of cognition. Another way treats them as individual differences in structural properties of the cognitive system itself, an instance being cognitive complexity versus simplicity. Another view conceives of styles as consistent intraindividual contrasts of abilities or cognitive controls, as in Witkin's final version of field independence highlighting restructuring versus interpersonal skills or Hudson's (1966) converging versus diverging styles of thinking. Still other conceptions define cognitive styles as enduring preferences for different ways of conceptualizing and organizing the stimulus world; as preferred or habitual decision-making strategies; or, as differential preference (or facility) for processing different forms of information. A good way to capture the core of these overlapping notions is to contrast cognitive styles with intellective abilities and cognitive strategies.

Styles as Compared With Abilities and Strategies

To begin with, abilities are competencies or enabling variables whereas styles are propensities or performance variables. Moreover, abilities are unipolar and value directional, that is, high amounts of ability are always preferable to low amounts and are uniformly more adaptive. Some cognitive controls are also unipolar, such as conceptual differentiation, as well as being value directional, as in constricted versus flexible control (Messick, 1984). In contrast, cognitive styles are typically bipolar and value differentiated, that is, each pole of a style dimension has different adaptive

implications. Furthermore, an ability is usually limited to a particular domain of content or function, such as verbal or memory abilities, whereas a cognitive style cuts across domains of ability, personality, and interpersonal behavior. Cognitive strategies refer to conscious decisions among alternative approaches as a function of task requirements and situational constraints. In contrast, cognitive styles are spontaneously invoked without awareness or choice in a wide variety of situations having similar information-processing requirements in the absence of personally compelling cues to act differently.

Styles and abilities can also be distinguished in terms of the optimal approach to their measurement. Optimal measurement of ability is in terms of ***maximal*** performance assessing how well individuals ***can*** perform at their best, with the emphasis on accuracy and correctness of response. Optimal measurement of style is in terms of ***typical*** or ***contrasted*** performance, with the emphasis on either customary or predominant processing mode. Inherent in the concept of typical performance is the notion that what an individual customarily does when the ability to do otherwise is presumable or demonstrable is a natural indicator of personal style. For example, because individuals presumably have the ability to use either broad or narrow categories in making perceptual judgments, the consistent tendency to utilize one or the other is interpreted in stylistic terms.

Styles as Intraindividual Contrasts

Inherent in the concept of contrasted measurement is the notion that stylistic propensities may be inferred from asymmetries in performance on measures of both poles of a style dimension, even if the measures are of the maximal performance variety. Such asymmetries in performance yield an ipsative or intraindividual pattern indicating the relative strength of one tendency or ability vis-à-vis another in the individual's cognitive repertoire. Indeed, this type of intraindividual contrast was earlier proposed by Broverman (1960a, 1960b) as a fundamental approach to measuring cognitive styles. For example, through ipsative analysis, Broverman and Klaiber (1969) identified a style of ***automatization versus restructuring***, on which the automatized tendency to respond to obvious stimulus properties in simple repetitive tasks is dysfunctional on tasks where salient properties must be set aside or restructured to reach solution.

These ipsative or contrasted measures may be constructed in various ways, for example, by pitting one ability against another, as in convergent versus divergent thinking (Hudson, 1966, 1968); pitting one cognitive control against another, as in relational versus analytical conceptualizing (Wallach & Kogan, 1965); contrasting a cognitive control with an ability, as in compartmentalization versus spontaneous flexibility (Messick & Kogan, 1963); or, pitting one stylistic component against another, such as accuracy versus speed to assess reflection versus impulsivity (Salkind & Wright, 1977). Such constructed contrasts are typically derived by subtracting standard scores for one pole of the desired contrast from standard scores for the other pole. This method of creating a bipolar dimension statistically is applicable not only when the two poles correlate negatively, but also when they vary independently or even correlate somewhat positively -- provided, of course, that the polar scores are not so positively correlated that the reliability of the difference score is questionable. When a constructed contrast yields a reliable value-differentiated bipolarity, as in the instance of converging versus diverging, it usually qualifies as a cognitive style.

This ipsative or contrasted-measurement approach suggests that a cognitive style represents a relative balance in the alternative means by which an individual processes information and organizes experience, not the presence of one means and the absence of the other (Brodzinsky, 1985; Hudson, 1966, 1968). This implies that individuals in the middle of the distribution have both tendencies in their repertoire to varying degrees and may thus be mobile in Witkin's terms; only those at the extremes of the bipolar continuum would be relatively fixed in their cognitive styles. Another advantage of contrasted measurement is that individuals in the middle range who are high on both tendencies, and hence more likely to be mobile, may be readily discriminated from those who are low on both by computing the sum of standard scores in addition to the difference.

Because the sum and difference of standard scores correlate zero, this is tantamount to a rotation of axes to an orthogonal framework that involves a bipolar variable indicating the relative strength of opposing tendencies along with a composite variable indicating their combined strength. As an instance, with respect to converging versus diverging, Hudson (1966, 1968) used what amounts to the sum score to assess what he called ***labile thinkers*** or ***all-***

rounders. As another instance, the sum and difference of latency and error scores have been employed in the contrasted measurement of refection versus impulsivity to distinguish the quick correct responses of cognitively efficient individuals from the quick incorrect or premature responses of impulsives (Salkind & Wright, 1977), a problem alluded to earlier.

Disentangling Style and Ability in Field Independence

Because some cognitive styles are measured in terms of neither typical nor contrasted performance but rather in terms of maximal performance, they face a problem of disentangling style from ability as performance determinants. The prime instance in this regard is field independence versus field dependence, where measures such as EFT and RFT are of the maximal performance type and are all ostensibly oriented toward only one stylistic pole. Worse still, only one measure, usually EFT, serves to mark the dimension in many studies. Under such maximal performance conditions, analytical style cannot be distinguished from analytical ability nor can the global style of the field dependent be distinguished from low analytical ability. Hence, these measures of field independence confound ability with style, while field dependence is assessed, if at all, by default.

It is easy to slip from an acknowledgment that these measures confound ability with style to a claim that they are primarily ability measures. Indeed, the close relationship of the Embedded Figures Test to flexibility of closure has led some to argue that field independence is merely closure ability and not a cognitive style at all. This is ironic because, as we have seen, Thurstone (1944) and his students (Pemberton, 1952) were excited about the stylistic aura and personality correlates of this so-called ability.

We must also be careful not to confuse the EFT measure with the field-independence construct because its other measures have distinct properties and the construct refers to a convergence of these indicators. For example, as Witkin ultimately maintained, RFT appears to be more a reflection of reliance on external information sources or sensitivity to field effects than an indicator of restructuring skill, but the field-independence construct refers to both. In any event, the interplay of ability and style in field independence is complicated because the analytical (but not the verbal) aspects of intelligence have long been assimilated into the style construct,

especially as revealed in such measures as block design, picture arrangement, and picture completion (Witkin, Dyk, Faterson, Goodenough, & Karp, 1962).

The issue of value directionality of field independence. A promising way to rectify this one-directional maximal-performance measurement problem is to move to contrasted measurement pitting indicators of field independence against indicators of field dependence. From the perspective of Witkin's final version of his theory, the likely candidates for this would be restructuring skills versus interpersonal skills. However, although there is ample evidence that field-dependent persons are interpersonally oriented (Witkin & Goodenough, 1977, 1981), there is sparse evidence that they possess interpersonal *skill*.

