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Researching the psychology of cognitive style and learning style: Is there really a future?

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ABSTRACT

The field of individual differences in cognitive and learning style has been constantly criticized for conceptual confusion, contested definitions, poor measurement and lack of validity. This study reports the findings from a global e-survey of 94 style researchers who were asked to comment on the state of the field and their own understanding of the phenomenon being studied, including areas of criticism. Our findings highlight considerable agreement over the value and future direction of style research. However, while there is also strong awareness of criticisms and concerns over terminology and measurement, there appears to be little resolve to address them.

1. Introduction

The cognitive and learning style field has been repeatedly criticized by some for the myriad of tests; contested, confused and overlapping definitions and terminology; inappropriate measurement and lack of independent evaluation (Messick, 1984; Tiedermann, 1989; Curry, 1990; Furnham, 1992; Sadler-Smith, 2001; Coffield, Eccleston, Hall, Meagher, & Mosely, 2004; Entwistle & Peterson, 2004). Others have taken a broader view and criticized style for its lack of theory and its isolation from main stream psychology and cognitive science (Kozhevnikov, 2007; Coffield et al., 2004; Rayner & Peterson, in press; Shipman & Shipman, 1985).

This article investigates what a sample of international style researchers think about the field. Specifically, it aims to establish why these researchers persist in the field despite the criticisms made in the recent Coffield et al. (2004) report. Given that these researchers do persist, we wanted to find out what tools and definitions they use and recommend, what value and future they see in the field, whether they were confused and concerned about the same issues as the critics, and what they perceive the strengths and weaknesses to be.

It might be argued that the prospects of identifying a consensus in theory, constructs, and future direction for style research would be virtually impossible. For example, it may be naïve to assume that a true consensus will be formed by experts responsible for the existing state of the science in a disparate field. Many style researchers have developed their own particular model of style upon which their academic reputation is based, and consensus or revision would probably mean re-evaluating their theory and running the risk of compromising the internal constructs of their own work.

We believe that it may not be possible to realize consensus for one definition or construct or a single way forward for style research, but it should be possible to integrate researchers' ideas into a more cohesive, meaningful and workable framework, benefiting new and established style researchers entering the field (Rayner, 2007a,b). Our survey of 94 style researchers, selected from an international forum encompassing respondents located in a wide range of different countries serves as a potential starting point for this discussion.

2. Method

2.1. Participants

The sample was recruited through three main sources:

1) The mail base of the European Learning Styles Information Network (ELSIN): an international forum ($n = 149$).
2) Conference attendance lists of the previous three ELSIN conferences ($n = 231$).
3) Exchanges with leaders in the learning and cognitive style field ($n = 9$).

To our knowledge ELSIN is the only international forum of cognitive and learning style researchers and therefore it represents an ideal place to conduct this survey. Respondents were also asked to forward details of the on-line survey to other interested researchers. A

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total of 110 registered for the survey and 94 (85%) completed most or all of the 70 questions (note participants were able to ignore questions they did not want to answer).

2.2. The questionnaire

The on-line questionnaire was designed in part to solicit comments from style researchers regarding the key criticism in the Coffield et al. (2004) report: Learning styles and Pedagogy in Post-16 Learning. The report reviewed 13 models of styles and argued that styles suffered from a lack of consensual or coherent theory, poor psychometric test properties, self promoting and affirming researchers, over commercialization of tests, and poorly established applications and links to practice. As Ashwin (2005) noted, these criticisms are not new and therefore perhaps not surprising, nevertheless, amongst style researchers the report received mixed reviews. On the positive side, it was viewed as a timely reminder of some of the key issues and concerns style researchers and practitioners need to be aware of and seek to address in the future (Peterson, 2004; Ashwin, 2005; Rosenfeld, 2006). However, responses to the review in the European Learning Styles and Information Network newsletter also commented on the review's inappropriate methodology, emotional tone and biased use of language (Rosenfeld, 2006; Peterson, 2004; Ashwin, 2005). Rayner (2007a,b,c) also argued:

> "Much of the conceptual infra-structure is un-attributed, deals in secondary sources, reflects a shaky basis, for an interpretation of psychometric judgments…and is summarily justified by a declaration that leading academics in the field were given an opportunity to defend their work." (Rayner, 2007a,b,c, p. 25).

