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## **An Investigation of the Differences in Phonological Awareness Performance Based on Cognitive Style**

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**Abstract**

*Purpose:* Research in cognitive style has shown its relevance in predicting reading ability. However, its effect on phonological awareness, which plays a central role in reading acquisition, remains unclear. The purpose of this study was to investigate differences in phonological awareness based on cognitive style.

*Method:* Twenty-nine monolingual English speaking African American and Caucasian 6-year-old 1st grade students from the Washington DC metropolitan area participated in the study. Participants were distributed as follows: 11 females, 18 males, 21 African Americans, and 8 Caucasians. Participants were of middle-class socioeconomic background with no evidence of cognitive, language, phonological, articulation or hearing deficits. Testing occurred over two sessions scheduled on different days. During the first session, participants were individually administered the Cognitive Style Assessment Protocol (CSAP) to measure cognitive style and assigned to either the wholistic or analytic cognitive style group. In the second session, the Phonological Awareness Assessment Protocol (PAAP) was administered to measure the main components of phonological awareness. Raw data consisted of participant scores on the CSAP and PAAP. Data were analyzed using two-tailed t-tests to determine if there were significant group differences between the analytic and wholistic groups in phonological awareness and its components.

*Results:* Results showed that students with an analytic cognitive style performed better than those with a wholistic cognitive style on overall phonological awareness and on the following phonological awareness components: syllable segmentation, phoneme substitution, and phoneme blending. No significant group differences were found on rhyming, phoneme isolation, phoneme deletion, and phoneme segmentation tasks.

*Conclusion:* Findings showed some differences in phonological awareness between analytic and wholistic students with analytic students performing better than wholistic students. These differences in aspects of phonological awareness seem to implicate cognitive style in reading acquisition given the central role that phonological awareness plays in reading development and suggest that wholistic students may experience reading difficulties that stem from their cognitive orientation.

**Keywords:** cognitive style, phonological awareness, reading, early detection, diversity

## Introduction

Reading is the fundamental skill upon which all formal education depends. When a student masters reading, they have built a foundation on which they can learn any academic content. A student that struggles with reading will likely have difficulty achieving academic success, have a higher risk of failing grade-levels, and is more likely to have diminished occupational success (NRP, 2002). Gaining a better understanding of why some students struggle with reading helps facilitate the development of effective remediation strategies that can lead to improved academic and occupational outcomes for at-risk students.

Phonological awareness and cognitive style are two factors that are thought to play a role in reading acquisition. Phonological awareness is the general ability to attend to the sounds of language as distinct from its meaning. It involves the conscious ability to detect and manipulate sounds and access to the sound structure of language (NRP, 2002). Cognitive style is a psychological construct that describes an individual's preferred and habitual approach to organizing and representing information which shows up in perceptual or intellectual activity (Riding & Rayner, 1998). It addresses how an individual learns, perceives, thinks, and problem solves (Simpson, Portis, & Weiseman, 1994). Understanding differences in phonological awareness based on cognitive style can help in developing effective reading interventions.

### Phonological Awareness and Reading

Betourne and Friel-Patti (2003) identified three component skills important in a student becoming a good reader: word attack, word identification, and comprehension. Word attack is the ability to sound out unfamiliar words; word identification involves the rapid access of phonological and semantic information to recognize familiar and unfamiliar words; and

comprehension utilizes the student's knowledge of the text's subject, their narrative and syntactic competence, and the ability to recognize familiar words and decode those that are unfamiliar. To varying degrees, all these skills rely on knowledge and use of phonological information. Ehri et al. (2001) suggested that students can decode words in five different ways depending on their reading competency: (1) assembling letters into a blend of sounds; (2) pronouncing and blending familiar spelling patterns; (3) retrieving sight words from memory; (4) analogizing to words already known by sight; and (5) using context cues to predict words. Students learn to read words in all five ways as they become skilled readers with early reading involving assembling letters into a blend of sounds. Students must know how letters typically symbolize sounds in words to be able to blend the sounds of letters into pronunciations that approximate real words, a process that involves letter knowledge and phonological awareness.

Phonological awareness is a critical prerequisite for word decoding although it is not a sufficient condition. Research (Goswami, 2003; NRP, 2002; Sprugevica & Hoiem, 2003) shows that phonological awareness is one of the predictors of the speed with which students acquire reading accuracy and fluency. Phonological awareness is now recognized to play a causal role in the acquisition of literacy; the presence of good phonological awareness has been associated with good readers and reduced awareness with poor readers (Hulme et al., 2012; Goswami, 2003; NRP, 2002).

