Are Cognitive Styles Still in Style?

Robert J. Sternberg and Elena L. Grigorenko
Yale University

Are cognitive styles still in style? The authors assert that they are and, indeed, that they may provide as promising an inroad to predicting school and other kinds of performance as do abilities. First, the authors introduce the concept of cognitive styles and discuss why they have piqued the interest of psychologists for many years and continue to do so. Second, 3 motivations for theory and research on cognitive styles are described. Third, some of the principal literature on cognitive styles is briefly reviewed. Fourth, the authors present their own theory and research, suggesting it may present a particularly promising approach. Finally, they draw some conclusions about styles and make some suggestions regarding profitable directions for future theory and research.

Suppose you were told that there is a mystery construct that predicts school achievement as well as, or possibly even better than, intellectual abilities, as measured by conventional psychometric tests of intelligence. Perhaps you would be skeptical, both because conventional ability tests predict school achievement so well and because other kinds of measures (with the exception of tests of school achievement) have not had as much success in predicting school achievement as have conventional ability tests (Anastasi, 1988; Cronbach, 1990).

Next, you are told that the correlation of a measure of this mystery construct with school achievement in a sample of 124 elementary and secondary school students is .01. You would smile. So much for the mystery construct: another promissory note that proves to have no value when it is cashed in, that is, when it is actually empirically validated.

But you are told, finally, that the true correlation of the mystery construct is being masked by a moderator variable, namely, the school in which the empirical validation is done. In an avant-garde, private elementary–secondary school emphasizing emotional education that views itself as being at the cutting edge of school reform, the correlation of the mystery construct with school achievement is $-.38$ ($p < .05$); in a second school, a Catholic parochial elementary–secondary school that views itself as quite traditional, the correlation is .49 ($p < .01$). In two other schools—a well-respected, nationally known preparatory school and a large, urban public school—the correlations are $-.39$ and .10, respectively. Perhaps now your interest would be piqued. After all, how many constructs show correlations with school

achievement that differ by close to .90 in two different schools, that are statistically significant in opposite directions, and that differ significantly from each other as well?

Moreover, how many constructs also significantly predict school achievement, above and beyond abilities, in part because of the genuine task demands of the school and in part because they are sources of bias in teachers' evaluations of students, whereby teachers evaluate students more favorably on these dimensions if students are more like themselves? Such constructs certainly ought to be receiving attention, whether or not they currently are.

If your interest is indeed piqued, then perhaps you would like to read more about *thinking styles,* which are not themselves abilities but rather preferred ways of using the abilities one has (Sternberg, 1988, 1990, 1994b, 1997). Thinking styles are but one manifestation of a broader program of research in which psychologists have been engaged for many decades, that on *cognitive styles,* or people's characteristic and typically preferred modes of processing information. Cognitive styles are, in turn, a subset of the general construct of *style,* which can be defined as "a distinctive or characteristic manner . . . or method of acting or performing" (Guralnik, 1976, p. 1415).

Our further discussion of cognitive styles is divided into four major parts. First, we motivate our discussion by describing why psychologists, including ourselves, have been interested over the years in cognitive styles as a psychological construct. Second, we review some of the principal literature in the field of cognitive styles, recognizing at the same time that a thorough literature review

Robert J.
Sternberg
Photo by Michael
Marsland, Yale
University, Office of
Public Affairs.

would be impossible in the context of a relatively brief journal article. We also discuss why cognitive styles, much like wide neckties, seem cyclically to come in and go out of fashion as the years pass and why we believe that the construct, like one's collection of wide neckties, is worth saving. Third, we briefly describe some of our own theory and research in the area and argue that our approach shows the general promise of the construct. Finally, we draw some conclusions and provide suggestions for how research in the field might progress in the future.

Why Should Psychologists Care About Cognitive Styles?

Interest in cognitive styles goes back at least to Jung (1923), who proposed a theory of psychological types that, in modified form, is still used today in assessments of styles through the Myers–Briggs Type Inventory (MBTI; Myers & McCaulley, 1985; Myers & Myers, 1980). However, modern research actively began in several laboratories within a short span of time with the work of Witkin (1964; Witkin, Dyk, Faterson, Goodenough, & Karp, 1962; Witkin et al., 1954); Klein (Klein, Gardner, & Schlesinger, 1962; Klein & Schlesinger, 1951; Smith & Klein, 1953); Gardner, Messick, and Jackson (Gardner, 1959, 1962; Gardner, Holzman, Klein, Linton, & Spence, 1959; Gardner, Jackson, & Messick, 1960; Messick & Ross, 1962); Kagan (1958, 1965a, 1965b, 1965c); Wallach and Kogan (1965); Pettigrew (1958); and others who, by the 1950s and 1960s, had become concerned with styles as representing an interface between work on cognition and work on personality.

What interested these researchers then, and contemporary researchers now, about the construct of cognitive styles? Styles are of interest for several reasons.

Bridging Cognition and Personality

First, cognitive styles represent a bridge between what might seem to be two fairly distinct areas of psychological investigation: cognition and personality. Although these two areas often have seemed to represent rather distinct areas of selfhood, there have long been investigators, such as Cattell (1971) and Royce (1973), who have tried to link them into a single encompassing theory. In the case of Cattell, one of the factors in the 16 personality-factor model (Factor B) is an intelligence factor. And in the widely accepted Big Five theory of personality (Costa & McCrae, 1992; Digman, 1990; McCrae, 1996; McCrae & Costa, 1987; Peabody & Goldberg, 1989), one of the factors, Openness to Experience, has been found to be closely linked with intelligence. Moreover, a single psychometric method has been used to investigate both cognition and intelligence, leading some investigators, such as Eysenck (1982; Eysenck & Eysenck, 1975), Vernon (1973), and Messick (1984), as well as Cattell, Royce, and many others, to be active in both fields.

