

Handbook of Intellectual Styles

Preferences in Cognition,
Learning, and Thinking



Editors
Li-Fang Zhang
Robert J. Sternberg
Stephen Rayner

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Learning, and Thinking*

Li-fang Zhang, PhD, is Associate Professor in the Faculty of Education at The University of Hong Kong, where she served as Associate Dean between 2007 and 2010. She is the author of over 100 peer-reviewed articles, book chapters, and books. Two of her recent books (with Dr. Robert J. Sternberg) are *The Nature of Intellectual Styles* and *Perspectives on the Nature of Intellectual Styles*. She serves on the editorial boards of *Educational Psychology*, *Educational Psychology Review*, and *Journal of Cognitive Education and Psychology*. Her main areas of research include intellectual styles, giftedness, personality, and student development in higher education.

Robert J. Sternberg, PhD, is Provost and Senior Vice President as well as Professor of Psychology at Oklahoma State University. His PhD is from Stanford and he holds 11 honorary doctorates. Dr. Sternberg is the author of roughly 1,250 publications and has won two dozen awards. He is President-Elect of the Federation of Associations of Brain and Behavioral Sciences, President of the International Association for Cognitive Education and Psychology, and a former President of the American Psychological Association. His main areas of interest are in intelligence, creativity, wisdom, intellectual styles, and leadership.

Stephen Rayner, PhD, is Professor of Education at Oxford Brookes University, UK. He is an internationally recognized scholar in the field of individual differences, educational leadership, and the management of inclusive education. His recent research includes the study of knowledge production in cognitive style research; examination of the construction and use of online personalized pedagogies; evaluation of doctoral pedagogies, learning, and curricula; and investigation of academic leadership in the role of the professoriate in the "UK University." He formerly taught in secondary and special education before moving to the University of Birmingham, where he worked more recently as the Director for Postgraduate Research Studies.

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 **SPRINGER PUBLISHING COMPANY**
NEW YORK

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Springer Publishing Company, LLC
11 West 42nd Street
New York, NY 10036
www.springerpub.com

Acquisitions Editor: Nancy S. Hale
Composition: Techset

ISBN: 978-0-8261-0667-4
E-book ISBN: 978-0-8261-0668-1

11 12 13/ 5 4 3 2 1

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Printed in the United States of America by Bradford & Bigelow

*To our children (Ashley, Seth, Sara, Samuel, Brittany, Melody,
Michael, and James), who have taught us first-hand that people learn
and think in different ways.*

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Contributors

Steven J. Armstrong, PhD, Hull University Business School, Hull, United Kingdom

Olesya Blazhenkova, PhD, Department of Psychology, National University of Singapore, Singapore

Simon Cassidy, PhD, Directorate of Psychology, Counseling, and Psychotherapy, University of Salford, Salford, United Kingdom

David W. Chan, PhD, Department of Educational Psychology, The Chinese University of Hong Kong, Shatin, Hong Kong

Eva Cools, PhD, Competence Center People & Organization, Vlerick Leuven Gent Management School, Gent, Belgium

Carol Evans, PhD, College of Social Sciences & International Studies, University of Exeter, Exeter, United Kingdom

Wei-qiao Fan, PhD, Department of Psychology, Shanghai Normal University, China

Seval Fer, PhD, Curriculum and Instruction Field, Educational Science Department, Faculty of Education, The University of Trakya, Turkey

Adrian Furnham, PhD, Department of Clinical, Educational, and Health Psychology, Division of Psychology and Language Sciences, University College London, London, United Kingdom

Melissa I. Gebbia, PhD, Department of Psychology, Molloy College, Rockville Centre, NY

Elena L. Grigorenko, PhD, Child Study Center, Yale University, New Haven, CT

Kyle A. Hartley, MA, School of Education, Indiana University, Bloomington, IN

Yunfeng He, PhD, Institute of Knowledge and Value Sciences, Shanghai Normal University, China

Andrea Honigsfeld, EdD, Division of Education, Molloy College, Rockville Centre, NY

Maria Kozhevnikov, PhD, Department of Radiology, Martinos Center for Biomedical Imaging, Harvard Medical School, Charlestown, MA

Samuel D. Mandelman, MA, EdM, Department of Human Development,
Teachers College, Columbia University, New York, NY

Tine Nielsen, PhD, Centre for Clinical Education, Copenhagen University Hospital,
The University of Copenhagen, Denmark

Jonathan A. Plucker, PhD, School of Education, Indiana University, Bloomington, IN

Stephen Rayner, PhD, Westminster Institute of Education, Oxford Brookes
University, Harcourt Hill, Oxford, United Kingdom

Esther Roodenburg, PGDip, Faculty of Education, Monash University,
Clayton Campus, Victoria, Australia

John Roodenburg, PhD, Krongold Center, Faculty of Education, Monash University,
Clayton Campus, Victoria, Australia

Eugene Sadler-Smith, PhD, School of Management, University of Surrey, Guildford,
United Kingdom

Robert J. Sternberg, PhD, Office of the Provost, Oklahoma State University,
Stillwater, OK

Beatrice I. J. M. van der Heijden, PhD, Department Strategic HRM, Faculty of
Management Science, Institute for Management Research, Radboud University,
The Netherlands

Michael Waring, PhD, School of Sport, Exercise, and Health Sciences, Loughborough
University, Loughborough, United Kingdom

Li-fang Zhang, PhD, Faculty of Education, The University of Hong Kong,
Hong Kong

Preface

“Intellectual styles,” a generic term for all style constructs, with or without the root word “style,” refer to people’s preferred ways of processing information and dealing with tasks. The accumulated knowledge in the field of intellectual styles has reached a new level of maturity. We see this maturity reflected in the nature of the research questions asked, the range of issues and topics investigated, the scope of investigations, the increasing sophistication of the research methodologies employed, the adequacy of the theoretical advancements achieved to account for and integrate the increasing body of empirical data, and the connections between the literature on intellectual styles and scholarship in other areas of psychology, education, and business, as well as allied fields.