Our study's survey questions were therefore designed in part to find out what a range of style researchers thought about the key areas of concern raised by Coffield et al. (2004) and what researchers from *within* the field thought were the most pressing issues in the field. This is important because Coffield et al. do not reject styles, but instead argue for a healthy level of skepticism especially regarding claims about implications for pedagogy. We wanted to find out how skeptical style researchers were, and the extent to which they were concerned about the same issues as the critics.

The survey took approximately 30–40 min to complete, with some respondents taking up to 90 min. The survey consisted of 46 multiple choice and 12 short answer questions and participants were directed by an email to the website to start the survey. The survey was set up to ensure that only one response per IP address was allowed. The response format for the questionnaire varied depending on the questions. In general, a positively packed five-point rating scale was used. This scale had two negative responses (strongly disagree, disagree) and three positive responses (slightly agree, moderately agree, strongly agree). Positively packed scales have proven better at generating a variety of responses when participants are inclined to respond positively to items (Brown, 2004). Participants were also offered a chance to comment on any section of the questionnaire or on any specific questions. A sample of the questions presented is given in Appendix A and a full copy is available from the first author.

2.3. Procedure

Participants were informed that the survey was aimed at researchers and experts in the field of cognitive and/or learning styles. They were also informed that the purpose of the study was to establish their understanding of cognitive style and learning styles as a phenomenon and to identify the different perceptions about the state of the field and how these perceptions might be used to generate some overall consensus and future research direction. All participants were assured that information would be treated as confidential and would only be used for the purposes of research. Participants were also advised that the survey would be open for seven days and all potential participants were sent one reminder before the survey closing date.

3. Results and discussion

3.1. Characteristics of the sample

The questionnaire attracted responses from researchers in a range of disciplines, with different levels of research experience, and from a range of geographical areas, although the majority were recruited from Europe (see Table 1).

3.1.1. The perceived value of style research — why do style researchers persist?

Considering the population from which the sample was drawn were style researchers it is not surprising that 70% of respondents identified themselves as believing the field had value, albeit research into learning styles had slightly more skeptics and disbelievers (17%) than cognitive style (7%).

In keeping with Sternberg and Grigorenko's (1997) stated reasons for working in the style field, most participants in our sample (92%) either moderately or strongly agreed that they worked in the style field in order to try and improve achievement and enhance the process and outcomes of learning. Sixty seven percent moderately or strongly agreed that they wanted to understand the bridge between personality and cognition and 41% moderately or strongly agreed that they wanted to improve vocational selection. Over 80% of the participants thought it was moderately or very important that teachers, lecturers and students were aware of styles and 70% felt that awareness of style amongst employers, employees and workplace teams was also moderately or very important.

3.2. Definitions of cognitive style and learning style

Confusion and contradiction with style definitions is a frequent criticism of the field (Armstrong & Rayner, 2002; Rayner, 2007c). In this study, each respondent was asked to give their definition of cognitive style and learning styles. Sixty-five respondents offered a definition and these responses were independently analysed for common themes by the authors. Participants were found to distinguish the terms in a variety of ways. Typically, cognitive styles were seen as stable, innate and closely linked to underlying information processing mechanisms. Learning styles were seen as variable, environmentally dependent and were described in terms of their broader effects on *learning behaviour* — not their effects on *cognitive processing*. Following this analysis, we proposed four definitions of cognitive style and three definitions of learning style as a fair representation of the range of proposed definitions (see Table 2). These definitions were then used for the first round of voting in a subsequent Delphi study (see Rescher, 1997) in order to work towards an overall consensus on style definitions. The results presented in Table 2 are from the first round of voting ($n=47$). Modifications were made to these definitions in subsequent voting rounds to try and capture a larger consensus. Full details of the method and results are reported in a forthcoming publication by the authors of this article.

While we were able to identify some similarities in the way style researchers define cognitive style and learning style, there were also some important differences, particularly regarding the stability and breadth of these constructs (see Table 3). This highlights the need to further develop agreed definitions and boundaries in the style field so that researchers and practitioners can be confident that they share core conceptualizations and the same style 'language'.