Many other approaches have been used to link personality and aspects of cognition, especially intelligence (Baron, 1982; Saklofske & Zeidner, 1995; Sternberg & Ruzgis, 1994), including constructs of social intelligence (Cantor & Kihlstrom, 1987a, 1987b; Ford & Tisak, 1983; Keating, 1978), practical intelligence (Sternberg, 1985, 1996; Sternberg & Wagner, 1986; Sternberg, Wagner, Williams, & Horvath, 1995), and emotional intelligence (Goleman, 1995; Salovey & Mayer, 1990). Clearly, psychologists see a need to link personality with cognition. We suggest that cognitive styles have provided and can continue to provide one viable way of doing so.

Cognitive Styles Go to School

Second, as suggested in the introductory paragraphs of this article, cognitive styles seem to have important implications for educational theory and practice (Dunn, Beaudry, & Klavas, 1989; Fischer & Fischer, 1979; Grigorenko & Sternberg, 1997; Hunt, 1979; Kagan, 1965c; Messick, 1984; Renzulli & Smith, 1978; Sternberg, 1990, 1994a, 1997; Sternberg & Grigorenko, 1993, 1995; Wallach & Kogan, 1965), an idea to which we return later on. Indeed, one of the initial motivations for studying styles, and which is still a motivation (Grigorenko & Sternberg, 1997), was the idea that perhaps prediction of achievement could be improved by adding measures of styles to measures of abilities as predictors of performance. For example, perhaps impulsive children would show lower performance in school because of their tendency not to be careful in their work, above and beyond any question of their intellectual abilities (Kagan, 1965c, 1966). Or perhaps children who could not separate themselves from their perceptual field or elements of this field from each other (so-called field-dependent children) would suffer when they were learning to read (Witkin, 1975).

Elena L. Grigorenko
Photo by Vladimir Pasechny.

Our own work in the area of cognitive styles has been motivated by educational considerations. For example, the daughter of Robert J. Sternberg would occasionally make suggestions to her teacher as to answers to problems that were alternatives to the answers the teacher presented in class. Over the course of the year, the teacher complained to the child's parents about what the teacher perceived as the child's disruptive behavior in class, and the teacher's opinion of the child seemed to decline monotonically. This experience made Sternberg wonder whether students were devalued in the eyes of their teachers when the students' styles did not match the teachers' styles, an idea consistent with some past hypotheses and data (see, e.g., Cronbach & Snow, 1977; Dunn & Dunn, 1978; Hyman & Rosoff, 1984).

Such incidents and, potentially, the valuing of students who match rather than mismatch teachers' styles are not limited to the elementary school level. When Sternberg was a college freshman, his first psychology examination required a series of short essays. Sternberg (mistakenly) viewed the testing situation as one in which creative ideas would be valued. In fact, he found out when the examination was returned—and he had received a composite score of 3 out of 10—that the way each essay had been scored was on a 10-point scale: The professor had 10 points he wanted the students to make, and the score out of 10 was the number of the professor's points that a given student made. Whatever the professor may have valued, it was not students who wanted to come up with their own ideas in that exam.

Cognitive Styles on the Job

Cognitive styles have implications not only for schooling but also for occupational choice and performance (Clapp,

1993; Gul, 1992; Holland, 1973; Huelsman, 1983; Jacobson, 1993; Kolb, 1974; Myers & McCaulley, 1985; Sternberg, 1997). Suppose it were the case, as hypothesized above, that teachers tend to reward certain styles but not other styles in their classrooms, effectively confounding styles with achievement. Suppose, moreover, that the styles valued in the classroom do not correspond particularly or even at all well with the styles actually valued in the jobs for which the classroom instruction is preparatory. What would be the results?

Conceivably, psychologists might find that those who are encouraged to go into a field are those who have styles compatible with the classroom preparation for the job but not with the job itself. Alternatively, some of those who might have styles quite compatible with the job might be discouraged from going into the job because of less than laudatory performance in the classroom preparation for the job.

We believe that this phenomenon is probably widespread. Those who have styles compatible with the kinds of learning required for multiple-choice tests, for example, may not have styles compatible with the kinds of performance required on a job for which the courses using the multiple-choice tests are supposedly preparatory. For example, psychologists need to come up with ideas for theories, experiments, and therapy, but they rarely, if ever, have to memorize books or lectures.

In sum, there are at least three major motivations for studying cognitive styles: providing a link between cognition and personality; understanding, predicting, and improving educational achievement; and improving vocational selection, guidance, and, possibly, placement. What kinds of work have researchers done to understand cognitive styles in these and other contexts?

Cognitive Styles: A Capsule Review of the Literature

We cannot possibly summarize in a short article the full range of work that has been done on cognitive styles. Fortunately, other works are available that provide relatively complete reviews (e.g., Globerson & Zelniker, 1984; Goldstein & Blackman, 1978; Grigorenko & Sternberg, 1995; Kagan & Kogan, 1970; Kogan, 1973, 1976, 1983; Kogan & Saarni, 1990; Messick, 1976, 1984; Miller, 1991; Riding & Cheema, 1991; Witkin & Goodenough, 1981).

First, we describe the criteria by which we evaluate the various theories of styles. Then, we classify much of the extant work on cognitive styles as falling into three major categories, which we refer to as cognition-centered, personality-centered, and activity-centered approaches, respectively (Grigorenko & Sternberg, 1995). We briefly summarize some of the work that falls under each of these three approaches, placing more of our attention on the first two of these approaches.