The goal of this handbook is to provide a complete, definitive, and authoritative single volume on intellectual styles. Specifically, the handbook is designed to achieve three objectives. The first is to create a reference for scholars and students from diverse areas (e.g., education, business, health sciences, and psychology) who wish to understand more about intellectual styles and their related constructs such as intelligence, creativity, metacognition, personality, and human development. The second is to provide an up-to-date, panoramic picture of the current state of research on intellectual styles. The third is to make available resources for anyone who is interested in applying the notion of styles to his/her work or personal life.

To this end, this book contains 19 chapters covering a wide range of issues and topics in this field, all written by leading experts who have either constructed conceptual frameworks or published work based on empirical investigations, or who have done both. The 19 chapters are divided into seven parts. Part I, the introduction, sets the stage for the remaining parts. In particular, it highlights some of the long-standing challenges facing researchers in the field, recounts the major achievements of the field in the past three decades, and makes suggestions for future research. Part II concerns the foundations of the field of intellectual styles: its historical literature, theory building, and measurement. Part III considers the development of intellectual styles: their etiology and their relationships to demographic characteristics and to culture. Part IV examines intellectual styles in comparison with related constructs: metacognition, intelligence, creativity, and personality. Part V looks at the roles of intellectual styles in human performance: academic achievement, learner developmental outcomes, management of careers, and work performance. Part VI focuses on applications of intellectual styles in various contexts: educational instruction and assessment, organizational behavior and management, and the education of exceptional learners. Part VII, the conclusion, addresses our continuing concern for a more strategic attempt at developing the identity of the field. It also is concerned with the continuing development of intellectual-styles theory, to support further basic, translational, and applied research within the paradigm.

The *Handbook of Intellectual Styles* is intended to be accessible to a diverse audience of readers. Although the editors come from a psychological background, the contributors are scholars from various academic areas, including business, education, sports, and health sciences, as well as psychology. The diverse topics relevant to intellectual styles will be of interest not only to students and scholars in the aforementioned academic disciplines but also to anyone who would like to understand intellectual styles and their effects on daily life.

Acknowledgments

We are grateful to Philip Laughlin for contracting the book. We sincerely thank our acquisitions editor Nancy Hale and assistant editor Kathryn Corasaniti for their continuing and tireless help with the book. We would like to thank all styles researchers whose publications have made this Handbook possible. We also would like to thank our children and our students, who have taught us so much about intellectual styles.

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1

Intellectual Styles: Challenges, Milestones, and Agenda

Li-fang Zhang, Robert J. Sternberg, and Stephen Rayner

At one time or another, we have all come across one or more of the following phenomena: (1) Alice is considered to be bright by one teacher, but not by another; (2) Michael has failed a multiple-choice test, but has excelled on an individual project; (3) Professor Miller was evaluated very highly by one group of students, but very poorly by another; and (4) Mrs. Jones did not do well in one particular business setting, but she was a great asset in another. These phenomena and many other similar ones we observe in education and in business settings were traditionally attributed to either abilities or personality, or perhaps to attitudes. However, in the past several decades, the construct of intellectual styles has been used to explain aspects of these situations.

“Intellectual styles,” an umbrella term for all style constructs, with or without the root word “styles,” refers to people’s preferred ways of processing information and dealing with tasks (Zhang & Sternberg, 2005). Different scholars have their own preferred style terms, both in their writings and in the talks they deliver, including “cognitive style,” “learning style,” “thinking style,” “mind style,” “mode of thinking,” or “teaching style.” However, many contemporary styles researchers agree that “style” constructs are encompassed by the term “intellectual styles,” which was initially proposed by Zhang and Sternberg (2005) in their “a Threefold Model of Intellectual Styles.”

The field of intellectual styles has a long and complicated history of nearly eight decades—that is, if one accepts the view that the notion of styles was first introduced into psychology by Gordon Allport (1937), when he referred to “styles of life” as a means of identifying distinctive personality types or types of behaviors. Some fields in psychology and other sciences have a unified history and interconnected philosophical and theoretical foundations; others do not. The field of intellectual styles is one of those that does not. A thorough historical account of the diverse philosophical–theoretical foundations of the field is well beyond the scope of this chapter. Proper historical treatments of the field are available elsewhere (e.g., Dember, 1964; Grigorenko & Sternberg, 1997; Kagan & Kogan, 1970; Messick, 1994; Moskvina & Kozhevnikov, 2011; Rayner & Riding, 1997; Vernon, 1973; Zhang & Sternberg, 2006) and in this volume (Chapter 2). This chapter focuses on delineating

the challenges faced by the field, which arise from its having multiple origins, and discusses the impact of these challenges on research activities in the field in the past three decades.

The remainder of this chapter is divided into three parts. The first discusses some of the long-standing challenges faced by researchers in the field. The second records the key milestones of the field in the past three decades. In the final part, some conclusions are drawn.

MAJOR CHALLENGES

During its long history, the field of intellectual styles has faced several major challenges that, on the one hand, have been impediments to the advancement of the field and, on the other, have served as a major impetus for researchers to continue to pursue research that has been increasingly more able to meet these challenges. Several authors have attempted to identify the various challenges encountered by the developing field of styles at particular points in time (e.g., Messick, 1994; Miller, 1987; Riding & Cheema, 1991; Sternberg, 2001; Zhang & Sternberg, 2006). We see the field as having been presented with three principal challenges: (1) a lack of identity, (2) the existence of three major controversies concerning the nature of styles, and (3) the confusion brought about by several critical reviews of the field.

Searching for Identity

During its long history, the field of intellectual styles has been struggling to find an identity within the larger context of the education, psychology, and business literatures. Such a struggle is the result of several related difficulties. One difficulty has been the lack of a clear definition of the style construct because styles easily can be mistaken for abilities or personality traits. As suggested by Sternberg (2001), one of the principal factors that contributed to the decline in styles research during the 1970s was that some early theories proposed styles that could not be shown to be “pure” style constructs. These styles were not clearly distinguishable from either abilities or personality traits. As a result, investigation into styles easily became assimilated into that of either abilities or personality, so that a distinct area of research on styles no longer seemed to be necessary.