### **Understanding Cognitive Style**

Examples of cognitive styles through the years include Field Independence-Field Dependence, Leveling-Sharpening, Reflection-Impulsivity, Converging-Diverging, Holist-Serialist, Assimilator-Explorer, Adaptor-Innovator, Verbaliser-Visualizer, and Wholistic-Analytic and Verbal-Imagery. The variety of style labels is largely a result of researchers working in their

own contexts in isolation from one another, developing their own instruments for assessment, and giving their own labels to the styles they were studying with little reference to the work of others (Riding & Rayner, 1998). Evidence (Miller, 1987; Riding & Cheema, 1991; Riding & Rayner, 1998) suggests that these different cognitive style labels are simply different conceptions of the same dimensions which Riding and Cheema (1991) conceptualized as the wholistic-analytic and verbal-imagery cognitive styles. According to this model, the wholistic-analytic and verbal-imagery cognitive styles are discrete cognitive styles that lie on a continuum independent of each other. Position on one cognitive style does not influence position on the other. The wholistic-analytic cognitive styles reflect the way in which a student organizes information, either in parts or as a whole. Although students can use either a wholistic or analytic way of organizing information, there is an inherent preference to using one over the other (Riding & Cheema, 1991). Table 1 shows the functional differences between wholistic and analytic students.

Table 1

*Psychological Characteristics Associated with Analytic and Wholistic Cognitive Styles (Adapted from Cohen, 1969)*

Analytic	Wholistic
Sensitivity to parts of stimuli	Sensitivity to global characteristics of stimuli
Awareness of obscure, abstract nonobvious features of stimuli	Awareness of obvious, sensed features of stimuli

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High ability to detect changes in monotonous but constantly changing perceptual field over a long period of time	Low ability to detect changes in a monotonous constantly changing perceptual field
Extracts from embedded context, names extracted properties and gives meaning in themselves	Parts are not named and not given meaning in themselves

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Evidence (Perney, 1976; Ramirez & Castaneda, 1974) suggests that students may differ in their cognitive styles because of cultural differences. Members of some cultures tend to be analytic, while those of other cultures tend to be wholistic because of culture-specific socialization practices that encourage the development of one cognitive style over the other (Witkin & Goodenough, 1986; Ramirez & Castaneda, 1974). Cole and Scribner (1974) observed that a student's method of perception, memorization, and thinking are inseparably bound to the patterns of activity, communication, and social relations of the culture in which the student is socialized. Ramirez and Castaneda (1974) suggested that African Americans and Hispanic Americans are likely to be wholistic while Caucasians are more likely to be analytic. Perney (1976) showed that African Americans were significantly more wholistic than Caucasians. Preference for a wholistic cognitive style was also shown among fourth grade Mexican American students (Rameriz, Castaneda, & Herold, 1974).

### **Cognitive Style and Reading**

Understanding the role of cognitive style on phonological awareness is important because of the central role that phonological awareness plays in reading acquisition. Several studies have looked at the impact of cognitive style on learning and educational attainment, providing some

evidence that cognitive style may be related to reading (Davies, 1994; Davies, 1988; Kirchner-Nebot & Amador-Campos, 1999; Paramo & Tinajero, 1990). Davies (1988) suggested that students with the analytic cognitive style might be better than those with the wholistic style in certain areas of the reading process that require visual restructuring. Using a lexical decision task, Davies (1994) concluded that analytic students appear to favor a phonological route to reading while wholistic students preferred the use of visual strategies. Kirchner-Nebot and Amador-Campos (1999) reported a relationship between cognitive style and reading that was gender specific. Cognitive style had no effect on the reading scores of girls, while analytic boys tended to be faster and more accurate readers than wholistic boys.

Although studies (Paramo & Tinajero, 1990; Kirchner-Nebot & Amador-Campos, 1999) have shown that wholistic and analytic cognitive styles are related to overall reading ability, with analytic students performing better than their wholistic peers in reading, there's no research examining the performance of analytic and wholistic students on phonological awareness. A few studies (Davies, 1994; Davies, 1988; Widiger, Knudson, & Rorer, 1980) have looked at the effect of cognitive style on tasks that somewhat involve phonological awareness. On tasks requiring the detection of short words embedded in longer words, Widiger et al. (1980) found that analytic students performed better than wholistic students. Davies (1994) obtained similar results and noted that analytic students appear to favor the use of phonological versus visual reading strategies.