Table 1
Percentage of participants under each demographic variable of interest ($N = 94$).

Main style research base	UK and Ireland	US and Canada	Mainland Europe incl. Scandinavia	Asia	Pacific/Australasia	Mixed/other	
	33	19.1	30.9	2.1	7.4	7.4	
Highest qualification	PhD	Masters	Bachelor	School-leaving cert.			
	72.3	22.3	4.3	1.1			
Main research background	Education	Psychology	Management	Teacher education	Computer science	Architecture/design	Other/mixed
	31.1	27.7	5.3	6.4	6.4	4.3	11.7
Main style research group	Children	Adolescent	Tertiary	Adults	Teacher education	Business and management	
	1.1	7.4	28.7	25.5	7.5	1.1	
Years in the style field	0–3	3–5	5–10	10–15	15+		
	14.9	16	33	14.9	2.2		
Approx no. of learning style publications	0	1–3	3–5	5–10	10–15	15+	
	34	26.6	9.6	18.1	5.3	5.3	
Approx no. of cognitive style publications	0	1–3	3–5	5–10	10–15	15+	
	38.9	26.7	15.6	11.1	4.4	3.3	

3.2.1. Measurement of style: perceived limitations of style tests

A major area of criticism in the style field is measurement and in particular the lack of rigor in psychometric testing (Coffield et al., 2004; Curry, 1990; Tiedermann, 1989). The style researchers in this sample seemed to be aware of these criticisms with many citing poor reliability and validity and a lack of thorough empirical methodology as major limitations of style tests. In spite of these concerns, large numbers of respondents thought it was possible to accurately measure learning and cognitive style differences (93% and 95% respectively). Furthermore, over 85% believed that there was enough evidence to accept the existence of cognitive style and learning style, although there was marginally stronger support for the existence of cognitive style over learning style, ($t(81) = -2.863$, $p = .005$, Cohen's $d = .07$).

Participants' support for the measurement of style was accompanied by strong assertions that a test must be psychometrically sound. More specifically, over 70% rated the following as very important or extremely important: internal consistency (each test sub scale is reliable); reliability (test re-test stability over time); and discriminate validity (evidence that tests are measuring an independent construct and not personality or intelligence). However, there was even more support for the need to show convergent validity (evidence that test performance relates to observed behaviour); with 90% of respondents arguing that this was very important or extremely important.

There was also concern over the commercialization of style tests and its impact on test development and scholarly research. Respondents commented that commercial interests were "infecting style research" because tests were kept "in house" leading to a "lack of independent testing" with "test evaluations carried out by supporters". One researcher said "…too many tests reflect an interest for making money and gaining power rather than actually really providing sound research".

3.3. What style tests do researchers recommend?

If the measurement of style is fraught with confusion and criticism, and this community of researchers is aware of the importance of psychometric rigor, then what style tests do they recommend? To identify which tests style researchers recommend and when or where these tests should be used, respondents were given a choice of style tests and fields as well as the option of adding their own. While many of the tests were recommended for more than one field, the most popular recommendations are given below in Table 4.

Many tests were recommended for the field of Education or Training and the most popular test overall was Tait, Entwistle and McCune's (1998) Approaches to Studying Inventory for Students (ASSIST) (see Table 4). This is somewhat perverse as the ASSIST (along with Biggs and Moore's (1993) similar inventory called the Study Process Questionnaire) is categorically argued by the test authors not

Table 2
Summary of definitions given for cognitive and learning style in the survey and the votes received in round 1 of the Delphi study.