Criteria for Evaluation of Theories of Styles

In discussing work on cognitive styles, we limit ourselves to style constructs that have been operationalized. In

other words, by this criterion, there is at least one measure of the style or styles posited by a given theory. We are particularly interested in the extent to which the research programs have met the following five additional criteria, two of which are qualitative and three of which are quantitative:

1. *theoretical specification*—the positing of a reasonably complete, well-specified, and internally consistent theory of styles that makes connection with extant psychological theory;
2. *internal validity*—a demonstration by factor analysis or some other method of internal analysis that the underlying structure of the item or subtest data is as predicted by the theory;
3. *convergent external validity*—a demonstration that the measures of styles correlate with other measures with which, in theory, they should correlate;
4. *discriminant external validity*—a demonstration that the measures of styles do not correlate with other measures with which, in theory, they should not correlate; and
5. *heuristic generativity*—the extent to which the theory has spawned and continues to spawn psychological research and, ideally, practical application.

To some extent, heuristic generativity is a function of the extent to which a theory has satisfied the first four criteria. But it is also a function of the extent to which an idea sparks interest in potential followers of a theory and is aggressively marketed to the consumer public.

The Cognition-Centered Approach

Work in this tradition is based loosely on a definition of cognitive styles as "the characteristic, self-consistent modes of functioning which individuals show in their perceptual and intellectual activities" (Witkin, Oltman, Raskin, & Karp, 1971, p. 3). The styles in this category most closely resemble abilities and, like abilities, have often been measured by tests of maximal performance with "right" and "wrong" answers. Much of the work in this tradition arose as a result of a perceived need to understand qualitative modes of cognitive functioning and not just to obtain an overall quantitative assessment of cognitive functioning, such as IQ.

Many styles have been proposed in the context of the cognitive approach to the study of cognitive styles, as shown in Table 1. Here, we discuss only the two styles that have generated the most theory and research, as well as interest: reflection–impulsivity and field dependence–independence.

Reflection–impulsivity. This polarity of styles is sometimes referred to as *conceptual tempo. Reflectivity* is the tendency to consider and reflect on alternative solution possibilities. Reflective individuals pause to think before beginning a task or making a decision and spend time evaluating their options. Conversely, *impulsivity* is the tendency to respond impulsively without sufficient forethought. Impulsive individuals quickly offer solutions to problems, without sufficient consideration of the probable accuracy of the solutions.

Conceptual tempo appears to be a relatively stable source of individual differences (Kagan, 1958, 1965a, 1965b, 1965c, 1966). There is disagreement, however, as to whether impulsivity and reflectivity, as conceptualized here, apply only to situations of high response uncertainty (Kagan & Messer, 1975) or to a way of approaching life in general (Block, Block, & Harrington, 1974). Operationally, reflectivity–impulsivity typically has been measured by patterns of response latencies and errors on relatively simple, highly speeded tasks. In particular, a reflective person will have a longer response time with fewer errors, whereas an impulsive person will have a shorter response time with more errors. The instrument most frequently used to measure the construct has been the Matching Familiar Figures Test (MFFT; Butter, 1979; Das, 1983; Kagan, 1966; but see Block et al., 1974). In the MFFT, a person is required to select from among several alternatives the one that exactly matches a standard. The number of errors and the time to complete the test are measured, and the median point is viewed as a cutoff for categorizing individuals. People with faster response times and relatively more errors are called *impulsive*; those with longer response times and longer latencies are called *reflective*. Two other groups of less interest for the present purposes are those who are *quick* (shorter response times with fewer errors) and those who are *slow* (longer response times with more errors; Eska & Black, 1971).

Many empirical findings about conceptual tempo have emerged. For example, impulsivity as a cognitive style appears to be different from impulsiveness as a personality trait (Glow, Lange, Glow, & Barnett, 1983), at least as the latter is measured by the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975). For example, children with an impulsive style, in contrast to those with a reflective style, make more errors in reading prose, make more errors of commission on serial-recall tasks, and are more likely to offer incorrect solutions on inductive-reasoning problems and visual discrimination tasks (Stahl, Erickson, & Rayman, 1986). Reflective people tend to make fewer errors in word-recognition, serial-learning, and inductive-reasoning tests (Zelniker & Oppenheimer, 1973). Impulsive individuals tend to have minimal anxiety about committing errors, an orientation toward quick success rather than avoiding failure, relatively low performance standards, low motivation to master tasks, and little attention in monitoring of stimuli (Kagan, 1966; Messer, 1970; Paulsen, 1978).

Field dependence–independence. This polar construct, generally associated with Witkin et al. (1962) and also known as *psychological differentiation,* refers to the extent to which a person is dependent versus independent of the organization of the surrounding perceptual field. The two principal measures of psychological differentiation are the Rod and Frame Test (RFT) and the Embedded Figures Test (EFT). In the RFT (Witkin, 1964; Witkin et al., 1962), individuals must ignore a visual context, a postural context, or both to locate a true vertical. In the EFT (Witkin et al., 1971), individuals must locate a previously seen simple figure within the context of a larger, more complex figure that has been purposefully designed to embed and obscure the simple figure.