### **Rationale for the Present Study**

The study investigated the differences in phonological awareness based on cognitive style to better understand the possible genesis of reading difficulties experienced by some students and help explain reading differences among some groups of students. A review of characteristic of

the wholistic-analytic cognitive styles outlined in Table 1 suggests that students with the analytic cognitive style may be better suited to the psychological and cognitive demands of reading than those with the wholistic cognitive style. For example, reading requires a progressive shift in speech perception from larger units (words and syllables) to segmental (phonemes) units (Jusczyk, 2000). Analytic students appear to be more sensitive to parts of stimuli, an important quality in acquiring greater understanding of the phonological units of speech. Reading also requires the student to understand that the alphabet is a symbol system for sounds, understand the nature of words and how written words consist of letters that map to speech sounds, and that words are the building blocks of phrases and sentences. This expanding awareness of language requires abstract thought. An ability that favors analytic students whose greater awareness of obscure and abstract features of stimuli is likely to facilitate the abstraction necessary to connect oral to written language. Regarding wholistic individuals, the tendency to devalue linear concepts might be an impediment to reading acquisition since word decoding and speech segmentation are founded on linear identification of strings of letters and phonemes. Comparing the cognitive characteristics of analytic and wholistic students to the phonological skills necessary in reading acquisition suggests that students with an analytic cognatic style may be better equipped to acquire reading compared to their wholistic peers.

## **Method**

### **Participants**

Twenty-nine 6-year-old first-grade students attending elementary school in the Washington DC Metropolitan Area participated in the study. All students were monolingual speakers of English with a middle-class socioeconomic background determined by their non-eligibility for the free or reduced-price lunch program. It was also a requirement that the parents



of participants be native English speakers. The language requirement allowed for the control of effects on phonological awareness that may be associated with second language exposure, acquisition, and/or use. Participant criteria also required that all students be typically developing with no evidence of cognitive, language, phonological, articulation or hearing deficits.

Information regarding typical development was provided by the classroom teacher. Participants were distributed as follows: 11 females, 18 males, 21 African Americans, and 8 Caucasians.

Participants were selected to include students belonging to the two cognitive styles, wholistic and analytic. Students ranged in age from 6 years and 3 months to 6 years and 9 months.

## **Materials**

### Cognitive Style Assessment Protocol

Students were administered the Cognitive Style Assessment Protocol (CSAP) to measure cognitive style. The CSAP consisted of the complete Children's Embedded Figures Test (CEFT; Karp & Konstadt, 1971) and select stimuli from the Cognitive Styles Test (CST; Kagan, Moss and Sigel, 1971) and the Sigel Cognitive Style Sorting Task (SCSST; Sigel, 1967).

The CEFT consists of 24 complex figures, each with an embedded familiar simple shape. Students were instructed to find the embedded shape and awarded one point for each shape that was correctly identified. A total score was computed. A high score on the CEFT indicated an analytic cognitive style, while a low score indicated a wholistic cognitive style. The CEFT was selected to measure cognitive style because it is a widely used test of the analytic-wholistic cognitive styles. It is standardized for children ages 5 to 9 years and offers high reliability (Karp & Konstadt, 1971). Saracho (1984) showed split-half reliability of 0.90 and test-retest reliability of 0.91 for first and third graders. The test has been shown to meet the criteria for construct

validity by demonstrating age differentiation and convergent and divergent validity (Glynn & Stoner, 1987).

A criticism of the CEFT as a measure of cognitive style is that it measures only one pole of a bipolar construct (Riding & Rayner, 1998). To address this, items from the CST and SCSST were included as supplemental measures. The CST and SCSST were selected because they measure both poles of the analytic and wholistic cognitive styles (Witkin, 1973 and Kagan et al., 1973). Eight items of the CST and four items of the SCSST were included in the CSAP. Each item consisted of three drawings. Students were asked to select two of the figures that were alike or went together in some way and justify their selection.

To be assigned a wholistic or analytic cognitive style, a student's performance on the CEFT had to be consistent with their performance on the 12 items of the CST and SCSST. A student with a low score on the CEFT had to produce a predominance of wholistic versus analytical responses on the CST and SCSST items to be coded as having a wholistic cognitive style. A student with a high score on the CEFT had to produce a predominance of analytic versus wholistic responses on the CST and SCSST items to be coded as having an analytic cognitive style. Failure to show such consistency indicated inability of the CSAP to reliably identify the student's cognitive style. These students were excluded from the study.