Definitions of cognitive style	%[a]	Definitions of learning style	%
Cognitive styles are individual differences in processing that are integrally linked to a person's cognitive system. More specifically, they are a person's preferred way of processing (perceiving, organising and analysing) information using cognitive brain-based mechanisms and structures. They are partly fixed, relatively stable and possibly innate preferences.	66.0	Learning styles are an individual's preferred ways of responding (cognitively and behaviourally) to learning tasks which change depending on the environment or context. Therefore a person's learning style is malleable.	40.9
Cognitive styles are complex, multifaceted psychological variables that affect the way a person prefers to process information. In particular, they refer to the way people solve problems, make decisions and undertake tasks. They are not tied to a particularly cognitive mechanism or structure. They are partly fixed, relatively stable and possibly innate preferences.	34.0	A learning style is an individual's psychological repertoire of preferred learning processes and strategies that are used when learning. These preferred processes can be cognitive, affective, motivational and behavioural and they shape the social and personal aspects of an individual's learning performance.	36.4
Cognitive styles are relatively stable super-ordinate psychological structures and processes (possibly innate) that determine a person's preferred way of thinking.	23.4	Learning styles are individual differences in the way a person processes information (i.e., their cognitive style) which determines their typical or preferred response (cognitive and behavioural) in a learning context. A person's learning style is relatively stable.	27.3
Cognitive styles are trait-like individual differences in the way people think. They are strongly linked, or possibly the same as, personality traits.	15.2		

[a] Percentage of the sample ($N = 44$) that strongly or mostly agreed with these definitions.

to be a style test, but rather measures the way individuals approach learning (Biggs, 2001; Entwistle & Peterson, 2004). Both Entwistle and Biggs have independently described approaches to learning in terms of learning intentions (or motives for learning) and learning processes (Entwistle & Peterson, 2004). Biggs (2001) makes the distinction that approaches are bottom-up processes which focus on the relationship *between* the learner and the task. In contrast, style is an individual difference variable that works independently in a top-down (internal to external) fashion affecting how a person generally learns across a number of contexts. The fact that ASSIST was chosen as the most popular style measure again points towards the need for clarity around definitions.

3.4. Perceived strengths and weaknesses of style research

When researchers were asked to identify the issue that worried them most about style research, we saw similar concerns re-emerging to those previously raised. Style researchers were most concerned about unreliable measurement, lack of validity, confusion in definitions, fragmented theory and abundance of concepts and tests. In particular, there was a concern over the level of "uncritical acceptance of the validity of instruments for measuring styles and their pedagogical implications". One researcher summed it all up with the comment "it is such a messy area". Another common concern, not previously identified, centered on categorizing or "labeling learners without proper knowledge", which researchers thought could have "a detrimental effect on learning".

Comments about the most positive or exciting feature of contemporary style research centered mainly on the application and growing awareness of styles. Researchers liked the way that style differences nurtured "potential" by allowing for "diversity in learning and teaching" and creating "a level playing field for young students". This enhancement, alongside "raising awareness" of the existence of styles for practitioners and students, as well as their impact on learning outcomes, was seen as important. Other researchers identified the growth of technology as a major strength and potential for style research as exemplified in computer-based testing and the application of styles to technology-based learning environments. Similarly, advances in neuroscience and the potential to explore possible biological foundations were also seen as new and exciting areas.

3.5. Applications of style research

When given the open question about how future style research could be made more applied, respondents seemed to fall into three categories: *supporters*, *gatekeepers* and *terminators*, with the majority of researchers falling into the first two categories. The *supporters* argued for the development of more qualitative research (particularly in classrooms) which takes into account the socio-cultural environment. Several respondents suggested the need to develop more action research, and longitudinal and mixed method research. This clearly indicates dissatisfaction with the purely positivist and experimental approach currently dominating the style field. The *gatekeepers* on the other hand, felt that the limitations of the field needed to be addressed before any research could be applied. They wanted to see the development of reliable and valid tools, clarification of terminology, and evidence that styles actually make a difference and are worth the investment. *The terminators* argued categorically that "style research should not be continued", or as one respondent said "Intelligent people should spend their careers on something else!"

Table 3
Percentage of participants that agreed or strongly agreed with questions about the stability and the broadness of cognitive style and learning style.

Questions about style definitions	% agreed or strongly agreed
'True' cognitive styles are stable and unchangeable	64
'True' learning styles are stable and unchangeable	33
Cognitive style is the broader more encompassing term	40
Learning style is the broader more encompassing term	26
Cognitive style and learning style are separate constructs	31
Cognitive style and learning style are the same construct	3

Table 4
List of popular style tests and their main field of recommendation along with the percentage of respondents that always or often recommended their use.