Table 1
Styles in the Cognition-Centered Approach

Style	Reference	Definition
Abstract versus concrete	Harvey, Hunt, & Schroder (1961)	Preferred level of abstraction
Category width	Pettigrew (1958)	Degree to which people act on awareness of differences
Cognitive complexity	Gardner & Schoen (1962)	Tendency to make more and more complex associations between groups
Compartmentalization	Messick & Kogan (1963)	Tendency to compartmentalize ideas into discrete categories
Conceptual differentiation	Gardner & Schoen (1962)	Spontaneous differentiation of heterogeneous items into related groups
Conceptual integration	Harvey et al. (1961)	Relating of parts to each other and to prior concepts
Conceptual style	Kagan, Moss, & Sigel (1963)	Preference for analytical versus relational organization of information
Conceptual tempo	Kagan (1958, 1966)	Tendency to consider and reflect on alternative solution versus tendency to respond impulsively
Constricted versus flexible control	Smith & Klein (1953)	Tendency to disregard one of two conflicting cues
Field dependence versus independence	Witkin (1964)	Degree of dependence on the structure of the prevailing visual field
Scanning	Gardner & Moriarty (1968)	Extent to which an individual attempts to verify his or her judgments
Tolerance for unrealistic experiences	Klein & Schlesinger (1951)	Person's readiness to accept or report experiences at variance with what he or she knows to be true

Because the concept of psychological differentiation was originated to overcome the incompleteness of conventional intelligence tests as bases for explaining individual differences in cognition, researchers have attempted to find the relation between conventional measures of intelligence and field dependence–independence. Witkin (1975) claimed that research showed the independence of the construct from verbal skills as tapped by the Wechsler scales. Moreover, Eagle, Goldberger, and Breitman (1969) found no difference between groups in ability to acquire new information. However, the story changes with spatial aspects of abilities. Witkin (1975) himself suggested that field independence is "essentially identical" (p. 7) with the abilities required for the Wechsler Block Design, Object Assembly, and Picture Completion subtests. Cronbach and Snow (1977) suggested that field dependence–independence adds nothing to the concept of *fluid ability* (Cattell, 1971), or the ability to think flexibly and cope with novelty, and MacLeod, Jackson, and Palmer (1986) used structural equation modeling to argue that field independence is identical to spatial ability. Goldstein and Blackman (1978), reviewing 20 studies, found consistent correlations between measures of field independence and both verbal and performance aspects of intelligence. Thus, the evidence suggests a close connection and perhaps an identity between field independence and aspects of intelligence.

The Personality-Centered Approach

Whereas the styles produced by the cognition-centered approach seem quite close to abilities, the styles produced by the personality-centered approach seem closer to personality traits. Moreover, styles in this approach are measured by typical-performance tests rather than by maximum-performance tests, much as are personality traits. We discuss two of the major theories based on this approach: the theory of types associated with Jung (1923) and the energic model associated with Gregorc (1979).

The theory of types. Jung (1923) proposed a theory of psychological types, according to which individuals can be characterized as differing in terms of two attitudes (extraversion and introversion), two perceptual functions (intuition and sensing), and two judgment functions (thinking and feeling). The attitudes of extraversion and introversion describe one's basic stance in dealing with other people one encounters. Extraversion characterizes those who are outgoing, with an interest in people and the environment; introversion describes people whose interests are more inwardly focused. Intuition and sensing are used in Jung's typology to describe preferences in perceiving stimuli. An intuitive person tends to perceive stimuli holistically and to concentrate on meaning rather than details, whereas a sensing individual perceives information realistically and precisely. Thinking and feeling represent two distinct ways of judging or understanding perceived stimuli. Judgments made in the thinking mode tend to be logical, analytical, and impersonal; those made in the feeling mode are usually based on values rather than logic.

An extension of Jung's (1923) theory (Myers & McCaulley, 1985; Myers & Myers, 1980) extended the theory of types to include one more distinction, that between judgment and perception. According to this view,

there are 16 types of personality styles resulting from all possible combinations of the four different functions, each of which has two categories. For example, a sensing type who is introverted and who prefers judging with thinking is a serious, quiet person who reaches success by concentration and thoroughness. This person is practical, orderly, matter-of-fact, logical, realistic, and dependable. An intuitive extravert who prefers judging with feeling is someone who is responsive and responsible. This individual feels real concern for what others think and want and tries to handle things with regard for other people's feelings.

This view is embodied in the MBTI (Myers & McCauley, 1985), a measure of styles that has the appearance of a standard personality inventory. The measure has been widely used in education as well as in business, although its validity has been called into serious question (Druckman & Bjork, 1991, 1994). Despite these reservations, the MBTI is probably the most widely used measure of styles today. Researchers have shown statistically significant correlations of styles derived from the MBTI with the mastery of a second language (Ehrman, 1994), creative performance on the job (Jacobson, 1993), and many other activities (cf. Hahn-Rollins & Mongeon, 1988). There also have been a number of attempts to use the MBTI in school settings. For example, Huelsman (1983) found that whereas preferred styles in learners are fairly evenly distributed among psychological types, preferred styles in teaching are not. Those teachers who reported intuitive–thinking and intuitive–feeling as the preferred learning styles of their students tended themselves to prefer teaching by means of sensing–thinking and sensing–feeling styles. Huelsman suggested that this lack of congruity between teachers' and students' styles could be detrimental to teachers' effectiveness. However, Lawrence (1982) reported that extraversion and sensing (not intuition) are the most common psychological types among children in school.

Gregorc's energic model. Gregorc (1979, 1984, 1985) suggested that styles can be understood in terms of two basic dimensions: use of space and use of time. Space refers to perceptual categories for acquiring and expressing information and is divided into concrete (or physical) and abstract (or metaphorical) space. Time is divided into two different ways of ordering facts and events: sequential (i.e., in a step-by-step or branchlike manner) and random ordering (i.e., in a weblike or spiral manner).

The Gregorc Style Delineator (Gregorc, 1982) classifies individuals into four basic types: concrete–sequential —people who focus their attention on concrete reality and physical objects and validate ideas through the senses; abstract–sequential—people who prefer logical and synthetic thinking and validate information through preset formulas; abstract–random—people who tend to focus their attention on the world of feeling and emotion and to validate ideas through inner guidance; and concrete–random—people who prefer intuitive and instinctive thinking and who rely on personal proof for validating ideas, rarely accepting outside authority.