For example, there is some indication that field-dependent persons have better incidental memory for faces (Messick & Damarin, 1964), but not all studies are consistent and field independent persons appear to have the advantage in directed memory for faces (Goodenough, 1976; Hoffman & Kagan, 1977). There is also some indication that field-dependent persons are more adept at conflict resolution and that this is not just due to compliance with others or opinion change (Oltman, Goodenough, Witkin, Freedman, & Friedman, 1975). On the other hand, field-independent persons were found to be more accurate in the discrimination of affective expressions and implied meanings (Wolitsky, 1973).

The most compelling evidence bearing on the presumed interpersonal competency of field dependents is embodied in the extensive longitudinal personality correlates reported by Kogan and Block (1991). In these data, there is no indication that the interpersonal orientation of field dependents yields effective interpersonal skill. On the contrary, field-dependent persons appear to "cope with their social world with a sense of anxious vulnerability" (p. 192), looking to others for cues to help deal with indecision and vacillation. On the other hand, although not their most salient characteristics, field-independent persons do exhibit social qualities that are "positive in tone and hardly suggestive of either indifference or ineptness in the interpersonal realm" (p. 192). Hence, pitting restructuring skills against interpersonal skills does not appear to be a promising approach to the contrasted measurement of field independence versus field dependence.

Nor does it seem fruitful to pit restructuring skills against measures of interpersonal orientation because of the positive social qualities attributed to field independents in these data.

One implication of these findings is that field independence versus field dependence no longer appears to be value differentiated but rather value directional, with positive value favoring the analytic field-independent pole over the global field-dependent pole. However, this might be an artifact of cultural nearsightedness. In his cross-cultural studies of indigenous cognition, Berry (1984, 1993) shows that in some groups holistic rather than analytic problem solving is culturally valued and that collective discussion, as opposed to individual reflection, is the preferred mode of judgment and decision making.

In any event, one should not generalize this value directionality to other cognitive styles. Indeed, Kogan (1973) has proposed a three-fold distinction among cognitive styles in terms of their value implications and relative reliance on maximal performance. Type I styles are assessed by maximal-performance measures emphasizing accuracy of response, with the implication that accuracy is uniformly valued. The prime example here appears to be field independence.

In Type II styles, the measurement cannot be characterized in terms of accuracy or correctness of performance but, nevertheless, value directionality is usually imposed on the stylistic dimension, as in cognitive complexity versus simplicity. Even here, however, the value imposition is equivocal: Cognitively simple individuals, being primed for consistencies and regularities in the environment, are more confident and discerning in processing consonant information; while cognitively complex individuals, being attuned to diversity, are more certain and effective in processing dissonant information (Bieri et al., 1966). There is also evidence that under some circumstances cognitive simplicity contributes to decisiveness of judgment, complexity to indecisiveness (Schroder, Driver, & Streufert, 1967). Part of the problem in this regard stems from the value implications of the short-hand construct labels that are used for convenience, without seeking evidence that the value implications and trait implications of the construct are commensurate (Messick, 1989b). Just think of how we would have been led

astray in a different way if this construct had been labeled cognitive complication or cognitive clutter versus cognitive clarity.

For Type III styles, accuracy of response is not an issue, nor is value directionality imposed on the stylistic dimension. An example here is broad versus narrow categorizing. It is also noteworthy, with reflectives shown to be effective detail processors and impulsives effective global processors, that Kogan (1983) concedes that a Type I style has been converted into a Type III style.

Field independence as restructuring skill versus sensitivity to field effects. We are still left, however, now that interpersonal skill has been ruled out as a likely component, with the problem of creating viable contrasted measurement for field independence versus field dependence. In this regard, some guidance may be obtained from Pascual-Leone's (1969, 1989) neo-Piagetian theory of constructive operators. In this theory, Pascual-Leone posits what he refers to as an F-factor for sensitivity to gestalt field effects. These field forces facilitate figure-ground organization for the individual as well as the synthesizing of stimulus features for object identification and categorization. Individuals with strong F-factors are highly sensitive to field effects.

Processes for overcoming field effects are also posited. These include what Pascual-Leone calls an excitatory M-process and an inhibitory I-process. The M-process mobilizes attentional energy to activate task relevant schemes, which are internal representations of task-relevant information. M-reserve is the maximum number of schemes a person is capable of activating at any one time, which is tantamount to working-memory capacity. The I-process is a mechanism for interrupting or actively inhibiting irrelevant or misleading schemes activated by field effects. The M- and I-processes together contribute to restructuring skills.

The notion here is that the Rod-and-Frame Test, as Witkin originally and ultimately maintained, measures sensitivity to figural field effects (or Pascual-Leone's F-factor), that is, relative reliance on external referents as opposed to internal vestibular cues. The Embedded Figures Test taps restructuring skills. As Missler (1986) put it, "the RFT measures only the degree of field effect . . ., the personality tendency to go along with

context. The EFT, on the other hand, represents an ability to get at a crux despite misleading contexts. Thus they are related bipolarly" (pp. 6, 11).

By pitting EFT against RFT (scored in the field-sensitivity direction), one derives an appropriate contrasted measure of field independence versus field dependence. That is, standard scores for errors on RFT are subtracted from standard scores for correctness on EFT, yielding a contrasted score in the field-independent direction. This is essentially similar to the perceptual index used by Witkin (which also included BAT and was scored in the field-dependent direction in terms of solution time on EFT and errors on RFT); it is identical to the index used by Kogan and Block (1991). However, now the rationale is quite different. The index is no longer viewed as a composite of measures that tap the same thing but rather as a contrast of measures tapping different things, namely, restructuring skills versus responsiveness to field effects. Individuals high on the contrasted difference score (i.e., field independents) would have strong restructuring skills and a weak F-factor, while those scoring in the opposite direction (i.e., field dependents) would have a strong F-factor and weak restructuring skills.

This rationale, of course, depends on the extent to which EFT and RFT tap distinct processes. One of the first indications that this might be the case was Vernon's (1972) finding that, unlike EFT, substantial residual variance remained for RFT after extraction of factors for general intelligence and spatial visualization. Subsequently, Linn and Kyllonen (1981) demonstrated that RFT loaded a factor distinct from the one marked by EFT. They interpreted this RFT factor, scored in the field-independent direction, in terms of the tendency to select a relevant strategy to overcome salient but irrelevant strategies triggered by field effects. For our purposes, concern is with the field-dependent direction, where high scorers find field effects compelling and, when misleading, difficult to overcome strategically. That is, in Pascual-Leone's terms, field dependents have a strong F-factor, weak or ineptly deployed interruption or I-processes, and a tendency to underutilize their attentional resources or M-power. More recently, microprocess analyses of task performance also illuminate clear differences between EFT and RFT (Goodenough, Oltman, Snow, Cox, & Markowitz, 1991; Pascual-Leone, 1989; Spinelli, Antonucci, Goodenough, Pizzamiglio, & Zoccolotti, 1991), as do macroprocess studies of cross-cultural correlation patterns (Berry, 1991;

Berry, van de Koppel, Sénéchal, Annis, Bahuchet, Cavalli-Sforza, & Witkin, 1986).