#### Phonological Awareness Assessment Protocol

To measure phonological awareness, the Phonological Awareness Assessment Protocol (PAAP) was administered. The PAAP consisted of select subtests of the Phonological Awareness Test (Robertson & Salter, 1997) that measure the main components of phonological awareness, namely: rhyme, syllable segmentation, phoneme isolation (initial, medial, and final positions),

phoneme deletion, phoneme segmentation, phoneme substitution, and phoneme blending. Seven of the nine PAAP subtests assessed phonemic awareness because it is a strong predictor of reading acquisition. They included the following tasks: 1) phoneme isolation, which required the student to identify the sound in a particular position of a spoken word, 2) phoneme substitution, which required the student to mentally replace a sound in a word by another to make a new word, 3) phoneme segmentation, in which the student was asked to break a word into its component sounds, and 4) phoneme blending, which involved the student combining sounds that were spoken separately into a word.

### **Procedure**

Students were individually administered the CSAP and PAAP over two sessions scheduled on different days. Test administration was conducted by the researcher. To minimize the risk of students missing valuable class time, the researcher worked with classroom teachers to make certain that testing time did not take away from classroom instruction time. This included scheduling testing during noninstructional time and arranging for students to receive compensatory instruction. Administration of the CSAP allowed for classification of students as wholistic or analytic. The CSAP was administered during the initial session and the PAAP during the subsequent session. Students whose cognitive style could not be reliably classified were excluded from the study. Final distribution of participants resulted in 20 analytic and 9 wholistic students. Student PAAP testing order was randomly assigned.

Rapport was established with each student before testing. The examiner ensured that each student fully understood task directions and performance expectations by providing appropriate reinforcement, repetition, and clarification. On average each test took approximately 30 minutes to administer.

Raw data for the wholistic and analytic groups consisted of students' scores on the PAAP. Data were analyzed using two-tailed t-tests to determine if there were significant analytic-wholistic group differences in phonological awareness and its components. A significance level of 0.05 was used for rejection of null hypotheses.

## Results

Table 2 shows the performance of analytic and wholistic student in phonological awareness and its components.

**Table 2**

*Phonological Awareness Performance by Cognitive Style*

Test/Subtest	Analytic		Wholistic		<i>t</i> (27)	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
PAAP Composite	70.2	13.1	53.7	19.5	2.7	.01
Rhyming	8.8	2.0	6.3	4.3	2.1	.04
Syllable Segmentation	8.8	1.7	6.2	2.7	3.0	.006
Phoneme Isolation-Initial	9.5	1.1	9.3	0.7	0.5	.61
Phoneme Isolation-Medial	8.0	1.7	6.7	2.8	1.5	.15
Phoneme Isolation-Final	7.6	2.1	6.2	2.3	1.6	.12
Phoneme Deletion	7.5	2.1	5.7	3.4	1.6	.12
Phoneme Segmentation	5.6	2.5	3.8	2.8	1.7	.11
Phoneme Substitution	5.6	2.6	2.9	2.0	2.7	.01
Phoneme Blending	8.8	1.5	6.2	3.3	2.8	.009

The students' PAAP Composite performance examined the effect of cognitive style on overall phonological awareness. Findings showed that analytic students scored significantly higher than wholistic students ( $t(27) = 2.7, p = .01$ ) indicating better overall phonological awareness performance. The effect size was large (Cohen  $d = 0.9$ ).

Students' performance on the PAAP subtests allowed for examination of the effect of cognitive style on components of phonological awareness. On the subtest examining students' ability to segment one-, two-, three-, and four-syllable words (syllable segmentation), findings showed that analytic students scored significantly higher than wholistic students ( $t(27) = 3.0, p = .006$ ), indicating that analytic students performed better than wholistic students on this task. The effect size was large (Cohen  $d = 1.1$ ). On the subtest examining students' ability to substitute phonemes at the beginning, middle, and end of words (phoneme substitution), findings showed that analytic students scored significantly higher than wholistic students ( $t(27) = 2.7, p = .01$ ), indicating that phoneme substitution is an aspect of phonemic awareness where analytic students performed better than wholistic students. The effect size was large (Cohen  $d = 1.1$ ). Analytic students also performed significantly better than wholistic students ( $t(27) = 2.8, p = .009$ ) on phoneme blending, a phonemic awareness task requiring students to blend phonemes in one- and two-syllable words. The effect size was large (Cohen  $d = 1.0$ ). No significant group differences were found on rhyming tasks, phoneme isolation tasks involving identification of phonemes at the beginning, middle, and end of words, on phoneme deletion tasks involving deletion of phonemes at the beginning and end of words, and on phoneme segmentation tasks involving the ability to segment simple words into their constituent phonemes.