The Activity-Centered Approach

A third approach to styles is centered on the notion of styles as mediators of various forms of activities that may arise from aspects of cognition and personality. Thus, this approach attempts to move toward what its proponents would view as a more dynamic conceptualization of styles. This approach is described only briefly because there has been much less validation of its theories than of the theories described under the other two approaches.

Learning styles. A major kind of activity in which styles have traditionally been viewed as being of potential importance is learning. There are a number of theories of learning styles, but the styles are conceptualized in very different ways in these theories.

According to one approach (Renzulli & Smith, 1978), learning styles are viewed as corresponding to pupils' fit and comfort with various methods of teaching, including projects, drill and recitation, peer teaching, discussion, teaching games, independent study, programmed instruction, lecture, and simulation. Schmeck (1983) suggested differentiation of "deep" (emphasizing depth) and "elaborative" (emphasizing breadth) learning styles. Another conceptualization, that of Dunn and Dunn (1978; Dunn et al., 1989), uses four main categories: environmental (e.g., sound and light), emotional (e.g., motivation and responsibility), sociological (e.g., peers and self), and physical (e.g., perceptual and mobility).

Taking a different viewpoint, Holland (1973) suggested that job interests can be predicted by the way people seek to acquire and use knowledge: realistic, investigative, artistic, social, enterprising, and conventional. This conceptualization has generated more research than the others described in this section. In yet another view, Kolb (1974, 1978) identified four types of learning styles based on two dimensions—converging versus diverging and assimilating versus accommodating—and these four types yield different kinds of learners. For example, convergers prefer hypothetical–deductive thinking, whereas divergers prefer more imaginative and intuitive kinds of thinking.

Teaching styles. Several investigators have noted the importance of styles of teaching to the educational process. For example, Joyce and Hodges (1966) suggested that teachers who have a wider range of teaching styles are likely to be more successful than are those whose repertoire is more limited. Henson and Borthwick (1984) suggested six different and specific categories of teaching styles, namely, task-oriented, cooperative planner, child-centered, subject-centered, learning-centered, and emotionally exciting.

Evaluation of Theory and Research on Cognitive Styles

We consider here an evaluation of extant theory and research in terms of the criteria discussed above. We limit our evaluation to the cognition-centered and personality-

centered approaches because there does not appear to be sufficient validation of the activity-based approaches to evaluate them properly.

First, with regard to theoretical specification, the research under the cognition-centered approach has presented itself as a series of research paradigms, with the relations among them unclear and no clear theoretical relation to broader psychological theorizing. Although there were numerous studies involving computation of correlations between the style measures and other kinds of measures, the broadening empirical development of the work was never matched by an equal broadening in the theoretical grounding for the enterprise.

Theory and research under the personality-centered approach has yielded somewhat larger scale theories, although relations with mainstream psychological theories and paradigms still remain somewhat obscure. Jung's (1923) theory, as manifested in the MBTI, is about as broadly based as are most theories of other kinds of psychological phenomena. Realistically, people are probably not "types," whether according to this theory or any other, but rather vary continuously and somewhat differently as a function of diverse person–situation interactions.

Second, consider internal validation, which assesses whether empirical data support the proposed styles and their proposed interrelations. With regard to the cognition-centered approach, because the theories proposed were generally of individual styles, internal validation recovering a structure of the interrelations of various styles within a given theory to each other was never possible.

There has been more internal validation of theories in the personality-centered approach. The proposed factor structures of the MBTI as well as other personality-centered questionnaires have not been well supported by empirical findings (Goldsmith, 1985; Keller & Holland, 1978; Kirton & De Ciantis, 1986; Mulligan & Martin, 1980; O'Brien, 1990). Ross (1962) found a mismatch between the MBTI scales and the factors resulting from the analysis he performed. Joniak and Isaksen (1988), analyzing Gregorc's (1982) questionnaire, showed that an instrument with only two subscales (Sequential–Random and Concrete–Abstract) based on two orthogonal dimensions (ordering and perception) would give a more parsimonious representation of Gregorc's (1979) styles.

Third, consider the issue of convergent validity. With regard to the cognition-centered approach, the convergent validity of various measures of the same style, such as conceptual tempo or psychological differentiation, was never as high as originally had been hoped. For example, it was not clear that the RFT and the EFT really measured the same construct, nor that conceptual tempo as measured by the EFT really generalized much beyond similar kinds of tasks outside constrained settings (see, e.g., Butter, 1979; Messick, 1984).

Convergent-validity studies of external correlates of the personality-centered measures yield somewhat confusing findings, to the point that Messick (1984) observed that "sometimes quite disparate measures are used to assess ostensibly the same style in different studies, while on other occasions, highly similar instruments serve to tap purportedly distinct styles" (p. 59). There are some relations. For example, Joniak and Isaksen (1988) correlated scores on Gregorc's (1982) measure with scores on the Kirton Adaptation–Innovation Inventory (Kirton, 1977). Kirton's (1976) theory of styles specifies a bipolar dimension with the innovator and the adapter on opposite ends. When confronted with a problem, the adapter turns to traditional or conventional procedures to find solutions; in contrast, the innovator typically redefines the problem and approaches it from a novel perspective. The results indicated that Gregorc's (1982) sequential stylists were adapters on Kirton's scale and Gregorc's randoms were innovators; however, the concrete–abstract dimensions did not relate to Kirton's measure.