Instead of (or in addition to) using RFT to anchor the field-dependent pole of this contrast, one might prefer to use Witkin's Rotating-Room-Rotating-Chair Test (or RRT), on which one's body must be set to the true vertical while seated on a rotating chair surrounded by a rotating room. On RFT, an error score serves as a positive indicator of sensitivity to field effects, whereas on RRT accuracy is the indicator. That is, the field dependent's strong F-factor makes salient the verticality cues of the rotating room, which are veridical. In contrast, by virtue of the field independent's weak F-factor, less weight is given to external referents and more to internal gravitational cues, which in this case are distorted by centrifugal forces.

Some might argue that RRT is a contrived artificial way to give field dependents an advantage, but many experimentally controlled procedures are artificial and contrived. What RRT does contribute is a buttressing of the interpretation of field independence versus field dependence in terms of weak versus strong sensitivity to field effects in addition to the selection of relevant versus irrelevant strategies for task performance as proposed by Linn and Kyllonen (1981). If it were just that field independents are facile in applying relevant strategies, one would expect them to do so on RRT, especially since the relevant strategy is visually compelling.

Adaptive flexibility and speed of closure in style mobility. Pascual-Leone (1989) also explicitly considered the contrasted measurement of field independence versus field dependence. He proposed the creation of a bipolar variable by subtracting two separate scores, one corresponding to a task requiring M- and I-process strategies for restructuring and the other involving strategies triggered by misleading field effects. However, Pascual-Leone did not employ the sum score to identify individuals strong in both I- and F-factors, and hence potentially mobile. Instead, he used measures of adaptive flexibility to select mobile individuals from the middle-high range of the bipolar continuum.

In our case, the sum score would be computed by adding standard scores for EFT correctness to standard scores for RFT errors (or for RRT accuracy). High scorers are highly sensitive to gestalt field effects that facilitate

closure, but at the same time are facile in setting aside one closure to consider alternative possibilities. Such individuals might well excel, as Pascual-Leone maintains, on adaptive flexibility tests, which involve insight problems requiring the divergent production of transformations (Guilford, 1967). However, they might also excel in identifying incomplete figures on measures of speed of closure, which often requires consideration of alternative interpretations before closing on the best.

Thus, although flexibility of closure is aligned with the field-independent pole of the stylistic contrast, speed of closure may be aligned not with the field-dependent pole but with the sum score. This would resolve the difficulty mentioned earlier that the moderate positive correlation between the two closure factors embarasses an attempt to link flexibility versus speed of closure to an anlytic versus synthetic dimension underlying field independence versus field dependence (Missler, 1986), as portrayed in Figure 1. Synthesizing ability in this view is not the responsiveness to field effects of field dependents but, rather, the balance of field sensitivity with the inhibitory processes facilitative of flexible perspectives.

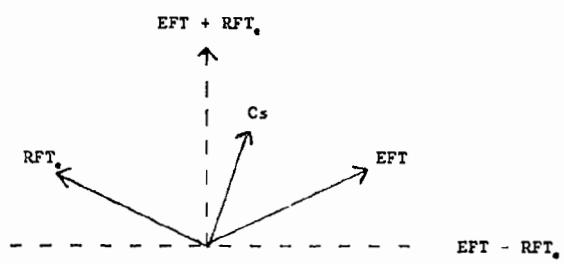

Figure 1. Contrasted Measurement of Field Independence versus Field Dependence In Terms of the Difference Score (EFT-RFT$_e$), Mobility in Terms of the Sum (EFT+RFT$_e$). EFT Refers to Standard Scores for Correctness on the Embedded Figures Test, RFT$_e$ to Standard Scores for Errors on the Rod-and-Frame Test, C_s to Scores on Speed of Closure.

This view of the contrasted measurement of field independence versus field dependence makes it clear that neither EFT nor RFT (or similar measures tapping restructuring skills and responsiveness to field effects) can stand alone to mark the construct. The two processes oppose one another in bipolar fashion intraindividually, as captured by the ipsative contrast score,

although they do not necessarily correlate highly negatively when measured normatively (Broverman & Klaiber, 1969). Individuals for whom both processes are of comparable strength fall in the middle of the bipolar continuum. Those for whom both processes are strong may be potentially mobile and capable of changing their stylistic behavior to suit varied circumstances. Such distinctions cannot be made if only one pole is assessed, whether by EFT or RFT; worse still, the construct itself is incompletely addressed.

STYLES OF LEARNING AND TEACHING

Cognitive styles have been viewed as *performance* variables rather than *competence* variables (Globerson, 1989; Neimark, 1981) because they reflect consistent individual differences in the manner or form of cognition as distinct from the content or level of cognition. From this perspective, cognitive styles reflect not competence per se but, rather, the utilization of competence. That is, styles moderate access to competence as well as its strategic deployment in meeting task requirements (Neimark, 1985). Indeed, Pascual-Leone's (1969) theory of constructive operators is tantamount to a performance model overlaid on the competence model of Piaget.

However, stylistic modes of conceptualizing, categorizing, attentional scanning, leveling or sharpening in memory, restructuring, and so forth influence the nature and quality of stimulus information available for thinking and problem solving, thereby affecting not just the manner but the material of cognition. These style-based differences in the substance of cognition shape the nature of ability and knowledge structures that an individual forms as well as their higher-order organization. Thus cognitive styles are both performance and competence variables combined: Styles influence not only the utilization of cognitive structures but also their development (Brodzinsky, 1985; Messick, 1984, 1987, 1993). As a consequence, cognitive styles have potentially profound implications for learning and the structuring of knowledge.

Many of these educational implications with respect to field independence versus field dependence have been extensively reviewed by Davis (1991), updating the prior summary by Witkin and his associates (Witkin, Moore, Goodenough, & Cox, 1977). Overall, field-independent learners appear to be

more efficient in the selection and implementation of executive strategies that coordinate information processes, especially those used in selectively attending to relevant cues as well as in storing and retrieving information from memory. Field-dependent learners appear to be more responsive to salient cues, whether relevant or irrelevant, and less strategic in orientation, even when appropriate strategies are available in their cognitive repertoires (Linn, 1978). This nonstrategic orientation is reminiscent of the Kemler Nelson and Smith (1981) view of impulsivity mentioned earlier.

In Davis's (1991) summary, aptitude-treatment interaction studies of the match between student style and instructional method, as usual, proved to be mixed: Some studies found no difference for cognitive style; some reported that field-independent students outperformed their field-dependent peers regardless of instructional treatment; and, some exhibited significant interactions, as when field-independent students achieved best with deductive instruction and field-dependent students achieved on a par with field independents in instruction based on examples. Significant interactions were also obtained when students were matched to instructional environments in terms of cognitive complexity (Miller, 1981). Furthermore, recent evidence suggests that matching students and teachers in cognitive style can influence achievement, sometimes positively for field-dependent students but negatively for field-independent students and sometimes the reverse. It was also found that making teachers aware of the teaching and learning implications of the field-dependence dimension led to adaptations in teaching style attuned to student stylistic differences, which in turn created a more conducive classroom climate. One caution in evaluating these findings is that most of the studies involved EFT and some RFT, but rarely (if at all) was an appropriate contrast index employed.