With regard to the relationship between styles and abilities, the focal point of discussion has been Witkin's (1954) construct of field dependence/independence (FDI). Although some scholars (Kagan & Kogan, 1970; Jones, 1997; Satterly, 1976) have fervently argued that the FDI is a cognitive style construct, others (e.g., Richardson & Turner, 2000; Zigler, 1963) have insisted that the FDI construct is not a style construct because intelligence plays a critical role in individuals' performance on tests of the FDI construct. Similarly, the relationship between styles and personality has also been the subject of much debate. Some scholars (e.g., Cattell, 1973; Korchin, 1982; Messick, 1994) have argued that styles should be organized within the broader personality systems. Others (e.g., Furnham, 1995; Meyers, 1988) have

taken the opposite view, placing more emphasis on the contributions of personality to styles. Still others (e.g., Kogan & Block, 1991) have adopted a more balanced position, contending that the relationship between styles and personality is bidirectional and interactive.

A second difficulty that has contributed greatly to the field's lack of identity has been the absence of a common language and a common conceptual framework within which work on styles could be understood. Such a lack of a common language and a common conceptual framework has been attributed to the huge number of style labels generated, accompanied by a corresponding number of style measures (e.g., Evans & Waring, 2009; Messick, 1994; Miller, 1987; Vernon, 1973). Indeed, the number of style labels has increased with time. When reviewing the then-existing work on styles, Hayes and Allinson (1994) noted that there were 22 different dimensions of cognitive style alone. A recent review (Coffield, Moseley, Hall, & Ecclestone, 2004) recorded, as Evans and Waring put it, "a bewildering library of style measures (over 71 theories of styles)" (Evans & Waring, 2009, p. 172).

This lack of a common language and a common conceptual framework for understanding work on styles eventually led to a reduction in the quantity (and, arguably, quality) of styles research between the early 1970s and the mid-1980s (e.g., Jones, 1997; Riding & Cheema, 1991). Riding and Cheema once compared the manner in which scholars were investigating styles to "the blind man and the elephant" (Riding & Cheema, 1991, p. 193). This "blind man and the elephant" phenomenon, despite becoming somewhat less apparent over time, especially within the last decade, still exists today.

A third difficulty that has contributed to the lack of identity of the field is the limited contact that the styles literature has had with the literatures in the larger setting of business, education, and psychology. Consider the case of styles in the context of psychology: It is commonly acknowledged (e.g., Kagan & Kogan, 1970; Messick, 1994; Morgan, 1997; Rayner & Riding, 1997; Vernon, 1973) that the field of intellectual styles is rooted in diverse philosophical and theoretical foundations, ranging from the classical Greek literature, to conceptions of individual differences, to Jung's (1923) theory of personality types. Similarly, work on styles has drawn on diverse research traditions, most notably cognitive-developmental psychology; differential psychology; Gestalt psychology; psychoanalytic ego psychology; and the experimental psychology of cognition (Messick, 1994). However, there has been neither much articulation on exactly how styles are rooted in and related to constructs in these aforementioned fields, nor adequate empirical evidence supporting the claim for such a historical account.

Also consider the case of styles in the context of business: Until recently, much of the styles work done within the context of business settings had been based on the Myers-Briggs Type Indicator (Myers & McCaulley, 1985), which has its origins in Jung's (1923) theory of personality types, and on the Kirton Adaption-Innovation Inventory (1976), grounded in Kirton's (1961) theory of decision-making styles. Although research based on these two style constructs had been fruitful, it was not clear whether or not the remaining multitude of style constructs would matter in business contexts.

Finally, consider the styles work that has been carried out within the context of education. No doubt, much of the published styles literature has come from research

in the education context. However, this literature had until recently been dominated by studies that examined the relationships of styles to academic achievement. Understanding the roles of intellectual styles in students' academic performance is important to both styles researchers and educators. Nonetheless, efforts to understand styles within other aspects of education are insufficient.

To summarize, the field has been struggling with its identity as a result of (1) the difficulty of distinguishing styles from abilities and personality, (2) the lack of a common language and a common conceptual framework, and (3) the lack of contact between the styles literature and other more general bodies of literature. In the history of the field, these difficulties have been a double-edged sword. On the one hand, they have prevented the styles field from making the degree of progress it should have made. On the other, they have also acted as a positive force in steering the field forward. Over the years, especially in the past three decades, great progress has been made in each of the above three areas (see the discussion in the next part, "Key Milestones in the Past Three Decades").

Three Controversial Issues Concerning the Nature of Intellectual Styles

The field has also been challenged by three major controversial issues concerning the nature of intellectual styles: (1) styles as different constructs versus similar constructs with different labels (also known as the issue of style overlap); (2) styles as traits versus states (also known as the issue of style malleability); and (3) styles as value-free versus value-laden (also known as the issue of style value).

Style Overlap

As noted earlier, one of the major contributors to the lack of identity of the field has been the massive production of style labels. One naturally wonders whether there are any relationships among these style labels. If one preferred to use a deep approach to study in a learning context, would one also tend to use an innovative decision-making style at work? What are the major differences among, say, cognitive styles, learning styles, and thinking styles? Are styles different constructs, or are they merely similar constructs that have been given different labels (e.g., Coan, 1974; Fowler, 1980; Miller, 1987; Riding, 1997)? Such questions have puzzled not only scholars in the field, but also laypeople who are interested in the notion of styles.

In the literature, although it was not until 2005 that Zhang and Sternberg openly addressed these questions by discussing the issues of style overlap, style overlap (or style uniqueness) has always been the subject of intense discussion. Broadly speaking, these discussions have taken place at two levels: the empirical and the conceptual.

Conceptualization of the relationships among the multitude of style labels has been a daunting task. Some scholars have implicitly addressed this issue through defining styles. In so doing, some of them have focused on the unique characteristics of particular style labels without acknowledging the existence of style labels other

than the ones they were trying to define. For example, Anastasi (1988) defined *cognitive styles* as broad, systematic features affecting an individual's responses to a variety of circumstances. Similarly, Gregorc (1979) defined *learning styles* as the distinctive behaviors that indicate how a person learns from and adapts to his/her environment.