Fourth, consider discriminant validation. With respect to the cognition-centered approach, the notion of style was intended to be useful as a bridge between cognition and personality, and for the notion to succeed, discriminant validity with respect to measures of cognition and personality was essential. But the cognitive approach yielded tasks that appeared, on their surface, to be somewhat similar to those on conventional intelligence tests, with "right" and "wrong" answers and higher and lower scores. In fact, one pole of the stylistic constructs almost always seemed to correlate with measures of abilities, and in the case of psychological differentiation, it was not clear how the measures really distinguished themselves at all from performance-based and especially spatial measures of intelligence.

With respect to the personality-centered approach, it is somewhat difficult in this approach to distinguish between styles and personality traits. More conceptual clarity is probably needed regarding the differences between the two, especially with regard to domain generality versus specificity and traitlike versus statelike properties. Psychologists need to better understand the extent to which styles change over time and even over particular situations. At present, the distinction between styles and traits remains somewhat vague.

Fifth, consider heuristic generativity. With regard to the cognition-centered approach, some of the theories were generative of a wide body of research, especially the theories of conceptual tempo and psychological differentiation. But most of the theory and research on the cognition-centered approach is rather old, and although there were some programs of research in the 1970s to resurrect it (e.g., Baron, 1979; Cooper, 1976; Day, 1970; Hock, Gordon, & Marcus, 1974), these research programs never really caught on with the psychological public, and they receded, although never totally disappeared, after rather limited periods of time, presumably because of some of the validity issues discussed above.

Although personality-centered approaches have been widely used, they, too, have failed in recent years to generate much research in mainstream psychology or ed-

ucation, especially outside the circle of individuals who produce or already are adherents to the models. Although our experience suggests there are large numbers of adherents, they seem to be swayed more by personal perceived successes with the instruments or unrefereed published or unpublished reports of others regarding successes. For example, Druckman and Bjork (1991, 1994) argued that the extant literature does not support use of the MBTI in job classification and placement.

A Mental Self-Government Approach

We have proposed an approach to styles that we believe may have some merit as an alternative to some of the traditional approaches described above. The approach is for the elucidation of thinking styles and is called the *theory of mental self-government* (Sternberg, 1988, 1990, 1994a, 1994b, 1997).

The Theory

The basic idea of the theory is that the various styles of government that are seen in the world may be, at some level, external reflections of the styles that can be found in the mind. Thus, to understand the styles of thought, one can look at aspects of government for a sense of what is internally (as well as externally) possible.

The proposed theory is a nomothetic and continuous one: Everyone possesses every style to some degree, and what differs across individuals is strength of preferences and the kinds of tasks and situations that evoke various preferences. We suspect that none of the past theorists have ever viewed styles as purely idiographic and discrete. In other words, the theorists do not argue that everyone has wholly different styles and that either people have a given style or they don't. Even studies labeling children as, say, *impulsive* or *reflective* have assigned labels on the bases of discrete cutoffs assigned to values on continuous numerical scales. And we doubt anyone would have argued that reflective individuals never act impulsively, or vice versa. Rather, the discrete categories were simplifications for purposes of research.

Functions of mental self-government. Just as governments carry out legislative, executive, and judicial functions, so does the mind. The *legislative* style characterizes people who enjoy creating and formulating. Such individuals like to create their own rules, do things in their own way, and build their own structures when deciding how to approach a problem. They prefer tasks that are not prestructured or prefabricated. The *executive* style characterizes people who are implementers. They prefer to follow rules, and they often rely on existing methods to master a situation. They prefer that activities be defined and structured for them. The *judicial* style characterizes people who like to evaluate rules and procedures; who like to judge things; and who like tasks in which they analyze and evaluate existing rules, ways, and ideas.

Forms of mental self-government. There are four main forms of mental self-government. The *monarchic* style characterizes individuals who like to focus on one task or aspect of that task until it is completed. People

with a primarily monarchic style tend to focus single-mindedly on one goal or need at a time. The *hierarchic* style characterizes individuals who allow for multiple goals, each of which may be given a different priority. People with a primarily hierarchic style enjoy dealing with many goals, although they recognize that some goals are more important than others; they tend to set priorities and to be systematic in their approach to solving problems. The *oligarchic* style characterizes people who allow for multiple goals, all of which are roughly equal in importance. People with a primarily oligarchic style like to do multiple things within the same time frame but have difficulty setting priorities for getting the things done. The *anarchic* style characterizes individuals who do not like to be tied down to systems, rules, or particular approaches to problems. Often, they oppose existing systems, although not necessarily in favor of any clearly specified alternative. They tend to take a random approach to problems, thereby sometimes drawing connections that other people would not make.

Levels of mental self-government. There are two levels of mental self-government. The *local* style characterizes individuals who prefer tasks that require engagement with specific, concrete details and that often require considerable precision in execution. The *global* style characterizes individuals who prefer problems that are more general in nature and that require abstract thinking. The global person likes to conceptualize and work in the world of ideas.

Scope of mental self-government. There are two scopes of mental self-government. The *internal* style characterizes individuals who prefer tasks that allow them to work alone, independently of others. Their preference is generally to be on their own. The *external* style characterizes individuals who prefer tasks that allow them to work with other people through interaction. Their preference is to be with others.

Leanings of mental self-government. There are two major leanings of mental self-government. The *liberal* style characterizes individuals who like to go beyond existing rules and procedures and who allow substantial change from the way things are currently done. Unlike in the legislative style, however, the new ideas do not have to be the individuals' own. The *conservative* style characterizes individuals who prefer familiarity in life and to follow traditions. Unlike in the executive style, they may like to come up with their own ideas, but these ideas are grounded in existing and accepted customs.