Learning Styles and Orientations Toward Instruction

In addition to the role of cognitive styles in learning and the structuring of knowledge, a number of specific learning styles have been identified that are more closely tied to learning tasks and achievement motivation than to underlying personality structures (Schmeck, 1988). In particular, three distinct learning styles or orientations toward studying have been delineated in major research programs. In Entwistle's (1981, 1988)

program, the three learning styles are labeled ***meaning***, ***reproducing***, and ***achieving*** orientations. They entail, respectively, a search for personal understanding, memorization, and whatever is required to attain high grades. Students with a meaning orientation are intrinsically motivated, those with a reproducing orientation are externally motivated by fear of failure, while those with an achieving style are extrinsically motivated by hope for success. Three similar dimensions isolated by Biggs (1987) are labeled ***internalizing***, ***utilizing***, and ***achieving*** approaches.

In related research by Pask (1976, 1988), two learning strategies and associated learning styles have been exhibited by students who were asked to learn principles and procedures well enough to teach them back to others. One strategy is labeled ***holist***; consistency in its use indicates a style of ***comprehension learning***, which involves a global task approach, a wide-range of attention, reliance on analogies and illustrations, and construction of an overall concept before filling in details. The contrasting learning strategy is labeled ***serialist*** and the associated style is ***operation learning***, which involves a linear task approach focussing on operational details and sequential procedures. Students who flexibly employ both strategies are called ***versatile*** learners.

Similar distinctions have been made by Marton (1988; Marton & Säljö, 1976), emphasizing a conclusion-oriented deep-processing approach to learning as opposed to a description-oriented shallow-processing approach. In conclusion-oriented learning, the student's intention is to understand the material, and a deep-processing approach is adopted that relates arguments to evidence and ideas to personal experience. In description-oriented learning, the student's intention is to memorize the material, and a shallow-processing approach is adopted focussing on discrete facts and disconnected information learned by rote.

In the different terms used by each of these investigators, individuals with a meaning or internalizing orientation tend to adopt a deep-processing approach or a holist strategy, or both; students with a reproducing or utilizing orientation tend to adopt a shallow-processing approach or a serialist strategy, or both; and, those with an achieving orientation employ any approach that leads to high grades, deep-processing if understanding is rewarded or shallow-processing if reproduction is rewarded (Schmeck, 1988).

Biggs (1987) demurs on the latter point, however, holding that achieving students develop a shallow approach even under conditions that should foster deep processing. These stylistic consistencies in learning and knowledge acquisition are often referred to as orientations rather than styles to highlight the fact that they are heavily influenced by the student's perception of the situation and mediated by student motives (Entwistle, 1988).

IDEOLOGY OF CONSTRUCTIVE VERSUS DECONSTRUCTIVE CRITICISMS

The literature of cognitive and learning styles is peppered with unstable and inconsistent findings, while style theory seems either vague in glossing over inconsistencies or confused in stressing differentiated features selectively. A major source of this conceptual messiness is that different investigators use different measures to represent the same style constructs, use similar measures to represent different constructs, or use partial indicators such as EFT or RFT to represent a complex style that requires contrasted measurement.

On such issues there have been numerous critiques that seem to fall into two categories. One type represents constructive criticism in the sense that efforts are made to amend or modify the style construct at issue in response to expanding evidence, or else to refine its measurement to take account of construct-irrelevant variance. Examples here are the reviews already mentioned by Kogan and Block (1991) and by Davis (1991). In light of their extensive personality correlates, Kogan and Block question whether the value-neutral character of Witkin's final version of field independence versus field dependence can be sustained empirically. In summarizing complex educational findings, Davis concludes that field independence sometimes acts as an ability and sometimes as a style, which is a major source of its power and attraction as an integrative variable. The other type of critique is deconstructive in the sense that attempts are made to undo or discount the style as a meaningful construct or to discredit its purported indicators as measures of something else entirely, such as intellective ability. Examples here are a series of critiques by McKenna (1983, 1984, 1990) and by Tiedemann (1989).

McKenna (1984) reviews numerous studies demonstrating that EFT correlates substantially with measures of analytical intelligence, especially Wechsler's

nonverbal index and Raven's progressive matrices. He concludes that EFT is a measure of analytical ability, not cognitive style. However, in describing this work, McKenna (1983) not only discounted EFT as a style indicator, but also "rejected the claim that field dependence is a cognitive style" (p. 51), thereby confusing the measure with the construct. Such a simplistic stance is problematic because Witkin had long noted such correlations and, as a consequence, had assimilated analytical intelligence into the style construct itself. In any event, as we have seen, EFT is only a partial indicator of a style that requires a convergence of distinct processes for its representation. Hence, to characterize EFT as an ability measure is by no means sufficient to deconstruct field independence as a cognitive style.

This point may be clarified by considering Pascual-Leone's (1969, 1989) attempt to disentangle ability from style in field independence. To begin with, he shows that working-memory capacity or M-reserve increases linearly in development up to the stage of formal operational thinking. Furthermore, such differences in working-memory capacity are highly related to developed reasoning ability (Kyllonen & Christal, 1990). For individuals differing developmentally in M-power, scores on contrasted measures of field independence versus field dependence would primarily reflect ability or capacity. For individuals with the same M-power, scores would reflect style, that is, stylistic differences in the deployment of M- and I-resources to overcome misleading field effects (Globerson, 1989).

McKenna (1983) also deflates field independence as a personality variable because EFT fails to correlate with questionnaire scores for extraversion, neuroticism, and locus of control. This is ironic because Witkin explicitly disclaims these correlates on theoretical as well as empirical grounds. For example, Witkin points out that "whereas field dependence-independence is a process variable, representing degree of autonomous functioning in assimilating information from self and field, locus of control is an attitudinal or belief variable, representing expectancies of internal or external control of reinforcement" (Witkin & Goodenough, 1981, p. 48).

McKenna (1990) also examined many of the same educational studies of field independence that Davis (1991) reviewed, but he reinterpreted all of the findings in terms of ability differences rather than style differences. For example, in considering cognitive-style matching of teachers and students,

McKenna concluded that field-independent teachers, with their higher analytical ability, achieved better educational outcomes regardless of student style. This glosses over the divergent findings attended to by Davis (1991) and gives short-shrift to the complexity of the problem of the match, which was first highlighted by J. McV. Hunt (1961) in considering optimal educational experiences to foster cognitive development. This complexity is one reason for the varied results reviewed by Davis (1991). That is, matching involves not just teacher style and student style, but also the stylistic demands of instructional methods and of the structure of educational materials. Furthermore, although matching may be oriented toward improved knowledge acquisition, mismatching is oriented toward enhanced flexibility of thinking and creativity, so that outcome measures need to vary accordingly (Messick, 1976, 1982).

More broadly, Tiedemann (1989) launched a frontal attack on several cognitive styles in terms of the adequacy of their measurement and their status as style constructs. Throughout his review, Tiedemann (1989) continually mistakes the measure for the style construct. He criticizes purported style indicators for unreliability and uncontrolled method variance and then discounts both the measure and the style without appraising reliable empirical consistencies reflective of construct-relevant variance. He conflates measures of distinct styles and then rejects them because they fail to correlate highly, as when category-width scores are compared with object-sorting measures that actually refer to the separate style of conceptual differentiation. He considers the disentangling of compartmentalization from conceptual differentiation to be a measurement deficit rather than a style refinement (Messick & Kogan, 1963).