### **Discussion**

The purpose of this study was to investigate differences in phonological awareness based on cognitive style in order to advance understanding of why some typically developing students experience reading difficulties. Differences in overall phonological awareness, with analytic students performing better than wholistic students, offer insight into the possible source of the reading differences that may be observed between these groups. It helps in identifying the

possible source of the problems wholistic students may experience in mastering reading since phonological awareness plays a central role in the ability to effectively decode printed words, a foundational process in reading. This result may explain findings by Kirchner-Nebot and Amador-Campos (1999) and Paramo and Tinajero (1990), which showed global reading differences between analytic and wholistic students with analytic students scoring better than wholistic students.

Findings show that analytic students performed better than wholistic students on some phonemic awareness tasks (phoneme blending and phoneme substitution). This has implications for reading since phonemic awareness is strongly correlated with reading achievement. Phonemic awareness is a component of phonological awareness that involves the ability to focus on and manipulate phonemes in spoken words (Enri, Nunes, Willows, Schuster, Yanghoub-Zadeh, & Shanahan, 2001). Phonemic awareness has been shown to explain over 25% of the variance in word reading in kindergarten and 9% of the variance in first grade (NRC, 2002). Phoneme blending is particularly important in reading because it allows students to combine individual sounds together to form words. In beginning readers, difficulties related to phoneme blending may manifest as global reading decoding difficulties. For older readers, difficulties might only be evident when attempting to read unfamiliar words when other strategies at decoding, such as sight word reading, reading by analogy, and use of context to predict the word have been unsuccessful. Phoneme substitution is the most advanced phonemic awareness ability. In a phoneme substitution task, the student must recognize the component parts of a word (segment the word into its phonemes), isolate a specific phoneme, delete that phoneme, add the new phoneme, and blend the phonemes together to say the new word. Phoneme manipulation

tasks (i.e., phoneme addition, deletion, and substitution) are the best predictors of word-level reading proficiency (Kilpatrick, 2015).

These findings may also help explain Davies' (1994) observation that analytic students appear to favor a phonological route to reading while wholistic students prefer the use of visual strategies. Wholistic students may naturally default to using visual cue reading strategies (e.g., sight word reading) because the processes involved are less demanding for them compared to using phonological strategies. Even though using visual cue reading strategies is a less effective route to reading than using phonological strategies, wholistic students may be drawn to it because of cognitive incompatibility with phonological awareness related tasks.

Better syllable segmentation in analytic students compared to wholistic students provides further evidence that wholistic students may encounter reading problems because of difficulties with phonological awareness. This finding is significant because research (Goswami, 2003) has suggested that students are spontaneously aware of syllables and that approximately 90% of 6-year-olds are able to segment by syllables. The challenges that wholistic students experience with syllable segmentation, a task that most of their age peers would have mastered, suggest that their phonological awareness difficulties are independent of level of task difficulty.

Present findings appear to show differences in phonological awareness based on cognitive style with analytic students performing better than wholistic students. Given the role of phonological awareness in decoding, reading fluency, and reading comprehension, these findings have implications for how we identify students who are at-risk for reading problems and the types of remediations that are offered. They indicate the need for early identification of wholistic students at-risk for reading difficulties and the provision of early phonological awareness instruction to promote reading success.

The findings showing analytic-wholistic group differences in phonological awareness have implications for reducing the reading achievement gap between minority and majority students, as well as raising reading achievement for all students. Providing targeted phonological awareness instruction to wholistic students who are at-risk for reading difficulties would not only benefit both majority and minority students, but could also result in steeper gains for minority students since they tend to be wholistic.

The findings of this study and their implications regarding reading acquisition should, however, be tempered given the exploratory nature of the study and the study limitations. Additionally, there were components of phonological awareness where no significant differences were observed between wholistic and analytic students. Nonetheless, findings offer a line of inquiry on possible underlying mechanisms that may impact the ease with which students in certain segments of the population learn to read. This is worthy of further exploration.