Some general properties of thinking styles. Whenever possible, people choose styles of managing themselves with which they are comfortable. Thus, people have sets of more and less preferred thinking styles. Still, people are at least somewhat flexible in their use of styles and try, with varying degrees of success, to adapt themselves to the stylistic demands of a given situation. The flexible use of the mind for mental self-government accounts for the variety of thinking styles, and flexibility may itself be viewed as a sort of metastyle that activates, monitors, and evaluates particular styles, much

as metacomponents (higher order executive processes) control the use of the information-processing components of intelligence (Sternberg, 1985).

Styles, like abilities, are not etched in stone at birth. They appear to be largely a function of a person's interactions with the environment, and they can be developed and socialized. An individual with one style in one task or situation may have a different style in a different task or situation. Moreover, some individuals may have one preferred stylistic profile at one stage of life and another preferred stylistic profile at another stage. Styles are not fixed, therefore, but fluid.

Thinking styles seem to be largely a function of people's interactions with tasks and situations. Certain tasks are more optimally performed with certain styles. For example, creative writing or composing music might draw more on the legislative style, whereas managing a plant might capitalize on the executive style. Rewarding students for using preferred styles on these tasks is likely to lead to greater display of the rewarded styles. More generally, a child's socialization into a value system will probably reward some styles more than others, leading to preferences for these styles. But the fact that some people retain less rewarded styles despite environmental pressures suggests that socialization does not fully account for the origins of styles and that there may be preprogrammed dispositions that are difficult to change.

Assessment of Thinking Styles

We have developed a number of converging operations for measuring styles, both in adolescents and adults (see Sternberg & Grigorenko, 1995). Four of the main ones are briefly described below.

First, the Thinking Styles Inventory (Sternberg & Wagner, 1991) is a self-report measure in which students (or other examinees) rate themselves on a 9-point scale ranging from 1 (*low*) to 9 (*high*) on a number of preferences. Examples of items on the inventory are "I like tasks that allow me to do things my own way" (legislative), "I like situations in which it is clear what role I must play or in what way I should participate" (executive), and "I like to evaluate and compare different points of view on issues that interest me" (judicial).

Second, the Thinking Styles Questionnaire for Teachers (Grigorenko & Sternberg, 1993c) measures teachers' preferences for thinking styles in students (for seven of the styles). These preferences may or may not correspond to their preferences for themselves. Examples of items, rated on a 1–9 scale, are "I want my students to develop their own ways of solving problems" (legislative) and "I agree with people who call for more, harsher discipline, and a return to the 'good old ways'" (conservative).

Third, the Set of Thinking Styles Tasks for Students (Grigorenko & Sternberg, 1993a) measures students' preferences for styles in actual tasks. An example of an item is "when I am studying literature, I prefer to (a) follow the teacher's advice and interpretations of authors' positions, and to use the teacher's way of analyzing litera-

ture" (executive), "(b) to make up my own story with my own characters and my own plot" (legislative), "(c) to evaluate the author's style, to criticize the author's ideas, and to evaluate characters' actions" (judicial), or "(d) to do something else (please indicate in the space below)."

Fourth, the Students' Thinking Styles Evaluated by Teachers (Grigorenko & Sternberg, 1993b) measure has teachers evaluate the styles of individual students. Examples of items are "s/he prefers to solve problems in her or his own way" (legislative) and "s/he likes to evaluate her or his own opinions and those of others" (judicial).

Data Generated by the Theory

Internal validity. An initial study with Marie Martin (see report in Sternberg, 1994b) assessed aspects of the internal validity of the Thinking Styles Inventory. Scale reliabilities ranged from .56 (executive) to .88 (global), with a median of .78. Most of the scale intercorrelations were low. The exceptions were ones that were anticipated. Correlations greater than .50 in absolute value were global with local (−.61), liberal with legislative (.66), conservative with legislative (−.50), conservative with executive (.59), and liberal with conservative (−.60). Thus, the legislative and liberal styles tend to be associated, as do the executive and conservative ones. Global and local styles tend to be negatively associated.

A factor analysis was generally, although not totally, supportive of the structure of the theory. Five factors accounted for 77% of the variance in the data. A first factor showed high loadings (greater than .70 in absolute value) for the conservative (.87), executive (.58), liberal (−.81), and legislative (−.78) styles. Thus, this factor combined the legislative–executive distinction with the liberal–conservative one. A second factor loaded separately for judicial (.70), with a high loading as well for oligarchic (.70). Whereas the legislative and executive styles are almost diametrically opposed, the judicial style is not diametrically opposed to either, so its loading on a separate factor makes reasonable sense. A third factor contrasted external (.72) with internal (−.80). The fourth factor contrasted the local style (.92) with the global one (−.82). And the fifth factor showed a high loading for the hierarchic style (.86).

External validation. In the above study, we also looked at some correlates with other tests, both of styles and abilities. Correlations were computed with the MBTI and Gregorc's (1982) measure of mind styles. For the MBTI, 30 of 128 correlations were statistically significant, whereas for Gregorc's measure, 22 of 52 were significant. These correlations are well above the levels that would be expected by chance and suggest that the various style measures partition a similar space of the intelligence–personality interface, but in different ways. In contrast, the correlation of the measure of mental self-government with IQ was not significant, nor was the correlation with grade point average (GPA). Three styles (judicial, global, and liberal) correlated significantly and positively with Scholastic Assessment Test (SAT) Math

scores but none with SAT Verbal scores. Thus, styles do indeed appear to be largely distinct from intelligence or aptitudes.

Utility of the theory in educational settings. We have assessed the usefulness of our measures in educational settings and have obtained some interesting findings (Grigorenko & Sternberg, 1997; Sternberg & Grigorenko, 1993, 1995). In a first study (Sternberg & Grigorenko, 1995), we examined whether teachers' styles differed as a function of school. Participants were 85 teachers (57 women and 28 men). They were in four schools of widely differing types: urban, public; prestigious, traditional, private; Catholic parochial; and progressive, avant-garde, private. We found several interesting effects.