As other instances, Tiedemann rejects complexity versus simplicity as a cognitive style because it is value directional, without considering, as discussed earlier, the positive features of simplification for processing consonant information and for decisiveness of judgment. He rejects converging versus diverging as a cognitive style because Guilford did not find such a bipolar dimension in his factor analysis of interest in thinking (Guilford, Christensen, Frick, & Merrifield, 1961). In the first place, Guilford did find a bipolar factor pitting interest in problem solving and logical processes against spontaneous divergent thinking. In the second place,

Tiedemann's argument is off the mark because it confuses an intraindividual ipsative contrast with factors of normative measures (Broverman, 1962, Ross, 1963).

The McKenna and Tiedemann critiques were brought up not to refute them, refrutable though they may be, but to illustrate the point that they and other deconstructive critiques tend to be one-sided and unqualified in their negative views. Indeed, they are so one-sided as to suggest an ideological rather than a scientific basis for their inexorability and affective overtones. It may be that the concept of personal styles is particularly troublesome to some individuals concerned with cognitive theory and modeling. Cognitive and learning styles greatly expand the nature and range of individual differences that have long complicated the search for psychological laws or the construction of generic process models. The concept of cognitive styles also implicates automatic or unconscious processes that confound cognitive modeling. Even at a conscious or strategic level, stylistic consistencies implicate motivational dynamics that greatly complicate (and enrich) strictly cognitive formulations. Hence, one's stance with respect to style may reflect not just scientific evidence, but its interpretation in light of deep-seated ideologies about the nature of the human being as a learner and as an adaptive organism. For example, is adaptation viewed as ability-driven or are both adaptation and ability development driven by underlying personality structures such as enduring needs and values?

However, if overcritical deconstructive critiques of cognitive style are partly ideologically based, so may be some overprotective justifications of style applications, especially in educational practice (Keefe, 1987, 1988; Keefe & Monk, 1988). Some proponents of cognitive and learning styles in education may be overenthusiastic in light of variable findings and again for partly ideological reasons. Their hope is that by individualizing education in terms of cognitive and learning styles, they would optimize instructional methods tailored to learner characteristics, thereby enriching teacher behavior and beliefs as well as enhancing student learning and thinking strategies (Messick, 1984).

These hopes at present far outstrip a consistent research base, but they are supported by a seductiv ideology. By virtue of the differential character of their value implications, cognitive styles convey a positive

message to students regardless of the direction of their cognitive leaning. This greatly expands the range of educational options that individuals might seek and loosens the ties that bind instruction to ability differences. It is akin to the ideology that drives Howard Gardner (1983, 1991) to champion the development of multiple intelligences in school programs, because it frees education from the constraints of IQ levels (Messick 1992). But as with the deconstructive critiques, the underlying ideology may provide blinders that hinder the scientific evaluation of contrary evidence.

ORGANIZING STYLES IN A PERSONALITY FRAMEWORK

A remaining issue with respect to the diversity of styles at least needs to be broached, namely, how are styles organized in relation to cognitive processes and within the broader personality system. One attempt at organization relates cognitive styles functionally to different phases of an input-output sequence of information processing or problem solving (Kagan & Kogan, 1970; Messick, 1984). For example, broad- versus sharp-focus scanning is implicated in information search, category width and conceptualizing styles in encoding, leveling versus sharpening in memory storage and retrieval, cognitive complexity versus simplicity in problem representation, field independence versus field dependence in problem structuring and restructuring, converging versus diverging in hypothesis generation, and reflection versus impulsivity in strategy selection and decision making. But such association is by no means one-to-one, because some cognitive styles influence information processing sequences at several points. As an instance, intensity and extensiveness of scanning affects information search of both external stimulus fields and internal fields of memory, meaning, and knowledge (Messick, 1989a).

Another attempt at organization views cognitive styles as individual differences in the various subcomponents of an information-processing model of perception, memory, and thought (Miller, 1987). For example, organization and retrieval are among the subcomponents of memory, the former being influenced by cognitive complexity and the latter by converging versus diverging. In addition, Miller (1987) postulates that "all of the cognitive styles are subordinate to, and reflect, a broad superordinate stylistic difference of analytic versus holistic processing" (p. 253). At the analytic pole of this

hierarchic organization, one finds such styles as field independence, sharpening, high conceptual differentiation, convergence, and serial processing; at the holistic pole one finds field dependence, leveling, low conceptual differentiation, divergence, and holistic processing. This proposed hierarchy is a heuristic device and not a summary of empirical relationships, which at present would by no means support such a structure. Miller also recognizes the need to distinguish the global and impressionistic aspects of the holistic pole from its synthetic and integrative aspects. Such an analytic versus holistic superstructure, with its two opposing principles for diversifying and unifying, is a familiar contrast. Indeed, it portends a perennial ideological bipolarity in the history of Western thought (Tomkins, 1965).

These attempts to organize cognitive styles within an information-processing framework are a good beginning, but they do not take account of the sources of cognitive style in personality structure. Miller (1988) does take a step in this direction by relating his model of cognitive processes and styles to a personality typology of cognitive, affective, and conative dimensions derived from such robust personality factors as the Big 5 (John, 1990). A more integrative attempt to place cognitive styles in a personality framework comes from Block and Block (1980), who describe cognitive styles as varying in terms of two basic personality dimensions of ego control and ego resiliency. This framework is also relevant to response styles, especially the relationship of acquiescence to ego control and of social desirability or self-deception to ego resiliency (Block, 1965; Messick, 1991).

Perhaps the most extensive attempt to incorporate styles within personality organization is due to Royce and Powell (1983). They describe a multidimensional three-level style hierarchy that is superordinate to a cognitive hierarchy of intellective abilities and an affective hierarchy of emotionality and temperament. The style hierarchy inputs control information to the other systems, selecting particular modes of processing that integrate and modulate information by coordinating cognition and affect. The style system overlaps and works in concert with a value hierarchy of interests or cognitive values and needs or affective values, not only to achieve task goals but also to select content of interest and to satisfy specific needs.

However, these efforts to integrate cognitive styles into a personality framework, promising as they are, do not fulfill the aspirations for cognitive styles voiced earlier by Klein in particular, but also by Murphy and Witkin among others. The hope was not to treat styles as cognitive variables that are related to personality variables, but to view them as bridging variables that embody cognition and personality simultaneously. Perhaps we need some new perspectives or new research paradigms in order to accomplish this. More likely, we need to start with a guiding personality theory, as Klein (1958, 1970) maintained long ago, whether it be ego psychology or some other theoretical orientation. If this theory illuminates the nature of form-giving structures in personality development, then styles can be treated not as cognitive or affective or behavioral variables related to personality, but as the manifestation of form-giving personality structures in cognition, affect, and behavior.

REFERENCES

Allport, G. W. (1961). ***Pattern and growth in personality.*** New York: Holt, Rinehart, and Winston.

Allport, G. W., & Vernon, P. E. (1933). ***Studies in expressive movement.*** New York: Macmillan.

Berry, J. W. (1984). Towards a universal psychology of cognitive competence. ***International Journal of Psychology, 19***, 335-361.