Other scholars, however, have put more emphasis on the commonalities among style labels and have demonstrated more awareness of the coexistence of multiple style terms. For example, Tennant stated: "'Cognitive style,' 'learning style,' and 'conceptual style' are related terms that refer to an individual's characteristic and consistent approach to organizing and processing information" (Tennant, 1997, p. 80).

Sternberg and Zhang (2001) took a position that both acknowledged the commonalities among all styles and recognized the unique characteristics that each style possessed. Specifically, while acknowledging that all styles share a key feature in that they are different from abilities, Sternberg and Zhang articulated the differences among learning styles, thinking styles, and cognitive styles by stating how each of the style constructs could be used: "Learning styles might be used to characterize how one prefers to learn about (particular material/information); ... Thinking styles might be used to characterize how one prefers to think about material as one is learning or after one already knows it; ... Cognitive styles might be used to characterize ways of cognizing the information" (Sternberg & Zhang, 2001, p. vii).

It is not surprising that such diverse views on the relationships among different styles have engendered efforts to clarify the issue of style overlap. In this regard, the most explicit efforts at the conceptual level have been manifested in the series of attempts to integrate the various style terms. Between 1983 and 2009, six major attempts were made (see the section "Integrative Style Models").

Style Malleability

As previously noted, styles have often been mistaken for either abilities or personality traits. It is widely believed that abilities can be enhanced through either maturation or deliberate exposure and training. In contrast, personality, until recently (Caspi, Roberts, & Shiner, 2005; Helson, Kwan, John, & Jones, 2002), had been regarded as a set of inner traits that was hard to change, if it could be changed at all. Where does the concept of style stand regarding its malleability? Answers to this question form the second long-standing controversial issue in the field. Two opposing views have been expressed.

To begin with, the disagreement over the malleability (or stability) of styles can be clearly discerned in the definitions of styles that various scholars (Kalsbeek, 1989; Messick, 1984) have proposed. Although these definitions share a major similarity, in that all styles communicate the idea that people have a predilection for attending to information in certain ways (but not in other ways), they differ in a fundamental way. Some definitions portray styles as a "characteristic mode or way of manifesting cognitive and/or affective phenomena" (Royce, 1973, p. 178), suggesting that styles are essentially stable traits, whereas others depict styles as being socialized and teachable (Sternberg, 1997). From the perspective of the

fundamental issue of the human capacity for change, Henson and Borthwick contended: "Since it is readily recognized that the majority of humans are capable of changing, both teaching and learning styles can therefore be manipulated" (Henson & Borthwick, 1984, p. 6).

Another perspective from which the issue of style malleability has been discussed is that of one particular style construct. In this regard, Witkin's FDI construct has always been a focal point for discussion, with some scholars (Bock & Kolakowski, 1973; Wertheimer, 1945; Wittig, 1976) in favor of the view that people's levels of FDI are fixed and others (Connor, Schackman, & Serbin, 1978; Renner, 1970; Sherman, 1967) insisting that FDI can be modified. Another style construct whose malleability (or stability) has often been discussed is Kirton's (1961) adaption–innovation (A–I) construct. Thus far, the prevailing view has been that A–I styles are stable (e.g., Clapp & De Ciantis, 1989; Kirton, 1976; Tullett, 1997).

Over the years, similar arguments from both sides have continued to be made, and the confusion created by these arguments has inevitably prevented the field from progressing in some ways. At the same time, such debates have led to efforts to find more balanced ways to address the issue of style malleability. For example, Vermunt (1992) asserted that although learning styles (later on termed as "learning patterns" in the context of research based on Vermunt's Inventory of Learning Styles) exhibit quite a high degree of stability, there still may be some learning components with stable characteristics (see also Tracey & Robbins, 2005). Further discussion on more recent efforts to address the issue of style malleability can be found in the next part ("Key Milestones in the Past Three Decades") of this chapter.

Style Value

As noted earlier, many style models have been created in the history of the field of styles. Within each style model, there are at least two different individual styles (e.g., field-dependent and field-independent styles in Witkin's theory of psychological differentiation; the 13 thinking styles in Sternberg's theory of mental self-government; and so forth). One would naturally wonder whether some styles are better than others. Are some styles more worth developing than others? These questions concern the issue of style value.

In the history of styles, no one has pursued the issue of style value as persistently as have Nathan Kogan and Samuel Messick. Kogan (1973) proposed a threefold distinction among styles regarding their value implications and their functional distance from the ability domain. Type I styles closely resemble abilities, as they are assessed by maximal-performance measures reflective of accuracy versus inaccuracy of response. By implication, Type I styles, which require accurate responses, are uniformly valued. For Type II styles, measurement cannot be characterized in terms of accuracy of response. However, some Type II styles are valued more than others in performance. Type III styles are characterized by their detachment from accuracy of performance as well as from value judgment. Kogan and Saarni referred to these styles as "value-free, preference-oriented Type III cognitive styles" (Kogan & Saarni, 1990, p. 4).

In his review of Witkin's 1977 Heinz Werner Lecture, Kogan commented that the FDI construct is not "quite as value free as Witkin would have liked it to be" (Kogan, 1980, p. 597)—FI individuals perform better than do FD ones on the standard indicators of the FDI construct. Kogan believed that the alleged compensating strengths of FD individuals in the interpersonal sphere had yet to be demonstrated. Subsequently, using convincing examples that ranged from the domain of performance to deliberate training of styles, Kogan (1989) asserted that styles were not and never had been value free.

At the same time, the issue of style value appears to have been one of Messick's focal points in his exposition of the nature of intellectual styles. For example, when Messick (1984) commented on Kogan's (1973) threefold distinction of styles, particularly with regard to Type II styles, he argued that the normally not-so-valued styles might show strengths under some circumstances. That is to say, styles could be value differentiated.

Ten years later, within the context of illustrating the differences among styles and abilities, Messick (1994) slightly shifted his emphasis from styles as mainly value differentiated to styles as mainly value directional. He affirmed that although there was ample evidence indicating that FD individuals were interpersonally oriented, there was hardly any evidence that they demonstrated superior interpersonal skills. To be exact, the FDI construct leans more toward being value directional.

Finally, Messick (1996) once again cogently articulated his view of style value—this time, within the context of discussing problems associated with the notion of style match. He convincingly made the case that matching styles itself is profoundly value laden.