Main field of recommendation and test	No of responses[a]	% always or often recommend
Education and Training		
Approaches to Studying	39	51
Cognitive Style Index (Allinson & Hayes, 1996)	27	40
Learning Style Inventory (Kolb, 1976)	49	39
Learning Style Inventory (Dunn, Dunn, & Price, 1989)	41	34
Inventory of Learning Styles (Vermunt, 1994)	22	36
Thinking Styles (Sternberg, 2001)	30	33
Impulsivity Reflectivity (Kagan, 1965)	21	29
Study Process Questionnaire (Biggs, 1987)	29	27
Learning Style Questionnaire (Honey & Mumford, 1982)	26	27
Cognitive Styles Analysis test (Riding, 1991)	29	10
PALS (Reid & Strnadova, 2004)	11	18
Motivator Style Profiler (Apter, 2001)	13	8
Psychology		
Extended Cognitive Styles Analysis test (Peterson, Deary, & Austin, 2003)	22	45
Verbal-Imagery Cognitive Style test (Peterson, Deary, & Austin, 2005)	22	36
Embedded Figures test and Group Embedded Figures test (Witkin, Oltman, Raskin, & Kidd, 1971)	27	22
Style Delineator (Gregorc, 1982)	19	5
Business or Management		
Adaptor Innovator (Kirton, 1976)	17	23

[a] No. of participants that always, often, sometimes, or never recommended the test. Participants who had never heard of the test were not included.

3.6. Future directions, collaboration and research

Finally, the respondents were asked to rank the top four areas of style research in most need of attention over the next 10 years. As noted above, clarification of definitions and terminology was highest, followed by improving measurement (reliability and validity), and then theory development and application. These aspects were ranked above research areas such as the impact of matching styles, investigating a biological base, consolidating tests, unifying the field and responding to specific criticism. Therefore, despite the common criticism that style lacks connections with main stream psychology, none of the participants mentioned this as a problem. Instead, the need to link style to other areas of psychology was seen as an exciting area for future investigation.

However, there was a strong sense in the short answer responses that style researchers felt a need to build a more cohesive academic community. In order to encourage collaboration in the future, respondents suggested two main strategies:

1) Encourage collaboration in the interest of promoting more applied research and make more effort to highlight stories of success in research.

In other words, the field could more constructively advance by celebrating commonalties and successes, rather than emphasizing differences and focusing on criticisms.

2) Develop an active, open, international network to discuss findings, collaborate on issues and encourage debate and discussion especially around the criticisms and key concepts.

Underlying this idea seems to be the belief that if style researchers could have honest, professional and impartial discussions about the field and seek some sort of consensus, then the field could move forward positively. This notion was supported by the fact that 93% of respondents agreed that style research was undermined by a lack of consensual theory.

3.7. Limitations of the study

A major limitation of this study is that the sample was largely drawn from one main data base, the European Learning Styles Information Network (ELSIN). Therefore, the majority of respondents (64%) were unsurprisingly from mainland Europe, the United Kingdom, and Ireland. North America also has a strong style research tradition (the response in this survey from the USA and Canada was 19%) and it is possible that style researchers associated with Europe have different attitudes to style research than their North American colleagues. A similar survey would need to be conducted amongst American style researchers before these findings could be represented as reflecting perceptions of a global research community. Similarly, the nature of the recruitment strategy meant that the sample consisted mainly of supporters of style. This is because it is unlikely that many critics are active members of the ELSIN style mail base or delegates at style based conferences. This sample bias is something that we acknowledge and the findings need to be interpreted in light of this.

The use of a web-based survey also has limitations. This method of data collection is often criticized for low response rates and biased, self selecting and non-representative samples which limit the extent to which the findings can be generalized (Eysenbach, 2004; Schonlau, 2004). However, web-based surveys that targeted a special population subset (such as our study focusing on style researchers within an international forum), and that only claim to represent that subset, can be valid and useful (Eysenbach, 2004).

Another limitation is that respondents' comments on the perceived limitations of style tests were considered independently from the style tests' frameworks. Future studies could also ask respondents to comment more directly on the limitations of the different style frameworks.