Berry, J. W. (1991). Cultural variations in field dependence-independence. In S. Wapner & J. Demick (Eds.), ***Field dependence-independence: Cognitive style across the life span*** (pp. 289-308). Hillsdale, NJ: Erlbaum.

Berry, J. W. (1993). A cultural ecology of cognition. Paper presented at the First Spearman Seminar, University of Plymouth, UK, July 21-23.

Berry, J. W., van de Koppel, J. M. H., Sénéchal, C., Annis, R. C., Bahuchet, S., Cavalli-Sforza, L. L., & Witkin, H. A. (1986). ***On the edge of the forest: Cultural adaptation and cognitive development in Central Africa.*** Lisse: Swets and Zeitlinger.

Bieri, J., Atkins, A. L., Briar, S., Leaman, R. L., Miller, H., & Tripodi, T. (1966). ***Clinical and social judgment: The discrimination of behavioral information.*** New York: Wiley.

Biggs, J. B. (1987). ***Student approaches to learning and studying.*** Hawthorn, Victoria: Australian Council for Educational Research.

Blake, R. R., & Ramsey, G. V. (1951). ***Perception. An approach to personality.*** New York: Ronald Press.

Block, J. (1965). ***The challenge of response sets.*** New York: Appleton-Century-Crofts.

Block, J. H., & Block, J. (1980). The role of ego-control and ego-resiliency in the organization of behavior. In W. A. Collins (Ed.), ***Minnesota symposia on child psychology*** (Vol. 13, pp. 39-101). Hillsdale, NJ: Erlbaum.

Brodzinsky, D. M. (1985). On the relationship between cognitive styles and cogntive structures. In Neimark, E. D., De Lisi, R., & Newman, J. L. (Eds.), ***Moderators of competence*** (pp. 147-174). Hillsdale, NJ: Erlbaum.

Broverman, D. M. (1960a). Cognitive style and intraindividual variation in abilities. *Journal of Personality*, *28*, 240-256.

Broverman, D. M. (1960b). Dimensions of cognitive style. *Journal of Personality*, *28*, 167-185.

Broverman, D. M. (1962). Normative and ipsative measurement in psychology. *Psychological Review*, *69*, 295-305.

Broverman, D. M. & Klaiber, E. L. (1969). Negative relationships between abilities. *Psychometrika*, *34*, 5-20.

Bruner, J. S., & Tajfel, H. (1961). Cognitive risk and environmental change. *Journal of Abnormal and Social Psychology*, *62*, 231-241.

Cattell, R. B. (1971). *Abilities: Their structure, growth, and action*. New York: Houghton Mifflin.

Davis, J. K. (1991). Educational implications of field dependence-independence. In S. Wapner & J. Demick (Eds.), *Field dependence-independence: Cognitive style across the life span* (pp. 149-176). Hillsdale, NJ: Erlbaum.

Ekman, P., & Oster, H. (1979). Facial expressions of emotion. *Annual Review of Psychology*, *30*, 527-554.

Entwistle, N. (1981). *Styles of learning and teaching*. New York: Wiley.

Entwistle, N. (1988). Motivational factors in students' approaches to learning. In R. R. Schmeck (Ed.), *Learning strategies and learning styles* (pp. 21-51). New York: Plenum Press.

Fillenbaum, S. (1959). Some stylistic aspects of categorizing behavior. *Journal of Personality*, *27*, 187-195.

Frenkel-Brunswik, E. (1949). Intolerance of ambiguity as an emotional and perceptual personality variable. *Journal of Personality*, *18*, 108-143.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.

Gardner, H. (1991). *The unschooled mind. How children think and how schools should teach*. New York: Basic Books.

Gardner, R. W. (1953). Cognitive styles in categorizing behavior. *Journal of Personality*, *22*, 214-333.

Gardner, R. W. (1961). Cognitive controls of attention deployment as determinants of visual illusions. *Journal of Abnormal and Social Psychology*, *62*, 120-129.

Gardner, R. W., Holzman, P. S., Klein, G. S., Linton, H. B., & Spence, D. P. (1959). Cognitive control: A study of individual consistencies in cognitive behavior. *Psychological Issues*, *1*(Whole No. 4).

Gardner, R. W., Jackson, D. N., & Messick, S. (1960). Personality organization in cognitive controls and intellectual abilities. *Psychological Issues*, *2*(Whole No. 8).

Gardner, R. W., & Moriarty, A. E. (1968). *Personality development at preadolescence*. Seattle: University of Washington Press.

Gardner, R. W., & Schoen, R. A. (1962). Differentiation and abstraction in concept formation. *Psychological Monographs*, *76*(41), (Whole No. 560).

Globerson, T. (1989). What is the relationship between cognitive style and cognitive development? In T. Globerson & T. Zelniker (Eds.), *Cognitive style and cognitive development* (pp. 71-85). Norwood, NJ: Ablex.

Globerson, T., & Zelniker, T. (1989). *Cognitive style and cognitive development*. Norwood, NJ: Ablex.

Goodenough, D. R. (1976). The role of individual differences in field dependence as a factor in learning and memory. *Psychological Bulletin*, *83*, 675-694.

Goodenough, D. R., Oltman, P. K., Snow, D., Cox, P. W., & Markowitz, D. (1991). Field dependence-independence and embedded figures performance. In S. Wapner & J. Demick (Eds.), *Field dependence-independence* (pp. 131-148). Hillsdale, NJ: Erlbaum.

Guilford, J. P. (1967). *The nature of human intelligence*. New York: McGraw-Hill.

Guilford, J. P., Christensen, P. R., Frick, J. W., & Merrifield, P. R. (1961). Factors of interest in thinking. *Journal of General Psychology*, *65*, 39-56.

Harvey, O. J., Hunt, D. E., & Schroder, H. M. (1961). *Conceptual systems and personality organization*. New York: Wiley.

Hoffman, C., & Kagan, S. (1977). Field dependence and facial recognition. *Perceptual and Motor Skills*, *44*, 119-124.

Holzman, P. S., & Gardner, R. W. (1959). Leveling and repression. *Journal of Abnormal and Social Psychology*, *59*, 151-155.

Holzman, P. S., & Gardner, R. W. (1960). Leveling-sharpening and memory organization. *Journal of Abnormal and Social Psychology*, *61*, 176-180.

Holzman, P. S., & Rousey, C. (1971). Disinhibition of communicated thought: Generality and role of cognitive style. *Journal of Abnormal Psychology*, *77*, 263-274.

Hudson, L. (1966). *Contrary imaginations*. New York: Schocken.

Hudson, L. (1968). *Frames of mind: Ability, perception and self-perception in the arts and sciences*. London: Methuen.

Hunt, J. McV. (1961). *Intelligence and experience*. New York: Ronald Press.

John, O. P. (1990). The "Big Five" factor taxonomy: Dimensions of personality in the natural language and in questionnaires. In L. A. Pervin (Ed.), *Handbook of personality theory and research* (pp. 66-100). New York: Guilford Press.

Kagan, J., & Kogan, N. (1970). Individual variation in cognitive processes. In P. H. Mussen (Ed.), *Carmichael's manual of child psychology* (Vol. 1, pp. 1273-1365). New York: Wiley.