Apart from Kogan and Messick, other scholars have also raised the issue of style value. For example, Shipman argued that one of the most appealing aspects of the style concept is that it was "intended to characterize the 'how' rather than the 'how much' of cognition . . . Nevertheless, with some styles, one pole *is* explicitly more valued than another, while with others, no particular value preference is noted" (Shipman, 1989, p. 6). Also, for example, in defining thinking styles, Sternberg noted that styles are not 'better' or 'worse'" (Sternberg, 1996, p. 347).

Over the years, Sternberg has developed a new perspective on the issue of style value. In 2005, together with his collaborator Zhang, Sternberg contended that Type I intellectual styles, which are more creativity-generating and denote higher levels of cognitive complexity, are normally more adaptive than Type II intellectual styles, which communicate higher degrees of norm-conformity and suggest more cognitive simplicity (Zhang & Sternberg, 2005).

Critical Reviews

The field of styles has been periodically challenged by trenchant critiques. These critiques have attempted to "undo or discount the style as a meaningful construct or to discredit its purported indicators as measures of something else entirely, such as intellectual ability" (Messick, 1994, p. 131).

As noted earlier, several authors (Jones, 1997; McKenna, 1983, 1984; Richardson & Turner, 2000; Zigler, 1963) have discounted the FDI construct as a style construct for the simple reason that performance on the Embedded Figures Test tends to be correlated with intellectual tasks that require visual disembedding. However, such a judgment is quite hasty. The overlap of one construct with another does not warrant the discrediting of either construct because each construct still possesses its unique characteristics and each explains a different phenomenon. In fact, scholars (e.g., Kogan, 1983) have long recognized that individuals' styles of cognition necessarily overlap with their problem solving and general intellectual functioning. Indeed, in the very same article in which McKenna (1983) was arguing that measures of FDI should be considered as ability measures, McKenna (1983) cited the work of Turner, Willerman, and Horn (1976) that found substantial overlap between Cattell's (1969) personality trait Independence and the Wechsler Adult Intelligence Scale. By implication, one could ask if such an overlap would cause Cattell's personality trait measure to be regarded as an ability measure. Probably not.

Another widely known attack on styles work was launched by Tiedemann (1989). After reviewing as few as eight style concepts and their measures, Joachim Tiedemann expressed his disillusionment with the notion of styles: "At the moment, nobody can claim that cognitive styles do not exist. But life is short, and so my personal opinion on the state of research into cognitive styles has to be: There is no point in chasing a chimera!" (Tiedemann, 1989, p. 273). However, as Messick (1994) has pointed out, throughout his review, Tiedemann mistook style measures for style constructs. Moreover, Tiedemann rejected some concepts (e.g., cognitive complexity versus simplicity) as style constructs because they are value directional; yet, as discussed earlier and to be elaborated more fully later, some styles are bound to be value directional.

Another attack on styles work was launched by Frank Coffield and his colleagues (Coffield et al., 2004) at the University of London. This critique was not without its merits, as it did raise some valid and important points, including some of the challenges that we discussed earlier.

However, the critique was dismissive of the relevance of styles for education. Rayner, for example, argued that the critique adopted a fundamentally flawed methodology of review. It traversed different paradigms in evaluating the styles literature at different stages of the review, and it used secondary sources in its argument that the majority of style measures lacked rigor. As another example, the authors criticized the field of styles as "fragmented, isolated, and ineffective" (Rayner, 2007, p. 136). However, the authors largely ignored the progress in other parts of the field. Most notably, at the time when the reviewers were preparing the report, at least four major attempts (Curry, 1983; Grigorenko & Sternberg, 1995; Miller, 1987; Riding & Cheema, 1991) had been made to bring together the fragmented body of literature, which are not considered in the critique.

As a final example, the authors questioned the relevance of styles to education, contending that individualized instruction was difficult and perhaps even unnecessary. We think that the authors quite simply missed the point about the relevance of styles to education. No one would be so ambitious as even to think about having

teachers “routinely changing their teaching style to accommodate up to 30 different learning styles in each class . . .” (Coffield et al., 2004, p. 122). This aspect of the critique is the subject of a classical debate in the field of styles: the debate over the “matching hypothesis.” Indeed, the so-called matching hypothesis is a constant point of criticism, as it is in the next critique.

A recent critique emanated from a group of American psychologists (Pashler, McDaniel, Rowher, & Bjork, 2008). In this critique, the authors argued that because there is no adequate empirical evidence supporting the so-called matching hypothesis, style assessments should not be incorporated into general educational practice. The authors even went so far as to recommend: “Thus, limited education resources would better be devoted to adopting other educational practices that have a strong evidence base . . .” (Pashler et al., 2008, p. 105). They were very limited in the sample of studies they used to form their critique. The authors equated a selected number of what Grigorenko and Sternberg (1995) called “activity-centered” styles (e.g., learning styles as conceptualized into the popular VAK—visual, auditory, kinesthetic) with the entire body of style theories and research that had been presented and debated.

Based on her research into university students’ preferences for teachers’ teaching styles, Zhang (2007) argued that a style match should be broadly interpreted as a situation in which teachers’ teaching styles or the learning environment created by the teachers meet the learning or personality needs of students. If a teacher is “teaching” in a way that fails to meet the learning needs of the student, the teacher is not really teaching.

Despite its limitations, the critique by Pashler and his colleagues (2008) was reported by the *Chronicle of Higher Education* (CHE) (January 8, 2010) under the title “Customized Teaching Fails a Test.” The author of the CHE article (Glenn) did try to present a more balanced view by citing the counter-arguments of such heavyweight style researchers as David Kolb, Richard Meyers, and Robert Sternberg. However, titles such as “Customized Teaching Fails a Test” and the one-sided and unqualified arguments against the notion of styles are likely to stay in the minds of those who are not familiar with the styles literature, scholars and the general public alike.