3.8. Summary, conclusion and significance of the findings

This is the first study to give insight into why an international group of style researchers persists in a field which has been so heavily criticized and identified as divorced from mainstream psychology (Coffield et al., 2004). We have found, however, that in spite of these criticisms, there is considerable support for the existence and value of style as a construct and the majority of researchers are keen to see advancement in theory and research in the field. Many researchers believe that style awareness is an important aspect in fully understanding a person's performance in learning and the work place. These researchers are motivated to work in the field because they believe style awareness and utilization can potentially improve learning outcomes. This commitment reflects the same belief articulated in Sternberg's (1996:363) assertion that 'styles matter'!

While this degree of support for style is not surprising given the nature of the sample, we have also tried for the first time to integrate researchers' ideas into a more cohesive, meaningful and workable framework in the hope that this would benefit new and established style researchers entering the field. In particular, we have presented findings about the degree of commonality around key style definitions, perceived limitations, strengths and weaknesses, most recommended tests, and main areas for future research.

We have found that within the style research community, researchers do not necessarily share the same 'language' for theorizing on the basic constructs or psychological phenomena. There was no clear consensus as to whether learning style or cognitive style was the broader theory, or whether they were separate constructs in the psychology of an individual. However, the majority of researchers did agree that cognitive styles were associated with underlying cognitive mechanisms and they were viewed as more stable than learning styles. We found that style researchers were well aware of the criticisms of the field, particularly around conflicting definitions, reliability, validity and application and importantly they were concerned about these issues and ranked them as very important for future research. Notably missing was a concern to link style to other psychological theories such as cognitive science, although this was seen as an exciting area for future research.

Overall, this survey shows that style researchers are concerned about similar issues to their critics. Our study points to a need for style researchers to actively address these concerns and commit to working towards clarifying key definitions and seeking a consensual, coherent and shared theory explaining the psychology of style. A consensual approach however, does not simply mean a single unified construct or definition, but rather a coherent framing of existing parts of the theory into a more meaningful whole: we need to share the same language, but not necessarily the same building. Unless more movement is seen in this direction, the research paradigm is likely to remain more or less fixed in the same place as suggested by Tiedermann (1989) and Curry (1990) when they each presented their first critiques of the field. A commitment to shift is crucial if we want to advance both the theoretical and applied fields of research into style differences in human performance across the contexts of educational psychology, learning and the work place.

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Appendix A. Sample items from the on-line questionnaire and response format options

Understanding the style construct

- Which is the broader or more encompassing term? (*Learning style/Cognitive style/Neither they are separate constructs/Neither they are the same construct*)
- Cognitive styles and learning styles are (*The same thing/Overlap a lot/Overlap somewhat/Overlap a little/Are completely separate*)

Cognitive style and learning style questions

- True cognitive/learning styles are stable and unchangeable (*scale: Strongly Agree–Strongly Disagree*)
- There is enough evidence to accept the existence of cognitive/learning style(s) as an individual difference (*scale: Strongly Agree–Strongly Disagree*)
- I believe that it is possible to measure cognitive/learning style differences (*scale: Strongly Agree–Strongly Disagree*)
- Overall which of the following best describes your current position on cognitive/learning style(s) research? (*scale: Strong Advocate/Supporter/Fence Sitter/Skeptic/Disbeliever*)

General questions

- On what basis do you choose style test (*list of 16 options, scale: Always Consider–Never consider*)
- When I recommend a style test, I usually advise…(*list of 18 options including other please specify*)…for the field (*list of 5 options including other please specify*) (*scale: Always Recommend–Never Recommend*)

- Briefly, on what bases do you generally make your decision above (*open ended*)
- Please identify how important the following psychometric properties of style test are to you (*list of 5 properties, scale: Extremely Important–Not Important, Don't Know*)
- Work in style research is undermined by a lack of consensual theory (*scale: Strongly Agree–Strongly Disagree*)
- There is a need for the inclusion of new or alternative paradigms in style research (*scale: Strongly Agree–Strongly Disagree*)

Note: Participants responded to the cognitive style and learning style questions separately, that is, they were presented as separate parallel items.

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