Kagan, J., Moss, H. A., & Sigel, I. E. (1963). Psychological significance of styles of conceptualization. *Monographs of the Society for Research in Child Development*, *28*(2, Serial No. 86), 73-112.

Kagan, J., Rosman, B. L., Day, D., Albert, J., & Phillips, W. (1964). Information processing in the child: Significance of analytic and reflective attitudes. *Psychological Monographs: General and Applied*, *78*(1, Whole No. 578).

Keefe, J. W. (1987). *Learning style theory and practice*. Reston, VA: National Association of Secondary School Principals.

Keefe, J. W. (1988). *Profiling and utilizing learning style*. Reston, VA: National Association of Secondary School Principals.

Keefe, J. W., & Monk, J. S. (1988). *Learning Style Profile: Technical manual*. Reston, VA: National Association of Secondary School Principals.

Kelly, G. A. (1955). *The psychology of personal constructs* (Vol. 1). New York: Norton.

Kemler Nelson, D. G., & Smith, J. D. (1989). Analytic and holistic processing in reflection-impulsivity and cognitive development. In T. Globerson & T. Zelniker (Eds.), *Cognitive style and cognitive development* (pp. 116-140). Norwood, NJ: Ablex.

Klein, G. S. (1954). Need and regulation. In M. R. Jones (Ed.), *Nebraska symposium on motivation*. Lincoln: University of Nebraska Press.

Klein, G. S. (1958). Cognitive control and motivation. In G. Lindzey (Ed.), ***Assessment of human motives*** (pp. 87-118). New York: Holt, Rinehart and Winston.

Klein, G. S. (1970). ***Perception, motives and personality***. New York: Knopf.

Klein, G. S., & Schlesinger, H. (1949). Where is the perceiver in perceptual theory? *Journal of Personality*, ***18***, 32-47.

Kogan, N. (1973). Creativity and cognitive style: A life-span perspective. In P. B. Baltes & K. W. Shaie (Eds.), ***Life-span developmental psychology: Personality and socialization*** (pp. 146-179). New York: Academic Press.

Kogan, N. (1976). ***Cognitive styles in infancy and early childhood***. Hillsdale, NJ: Erlbaum.

Kogan, N. (1983). Stylistic variation in childhood and adolescence: Creativity, metaphor, and cognitive style. In J. H. Flavell & E. M. Markman (Eds.), ***Handbook of child psychology: Cognitive development*** (4th ed., Vol. 3, pp. 630-706). New York: Wiley.

Kogan, N. (1985). Cognitive styles as moderators of competence: A commentary. In E. D. Neimark, R. De Lisi, & J. L. Newman (Eds.), ***Moderators of competence*** (pp.175-189). Hillsdale, NJ: Erlbaum.

Kogan, N., & Block, J. (1991). Field dependence-independence from early childhood through adolescence: Personality and socialization aspects. In S. Wapner & J. Demick (Eds.), ***Field dependence-independence: Cognitive style across the life span*** (pp. 177-208). Hillsdale, NJ: Erlbaum..

Kyllonen, P. C., & Christal, R. E. (1990). Reasoning ability is (little more than) working-memory capacity?! ***Intelligence***, ***14***, 389-433.

Linn, M. C. (1978). Influence of cognitive style and training on tasks requiring the separation of variables schema. ***Child Development***, ***49***, 874-877.

Linn, M. C., & Kyllonen, P. (1981). The field dependence-independence construct: Some, one, or none. ***Journal of Educational Psychology***, ***73***, 261-273.

Marton, F. (1988). Describing and improving learning. In R. R. Schmeck (Ed.), ***Learning strategies and learning styles*** (pp. 53-82). New York: Plenum

Marton, F., & Säljö, R. (1976). On qualitative differences in learning: I. Outcome and process. *British Journal of Educational Psychology*, ***46***, 4-11.

McKenna, F. P. (1983). Field dependence and personality: A re-examination. *Social Behavior and Personality*, *11*(2), 51-55.

McKenna, F. P. (1984). Measures of field dependence: Cognitive style or cognitive ability? *Journal of Personality and Social Psychology*, *47*, 593-603.

McKenna, F. P. (1990). Learning implications of field dependence-independence: Cognitive style versus cognitive ability. *Applied Cognitive Psychology*, *4*, 425-438.

Messick, S. (1968). Response sets. In D. L. Sills (Ed.), *International encyclopedia of the social sciences* (pp. 492-496). New York: Macmillan.

Messick, S. (1976). Personal styles and educational options. In S. Messick (Ed.), *Individuality in learning: Implications of cognitive styles and creativity for human development* (pp. 310-327). San Francisco: Jossey-Bass.

Messick, S. (1980). Herman A. Witkin, 1916-1979. *American Psychologist*, *35*, 99-100.

Messick, S. (1982). Developing abilities and knowledge: Style in the interplay of structure and process. *Educational Analysis*, *4*(2), 105-121.

Messick, S. (1984). The nature of cognitive styles: Problems and promise in educational practice. *Educational Psychologist*, *19*, 59-74.

Messick, S. (1986). Herman Witkin and the meaning of style. In M. Bertini, L. Pizzamiglio, & S. Wapner (Eds.), *Field dependence in psychological theory, research and application* (pp. 115-117). Hillsdale, NJ: Erlbaum.

Messick, S. (1987). Structural relationships across cognition, personality, and style. In R. E. Snow & M. J. Farr (Eds.), *Aptitude, learning, and instruction (Vol. III): Conative and affective process analysis* (pp. 35-75). Hillsdale, NJ: Erlbaum.

Messick, S. (1989a). *Cognitive style and personality: Scanning and orientation toward affect* (RR-89-16). Princeton, NJ: Educational Testing Service.

Messick, S. (1989b). Validity. In R. L. Linn (Ed.), *Educational measurement* (3rd ed., pp. 13-103). New York: Macmillan.

Messick, S. (1991). Psychology and methodology of response styles. In R. E. Snow & D. E. Wiley (Eds.), *Improving inquiry in social science: A volume in honor of Lee J. Cronbach* (pp. 161-200). Hillsdale, NJ: Erlbaum.

Messick, S. (1992). Multiple intelligences or multilevel intelligence? Selective emphasis on distinctive properties of hierarchy: On Gardner's ***Frames of Mind*** and Sternberg's ***Beyond IQ*** in the context of theory and research on the structure of human abilities. ***Psychological Inquiry***, ***3***, 365-384.

Messick, S. (1993). Human abilities and modes of attention: The issue of stylistic consistencies in cognition. Paper presented at the First Spearman Seminar, University of Plymouth, UK, July 21-23.

Messick, S., & Damarin, F. (1964). Cognitive styles and memory for faces. ***Journal of Abnormal and Social Psychology***, ***69***, 313-318.

Messick, S., & Hills, J. R. (1960). Objective measurement of personality: Cautiousness and intolerance of ambiguity. ***Educational and Psychological Measurement***, ***20***, 685-697.

Messick, S., & Kogan, N. (1963). Differentiation and compartmentalization in object-sorting measures of categorizing style. ***Perceptual and Motor Skills***, ***16***, 47-51.

Messick, S., & Kogan, N. (1966). Personality consistencies in judgment: Dimensions of role constructs. ***Multivariate Behavioral Research***, ***1***, 165-175.