KEY MILESTONES IN THE PAST THREE DECADES

Despite the challenges illustrated in the preceding, and indeed, partially because of them, the field of styles has regained great momentum in the past three decades. This renewed interest in styles work has been manifested through scholars’ concerted efforts to produce work that is better able to address the nature of intellectual styles as it pertains to (1) the relationship of styles to ability and personality, (2) the three controversial issues concerning styles, and (3) the place of the styles literature within the larger context of psychological, educational, and business literatures. Theoretical conceptualization and empirical findings from a large number of studies (such as the ones reviewed in the relevant chapters in this volume) conducted during the past three decades and earlier in the history of the field can be used to address

many important aspects of the three aforementioned issues. However, four types of publications produced in the recent three decades can be perceived as landmark works in the field, and they directly and systematically address these issues. These publications include: (1) six integrative style models, (2) one individual style model, (3) 10 special issues on styles published in five academic journals, and (4) four scholarly books.

Integrative Style Models

Facing the various challenges presented to the field, several scholars have attempted conceptually to integrate the style labels that have existed at different points in time. Between 1983 and 2009, six integrative models resulted from these endeavors: (1) Curry's (1983) "onion" model of learning styles; (2) Miller's (1987) model of cognitive processes and styles; (3) Riding and Cheema's (1991) model of cognitive styles; (4) Grigorenko and Sternberg's (1995) model of style traditions; (5) Zhang and Sternberg's (2005) threefold model of intellectual styles; and (6) Sadler-Smith's (2009) duplex model of cognitive style. We introduce the essence of each of these models and discuss how each model has taken up aspects of the aforementioned challenges.

Curry's "Onion" Model

Curry (1983) pioneered the effort to systematize the diverse style labels in the field by constructing a model of nine *learning*-style measures (subsequently expanded to 21 inventories) that can be organized into three layers resembling those of an onion. The innermost layer of the style onion is composed of measures of personality dimensions. The middle layer comprises style measures that assess information processing. The outermost layer consists of measures assessing individuals' instructional preferences. According to Curry (1983), learning behaviors are fundamentally manipulated by styles grounded in the deep structure of personality, translated through information-processing styles, and ultimately, interact with instructional preferences. Such dynamics ascribed to learning behaviors clearly represent Curry's position on style malleability. Curry anticipated and proved (through providing test–retest reliability data) that styles in the outermost layer of the onion demonstrated the largest degrees of modifiability, and that styles in the innermost layer were the least modifiable.

Curry's model also explicitly addressed the issue of style overlap. Indeed, Curry noted that the validity of the onion model could be demonstrated by data that (1) reveal strong associations among measures in the same layer; and (2) suggest that styles in the innermost layer are psychometrically essential to those in the other two layers.

Finally, Curry's model also has heuristic value for understanding the relationships of styles to personality and behavioral constructs. As Rayner and Riding (1997) pointed out, the onion model can be perceived as a useful effort to integrate cognition-, personality-, and activity-centered research.

Miller's Model of Cognitive Processes and Styles

Miller (1987) perceived *cognitive* styles as comprising individual differences in the various subcomponents of an information-processing model of three fundamental types of cognitive processes: perception, memory, and thought. Miller suggested that all cognitive styles are subordinate to a broad stylistic dimension (analytic–holistic) that is composed of cognitive styles, each contributing to a consistent individual difference in cognitive processing.

Among the six existing models, Miller's model stands out as one that has made the most explicit effort to establish links between the concept of styles and other literatures—in this case, that of cognitive processes. Moreover, in his subsequent work, Miller went far beyond examining cognition-oriented styles. He incorporated a personality typology of cognitive, affective, and conative dimensions into his original model (e.g., Miller, 1991) and provided preliminary empirical evidence for his revised model.

Miller's model did not directly address any of the three controversial issues concerning styles. However, Miller's position on style malleability and on style overlap can be clearly discerned in his articulation of his model. Miller held the view that styles represent a way of characterizing stable individual differences, although he did not claim that styles are static. Furthermore, given that all styles, according to Miller, fall along the analytic–holistic dimension, one could anticipate extensive overlaps among styles within the same pole of the style dimension.

Riding and Cheema's Model of Cognitive Styles

Anchored in their analysis of the descriptions, correlations, methods of assessment, and effects on the behavior of more than 30 style labels, Riding and Cheema (1991) concluded that these style labels could be classified along two primary cognitive-style dimensions: wholist–analytic and verbal–imagery. The former dimension pertains to whether an individual tends to process information in wholes or does so in parts; the latter concerns whether an individual has a propensity to represent information by thinking verbally or in terms of mental pictures.

Of all the aforementioned challenges presented to the field, two have been overtly addressed in Riding and Cheema's model. The first is the model's attempt to establish its link to other literatures, most noticeably that of cognitive neuroscience (Riding, Glass, Butler, & Pleydell-Pearce, 1997). Furthermore, in presenting their model of cognitive styles, Riding and Cheema made the issue of style overlap another primary point for discussion. Specifically, the authors maintained that styles that are strongly associated with one another should be subsumed under the same end of a style dimension.

Grigorenko and Sternberg's Model of Style Traditions

Grigorenko and Sternberg (1995) made their contributions to bringing order to the considerable number of style labels by recognizing three traditions in the study of styles: cognition-centered, personality-centered, and activity-centered. Styles in the cognition-centered tradition most closely resemble abilities. Moreover, like abilities,

styles in this tradition (e.g., Witkin's field-dependent/independent styles; Witkin, 1962) are measured by tests of maximal performance with "right" and "wrong" answers. The personality-centered tradition considers styles as most closely resembling personality traits. Furthermore, like personality traits, styles in this tradition (e.g., Jung's personality styles; Jung, 1923) are measured by tests of typical, rather than maximal, performance. The activity-centered tradition emphasizes that styles are mediators of activities that arise from both cognition and personality (e.g., learning approaches; Biggs, 1978; Entwistle, 1981).

Clearly, such a classification of styles work speaks directly to the long-standing issue of what styles are vis-à-vis abilities and personality. Styles are neither abilities nor personality. However, some styles are more related to abilities and others more to personality. Zhang and Sternberg (2006) have analyzed this model's implicit positions on the three controversial issues. However, within the context of proposing their model, Grigorenko and Sternberg (1995) simply alluded to the issue of style malleability. They commented that the activity-centered style tradition took little account of the development of styles and that the other two traditions did a better job in doing so.