First, teachers at lower grade levels were more legislative and less executive than were teachers at higher grade levels. In other words, the teachers at the lower grade levels were more encouraging of a style linked to creativity in their work with the students (Sternberg & Lubart, 1995, 1996).

Second, older teachers were more executive, local, and conservative than were younger teachers. Of course, we do not know whether this result was a cohort effect or whether it represented an aging process. But the study indicated that, on average, the younger teachers had a style more encouraging of creativity than did the older ones.

Third, teachers showed some differences in styles across subject-matter areas. Science teachers tended to be more local, whereas humanities teachers tended to be more liberal.

Fourth, we noted large differences in stylistic patterns of teachers across schools, differences that seemed to make sense in terms of the kinds of education the schools were providing. Therefore, we decided to have an independent rater rate the ideology of each school for each of the style dimensions. The idea here was for the rater, who was unaware of our hypotheses, to rate the ideology of the school, using catalogs, faculty and student handbooks, statements of goals and purposes, curricula, and related information. Some schools, for example, were rated as ideologically more legislative or liberal than were others. We found that six of seven planned contrasts relating teacher to school styles across four schools were statistically significant when the actual styles of the teachers in the schools were compared with the rated school ideology. In particular, significant effects were obtained for the legislative, executive, judicial, local, global, and conservative styles but not the liberal style. In sum, teachers' styles tended to match the ideology of the teachers' schools.

In a second study (Sternberg & Grigorenko, 1995), we studied some style demographics for 124 students. We found that both fathers' education and occupational level were negatively related to judicial, local, conservative, and oligarchic styles. Consistent with common beliefs, later-born siblings were found to be more legislative than were earlier-born ones. Moreover, we found that students tended to match their teachers in style. As students could not possibly have been placed in classes so as to achieve such a match, the results are consistent with our notion that styles are partially socialized—they develop by internalization of styles observed in role models.

In a third study (Sternberg & Grigorenko, 1995), we queried whether students benefited if their styles matched those of their teachers. In other words, we knew from the second study that there was a tendency to match. But did students who matched actually do better than students who did not, independently of the students' abilities? We found that students were more positively evaluated by and received better grades from teachers who matched their styles than from those who did not. Moreover, teachers tended to overestimate the extent to which their students matched them in styles. In other words, teachers think their students are more like them than they really are.

This study perhaps helps us understand why, in the initial work with Marie Martin, there was no significant overall correlation with GPA. What we found were patterns of correlation between styles and academic achievement that differed widely across schools, with differences in sign ranging up to about 1.00 point of correlation across school settings. For example, correlations across the four schools for the liberal style ranged from $-.42$ to $.58$; for the conservative style, correlations ranged from $-.39$ to $.49$. Other styles also showed widespread differences, although not quite so large as these. Clearly, what is valued in one environment may actually be devalued in another.

In a fourth study of 199 high school students (146 female adolescents and 53 male adolescents) from around the United States who attended the Yale Summer Psychology Program, we investigated correlations between styles of thinking and achievement in an advanced-placement, college-level introductory psychology course (Grigorenko & Sternberg, 1997). We found consistent positive relations between judicial style and performance. Most interestingly, when abilities (analytical, creative, and practical) were used to predict school achievement, and then styles were added in through a hierarchical regression, styles made a statistically significant incremental contribution to the prediction equation.

Conclusion

To conclude, styles have a fairly long but varied history in the context of theory and research in psychology. Like wide neckties, research on styles tends to come and go. In recent years, research on styles has been relatively "out" with regard to mainstream psychological research. There are several reasons for this trend, including issues of theoretical structure, as well as ones of internal validity, convergent external validity, discriminant external validity, and heuristic usefulness. But the underlying question regarding personal preferences in the use of cognitive abilities never went away. The theory of mental self-government was proposed as a possible answer to some of the objections that have been raised in the past against

work on styles. However, much more empirical validation of this theory is needed before it can be characterized as having once again opened the doors that, to some extent, have been shutting on styles research. Moreover, the data obtained so far, such as factor analytic data, are generally supportive of the theory but not supportive in their entirety.

In any case, the theory of mental self-government will no more be a final answer than will any other single theory. The various theories of styles cover related ground, although from different standpoints. To some extent, a choice among theories will be a choice of how to carve up a "styles space," rather than a choice between different spaces of styles. The situation is analogous to that of factor analytic theories of intelligence, where much of the difference among theories can be attributed not to the factor spaces analyzed but rather to placement of dimensions within a common space (Sternberg, 1985).

We believe that styles have a great deal of promise for the future. First, they have provided and continue to provide a much needed interface between research on cognition and personality. Second, unlike some psychological constructs, they have lent themselves to operationalization and direct empirical tests. Third, they show promise for helping psychologists understand some of the variation in school and job performance that cannot be accounted for by individual differences in abilities. For example, they predict school performance significantly and add to the prediction provided by ability tests. Finally, they can truly tell something about environments as well as individuals' interactions with these environments, as shown by the fact that correlations of styles with performance that are significantly positive in one environment are significantly negative in another environment.

Fashions come and go. In recent years, styles have been relatively out of fashion because of some mixed results in internal and external (convergent–discriminant) validations. Commercialism in the pushing of specific theories and programs also may have led to distaste on the part of some scientists. But we believe that styles have served and can continue to serve an important interface at the border between personality and cognition, a border that has been and continues to be an important one. Like wide neckties, styles may come and go, but they never will go completely out of style.

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