Miller, A. (1978). Conceptual systems theory: A critical review. ***Genetic Psychology Monographs***, ***97***, 77-126.

Miller, A. (1981). Conceptual matching models and interactional research in education. ***Review of Educational Research***, ***51***, 33-84.

Miller, A. (1987). Cognitive styles: An integrated model. ***Educational Psychology***, ***7***(4), 251-268.

Miller, A. (1988). Toward a typology of personality styles. ***Canadian Psychology***, ***29***, 263-283.

Missler, R. A. (1986). Analytic and synthetic cognitive functioning: A critical review of evidence bearing on field dependence. ***Journal of Research in Personality***, ***20***, 1-33.

Neimark, E. D. (1981). Confounding with cognitive style factors: An artifact explanation for the apparent nonuniversal incidence of formal operations. In Sigel, I. E., Brodzinsky, D. M., & Golinkoff, R. M. (Eds.), ***New directions in Piagetian theory and practice*** (pp. 177-199). Hillsdale, NJ: Erlbaum.

Neimark, E. D. (1985). Moderators of competence: Challenges to the universality of Piagetian theory. In E. D. Neimark, R. De Lisi, & J. L. Newman (Eds.), ***Moderators of competence*** (pp. 1-14). Hillsdale, NJ: Erlbaum.

Oltman, P. K., Goodenough, D. R., Witkin, H. A., Freedman, N., & Friedman, F. (1975). Psychological differentiation as a factor in conflict resolution. *Journal of Personality and Social Psychology*, *32*, 730-736.

Pascual-Leone, J. (1969). Cognitive development and cognitive style: A general psychological integration. Unpublished doctoral dissertation. University of Geneva.

Pascual-Leone, J. (1989). An organismic process model of Witkin's field-dependence-independence. In T. Globerson & T. Zelniker (Eds.), *Cognitive style and cognitive development* (pp. 36-70). Norwood, NJ: Ablex.

Pask, G. (1976). Styles and strategies of learning. *British Journal of Educational Psychology*, *46*, 128-148.

Pask, G. (1988). Learning strategies, teaching strategies, and conceptual or learning style. In R. R. Schmeck (Ed.), *Learning strategies and learning styles* (pp. 83-100). New York: Plenum.

Paulhus, D. L. (1984). Two-component models of socially desirable responding. *Journal of Personality and Social Psychology*, *46*, 598-609.

Paulhus, D. L. (1986). Self-deception and impression management in test responses. In A. Angleitner & J. S. Wiggins (Eds.), *Personality assessment via questionnaires* (pp. 143-165). New York: Springer-Verlag.

Pemberton, C. (1952). The closure factors related to temperament. *Journal of Personality*, *21*, 159-175.

Pettigrew, T. F. (1958). The measurement and correlates of category width as a cognitive variable. *Journal of Personality*, *26*, 532-544.

Rapaport, D. (1959). The structure of psychoanalytic theory: A systematizing attempt. In S. Koch (Ed.), *Psychology: A study of a science -- Formulations of the person and the social context (Vol. 3)*. New York: Mc Graw-Hill. (Reprinted in *Psychological Issues*, *6*, 1960).

Ross, J. (1963). The relation between test and person factors. *Psychological Review*, *70*, 432-443.

Royce, J. R., & Powell, A. (1983). *Theory of personality and individual differences: Factors, systems, and processes*. Englewood Cliffs, NJ: Prentice-Hall.

Salkind, N. J., & Wright, J. C. (1977). The development of reflection-impulsivity and cognitive efficiency. *Human Development*, *20*, 377-387.

Santostefano, S. (1991). Cognitive style as a process coordinating outer space with inner self: Lessons from the past. In S. Wapner & J. Demick (Eds.), ***Field dependence-independence: Cognitive style across the life span*** (pp. 269-288). Hillsdale, NJ: Erlbaum.

Schmeck, R. R. (1988). ***Learning strategies and learning styles***. New York: Plenum.

Schroder, H. M., Driver, M. J., & Streufert, S. (1967). ***Human information processing***. New York: Holt, Rinehart and Winston.

Shapiro, D. (1965). ***Neurotic styles***. New York: Basic Books.

Spinelli, D., Antonucci, G., Goodenough, D. R., Pizzamiglio, L., & Zoccolotti, P. (1991). Psychophysiological mechanisms underlying the rod-and-frame illusion. In S. Wapner & J. Demick (Eds.), ***Field dependence-independence: Cognitive style across the life span*** (pp. 37-60). Hillsdale, NJ: Erlbaum.

Thurstone, L. L. (1944). A factorial study of perception. ***Psychometric Monograph No. 4***. Chicago: University of Chicago Press.

Tiedemann, J. (1989). Measures of cognitive styles: A critical review. ***Educational Psychologist***, ***24***, 261-275..

Tomkins, S. S. (1965). Affect and the psychology of knowledge. In S. S. Tomkins & C. E. Izard (Eds.), ***Affect, cognition, and personality*** (pp. 72-97). New York: Springer.

Vernon, P. E. (1972). The distinctiveness of field independence. ***Journal of Personality***, ***40***, 366-391.

Vernon, P. E. (1973). Multivariate approaches to the study of cognitive styles. In J. R. Royce (Ed.), ***Multivariate analysis and psychological theory*** (pp. 125-141). New York: Academic Press.

Wallach, M. A., & Caron, A. J. (1959). Attribute criteriality and sex-linked conservatism as determinants of psychological similarity. ***Journal of Abnormal and Social Psychology***, ***59***, 43-50.

Wallach, M. A., & Kogan, N. (1965). ***Modes of thinking in young children: A study of the creativity-intelligence distinction***. New York: Holt, Rinehart and Winston.

Wapner, S. (1976). Commentary: Process and context in the conception of cognitive style. In S. Messick & Associates (Eds.), ***Individuality in learning: Implications of cognitive styles and creativity for human development*** (pp. 73-78). San Francisco, CA: Jossey-Bass.

Witkin, H. A., Dyk, R. B., Faterson, H. F., Goodenough, D. R., & Karp, S. A. (1962). ***Psychological Differentiation***. New York: Wiley.

Witkin, H. A., & Goodenough, D. R. (1977). Field dependence and interpersonal behavior. ***Psychological Bulletin***, ***84***, 661-689.

Witkin, H. A., & Goodenough, D. R. (1981). ***Cognitive styles: Essence and origins -- Field dependence and field independence***. New York: International Universities Press.

Witkin, H. A., Moore, C. A., Goodenough, D. R., & Cox, P. W. (1977). Field-dependent and field-independent cognitive styles and their educational implications. ***Review of Educational Research***, ***47***, 1-64.

Wolitzky, D. L. (1973). Cognitive controls and person perception. ***Perceptual and Motor Skills***, ***36***, 619-623.

Zelniker, T., & Jeffrey, W. E. (1976). Reflective and impulsive children: Strategies of information processing underlying differences in problem solving. ***Monographs of the Society for Research in Child Development***, ***41***(5, Serial No. 168), 1-46.

Zelniker, T., & Jeffrey, W. E. (1979). Attention and cognitive style in children. In G. H. Hale & M. Lewis (Eds.), ***Attention and cognitive development*** (pp. 275-296). New York: Plenum.