Zhang and Sternberg's Threefold Model of Intellectual Styles

Zhang and Sternberg (2005) proposed the threefold model of *intellectual* styles. It is important to keep in mind that although only 10 individual style models were reviewed at the time it was proposed, the threefold model adopts an open system. That is to say, any individual model can be included in this threefold model as soon as it meets the criteria set in the original threefold model. The term "intellectual styles" is used as a generic one that encompasses all style constructs proposed in the history of styles, whether or not these constructs carry the root word "style."

The threefold model harnesses all existing style constructs into one of three types: Type I, Type II, and Type III intellectual styles. Type I styles tend to be more creativity-generating and denote higher levels of cognitive complexity. Type II styles suggest a norm-favoring tendency and denote lower levels of cognitive complexity. Type III styles may manifest the characteristics of either Type I or Type II styles, depending upon the stylistic demands of the specific task being dealt with. Unlike any of the other existing integrative styles models that classify any one individual model into one group of style models or another, the threefold model classifies styles by cutting across each of the individual style models (e.g., the two styles from Witkin's model are categorized into two different style types, with the field-independent style being a Type I style and the field-dependent style as a Type II style). Such classification enables people to understand their own or others' intellectual styles in terms of five easy-to-monitor dimensions of preferences. These are: one's preference for high degrees of structure versus low degrees of structure, for cognitive simplicity versus cognitive complexity, for conformity versus nonconformity, for authority versus autonomy, and for group versus individual work (see Zhang & Sternberg, 2005, for details).

Another distinct feature of the threefold model is demonstrated through the explicit stance that it has taken on each of the three controversial issues concerning the nature of styles. Based on both empirical evidence and conceptualization, Zhang and Sternberg contended that most styles are value-laden (or at least

value-differentiated) rather than value-free; that they have both trait-like and state-like aspects, but for the most part are modifiable and hence more state-like; and that they overlap highly across theories. Specifically, Type I styles tend to carry more adaptive values because they are often strongly related to desirable human attributes and because almost without exception, all training programs aim at developing Type I styles. Type II styles tend to carry less adaptive values because they are often strongly associated with undesirable attributes and because all training programs are targeted at reducing the use of Type II styles. Type III styles may show more or less adaptive values depending on the stylistic demands of specific situations. Due to their high level of contingency upon situations, Type III styles are more malleable than are Type I and Type II styles. Finally, the threefold model posits that various style constructs share common variations. In particular, Type I styles are often positively related to one another, as are Type II styles.

Sadler-Smith's Duplex Model of Cognitive Style

Based on dual-process theory in general and Cognitive-Experiential Self-Theory (Epstein, Pacini, Denes-Raj, & Heier, 1996) in particular, Sadler-Smith (2009) proposed two fundamental information-processing modes that individuals may prefer to engage in during decision making and problem solving: intuitive and analytic. The intuitive mode is considered more affect-laden, relatively fast in operation and slow in formation; it is cognitively undemanding, imagistic-based, and unavailable to conscious awareness. The analytic mode is thought to be affect-free, relatively slow in operation and fast in formation; it is cognitively demanding, symbolic-based, and open to conscious awareness.

The duplex model addresses two of the challenges discussed earlier. At the outset, rooted in theories of information processing, the duplex model of cognitive style has established a preliminary link between the field of styles and that of cognitive psychology. At the same time, the duplex model addresses the issue of style malleability, both covertly and overtly. Sadler-Smith contended that when averaged out over a variety of tasks over a long period of time, most individuals have a propensity to process information using one of the two modes. What underlies this assertion is that individuals' preferred styles of dealing with tasks can be developed as the result of task exposure. Sadler-Smith took a step further in discussing style malleability more openly by stating that within the context of the duplex model, cognitive style has a hierarchical structure. At the specialized level, each of the two modes represents relatively stable preferences. At the more flexible level, the versatile style is formed. The versatile style is such that the intuitive and analytic modes of information processing are used interchangeably, depending upon the stylistic demands of the tasks.

Summary

Each of the six integrative models, in addition to bringing together different style constructs, addresses at least one aspect of the aforementioned challenges. Clearly, different scholars have emphasized different issues, and none of the models was intended to serve as an all-purpose one for addressing all challenges. Such an approach to problem solving (i.e., focusing on only one or two issues) is understandable because issues that were at the forefront of research activities earlier may well have

faded from view at a later time. For example, by the time Zhang and Sternberg (2005) proposed their threefold model of intellectual styles, what the field needed the most were (1) a generic term that would represent the colossal number of style labels, no matter which system a particular style construct originated from, be it cognitive, affective, physiological, psychological, or sociological (or to use Grigorenko and Sternberg's classification, cognition-centered, personality-centered, or activity-centered); (2) a common framework within which all styles could be conceptualized; and (3) a classification system that could address the three recurrent controversial issues: style value, style malleability, and style overlap. These three major tasks are precisely what the threefold model of intellectual styles has accomplished.

One might naturally want to see a model that could act as a panacea for addressing every single aspect of the aforementioned challenges and perhaps other problems related to the theorization of styles. However, while establishing such a model is not impossible, it is certainly an ambitious task, especially if one desires to construct a model that does indeed address all the challenges and beyond that, embraces the majority of, if not all, features of a good theoretical model. The authors of Chapter 3 in this volume have discussed the need for, and practicality of, building a grand theory of styles by taking forward the threefold model of intellectual styles. However, before such a daunting task can be accomplished, it is advisable that the issues collectively addressed by the six existing integrative models be taken into account when studying and applying the notion of styles.

An Individual Style Model: The Theory of Mental Self-Government

Many of the earlier individual style models have been criticized for portraying stylistic dimensions rather than presenting a coherent model of styles. Aiming to overcome the shortcomings inherent in the then-existing stylistic dimensions, Sternberg (1988, 1997) proposed the theory of mental self-government. Using "government" metaphorically, Sternberg (1988, 1997) contended that just as there are different ways of governing a society, so there are different ways that people use their abilities. These different preferences for using abilities can be construed as thinking styles. The theory specifies 13 thinking styles that fall along five dimensions of mental self-government: (a) functions, (b) forms, (c) levels, (d) scopes, and (e) leanings of government as applied to individuals (see Chapter 12 for the definition of each style).

In many ways, Sternberg's model of thinking styles is superior to all other existing individual style models because it addresses several aspects of the challenges discussed earlier, and embraces all three traditions in the study of styles (Grigorenko & Sternberg, 1995). The styles in this theory are cognitive in their way of looking at things (e.g., judicial style, global style, and so forth) and correspond to preferences in the use of abilities. However, because the styles are typical-performance rather than maximal-performance, they resemble the personality-centered tradition. Finally, the styles resemble the activity-centered tradition in that they can be measured in the context of activities. Such an articulation of the nature of thinking styles within the realm of the three style traditions clearly acknowledges the relationship of styles to abilities and personality. In his 1997 book, Sternberg actually

discussed at length the distinctions between styles and abilities and emphatically stated that “Styles are preferences in the use of abilities, not abilities themselves” (Sternberg, 1997, p. 79).

Although he did not directly address the three controversial issues concerning styles, the way in which Sternberg specified the major tenets in his theory clearly revealed his position on each of the three issues. He presented empirical data to communicate the idea that thinking styles do overlap with styles from other models. In putting forward a list of 15 “principles of thinking styles,” Sternberg asserted that “Styles are not, on average, good or bad—it’s a question of fit” (Sternberg, 1997, p. 97), suggesting that styles are value-differentiated. Within the same context, Sternberg argued that styles are at least partially socialized and are teachable.

Journal Special Issues on Styles

For the most part, the establishment of the six integrative models and the construction of the theory of mental self-government represent the efforts of individual scholars. These individual attempts have been paralleled by collective efforts that aimed at facing the challenges of the field. These collective efforts have resulted in the publication of special issues on styles in academic journals and scholarly books. This section introduces the 10 journal special issues on styles identified in the literature.

In the history of styles, only five journals have devoted special issues to work on styles. The very first special issue on styles (titled “Cognitive Style and Early Education” and guest-edited by Saracho) appeared in the journal *Early Child Development and Care* in 1989. This was followed by two double issues published by *Educational Psychology*, one in 1991 (titled “Learning Styles” and edited by Riding) and one in 1997 (titled “Learning Styles and Strategies” and edited by Riding and Rayner). The year 1999 saw the publication of a special issue (titled “Cognitive Styles and Psychopathology” and guest-edited by Riskind) by *Journal of Cognitive Psychopathology*. *Educational Psychology*’s continuing interest in work on styles was demonstrated by the publication of two more issues (2000 and 2004), both titled “Learning Styles,” with the former edited by Riding and Rayner and the latter by Wheldall and Riding. The most recent special issue (titled “New Directions with Styles Research” and guest-edited by Evans and Cools, 2011) was published by *Learning and Individual Differences*. Finally, one special issue on styles (titled “Styles of Practice” and edited by Evans and Kozhevnikova) will be published by *Research Papers in Education*.

The publication of these special issues is significant because each of these publications represents a major attempt to strengthen the field of styles. Across these special issues, five recurrent themes stand out: (1) examining similarities/differences among styles and distinguishing styles from abilities and personality; (2) elucidating the nature of styles as it relates to the three controversial issues; (3) integrating existing style constructs and addressing problems with styles measures; (4) establishing links between the styles literature and other literatures (e.g., cognitive psychology, developmental psychology, differential psychology, education, health sciences, and management sciences); and (5) applying the notion of styles to education and work settings.

These recurring themes are clearly ones that aim at addressing the key challenges illustrated earlier. Given these themes, the outcome of the discourse conducted in these special issues of journals is fruitful. Due to limited space, detailed analysis of this work is not provided here. However, one particular phenomenon should be noted. While the titles of early special issues include either “cognitive style” or “learning style,” the two most recent issues adopt the more general term “styles” in their special issues. Moreover, the editors (Evans & Cools, 2011; Evans & Kozhevnikova, in press) made a special point in setting the parameters for using the various style terms. Although it may appear to be a “trivial” task to some people, the importance of such a practice should be applauded because it signifies yet another attempt to create coherence in the literature.

Recent Scholarly Books

The concerted efforts to address the various challenges presented to the field have also resulted in the publication of scholarly books, and these books are predominantly edited ones. Earlier publications are excellent resource books for people who want to understand styles within the context of learning and instruction. These include Saracho’s (1990) edited book *Cognitive Style and Early Education*, Jonassen and Grabowski’s (1993) *Handbook of Individual Differences: Learning and Instruction* (which partially concerns work on styles), Sims and Sims’s (1995) edited book *The Importance of Learning Styles*, Morgan’s (1997) *Cognitive Styles and Classroom Learning*, and Riding and Rayner’s (1998) *Cognitive Styles and Learning Strategies*.

However, it is the four most recent books on styles that have demonstrated the maximum concerted and direct efforts to address some of the major difficulties of the field. These are: (1) Sternberg and Zhang’s (2001) edited book *Perspectives on Thinking, Learning, and Cognitive Styles*, (2) Zhang and Sternberg’s (2006) *The Nature of Intellectual Styles*, (3) Zhang and Sternberg’s (2009) *Perspectives on the Nature of Intellectual Styles*, and (4) Rayner and Cools’ (2011) *Style Differences in Cognition, Learning, and Management: Theory, Research, and Practice*. The major accomplishments of each of these four recent books are discussed in the final chapter of this volume. Suffice it to state here that collectively, these recent books have led the field to new advances.

To summarize, in the past three decades, a number of landmark accomplishments have been made despite the difficulties that the field has faced. These major accomplishments, along with other types of efforts, especially those as manifested in the publication of thousands and thousands of research articles, dissertations, and other scholarly books, have now led to the situation where *Handbook of Intellectual Styles* could be produced.

CONCLUSIONS

The field of intellectual styles does not have a unified history and cohesive philosophical and theoretical foundations. Largely due to this lack of historical and theoretical roots, the pace of advancement of the field has been slowed by many

challenges in the history of styles. Despite these difficulties, the field has flourished during the past three decades. Our hope is that it will flourish even more during the next three.

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