### **Limitations**

The study sample was limited in terms of total number of participants and the number of participants that were wholistic. Out of the 29 students in the study, only 9 were wholistic. The small sample size is a key limitation. The findings need validation in a much larger sample. Additionally, generalizability of findings may be somewhat limited given that study sample was a convenience sample of middle socioeconomic status students. Students from other socioeconomic groups may differ from their middle socioeconomic status peers on a number of factors which may modify the effect of cognitive style on phonological awareness.

### **Implications**



Given the study limitations, it is important that interpretation of implications be tempered by recognition of these limitations. That said, this study presents findings that suggest weaker phonological awareness in wholistic students compared to analytic students. Given the central role that phonological awareness plays in reading acquisition these findings have implications for reading-related screening, assessment, and intervention.

The findings suggest the need for early cognitive screening by educational practitioners (i.e., teachers, speech-language pathologists, reading specialists, etc.) to help identify wholistic students who might be at-risk for reading difficulties because of difficulties with phonological awareness. It is important to provide phonological awareness instruction to wholistic students early in their development since phonological awareness skills have been shown to develop as early as age three and preschoolers appear to benefit more from phonological awareness than kindergartners or primary school students. Additionally, phonemic awareness explains 25% of the variance in word reading in kindergarten compared to 9% in 1<sup>st</sup> grade (Ehri et al., 2002; Sprugevica & Hoiem, 2003). Instruction should particularly seek to address the phonological awareness areas that wholistic students find challenging that have been identified in this study such as phoneme substitution and phoneme blending. Since the reading difficulties experienced by wholistic students have been shown to be related to their cognitive style, it may be necessary to differentiate phonological awareness instruction methodologies and materials to accommodate the students' cognitive style. The differentiation of phonological awareness instruction relative to cognitive style is an area that needs further research.

The study findings may have implications for reducing the reading achievement gap between minority and majority students. Since more minorities tend to be wholistic, early

identification of wholistic students at-risk for reading difficulties and the provision of effective phonological intervention would benefit more minority students.

### **Conclusion**

This study examined the differences in phonological awareness performance based on cognitive style. The findings show analytic students performed better than wholistic students in overall phonological awareness and in the following phonological awareness components: syllable segmentation, phoneme substitution and phoneme blending. Since phonological awareness and its components are good predictors of reading ability, the reduced phonological awareness in wholistic students has implications regarding the ease with which they acquire reading. The study findings suggest that wholistic students may experience reading difficulties stemming from their phonological awareness difficulties. It is, therefore, important to identify these students early in their educational careers and offer them appropriate remediation services.

Additionally, since minority students are more likely to be wholistic compared to their majority peers, the early identification of at-risk wholistic students combined with the provision of targeted phonological awareness intervention could help reduce the minority-majority reading achievement gap. This study offers a significant contribution to our understanding of the role of cognitive style in the reading acquisition process and helps explain why some students find reading challenging.

## References

- Betourne, L. S. & Friel-Patti, S. (2003). Phonological processing and oral language abilities in fourth-grade poor readers. *Journal of Communication Disorders*, 36, 507-527.
- Cohen, R. A. (1969). Conceptual Styles, Culture Conflict, and Nonverbal Tests of Intelligence. *American Anthropologist*, 71, 828-856.
- Cole, M. & Scribner, S. (1974). *Culture and thought: A psychological introduction*. New York: Wiley.
- Davies, M. F. (1994). Individual differences in reading process: Field independence and letter detection. *Perceptual and Motor Skills*, 66, 323-326.
- Davies, M. F. (1988). Cognitive style and the reading process: Field-dependence differences on a lexical-decision task. *Perceptual and Motor Skills*, 78, 1195-1198.
- Ehri, L.C., Nunes, S.R., Willows, D.M., Schuster, B. V., Yaghoub-Zadeh, Z., & Shanahan, T. (2001). Phonemic awareness instruction helps children learn to read: Evidence from the National Reading Panel's meta-analysis. *Reading Research Quarterly*, 36(2), 250-287.
- Glynn, M. A. & Stoner, S. B. (1987). Construct validity of the children's embedded figures test. *Perceptual and Motor Skills*, 64, 1035-1038.
- Goswami, U. (2003). Early phonological development and the acquisition of literacy. In Neuman, S. E. & Dickinson, D. K. (Eds.), *Handbook of early literacy research* (pp 111-125). NY: The Guilford Press.
- Hulme, C., Claudine Bowyer-Crane, C., Carroll, J.M., Duff, F.J., & Snowling, M.J. (2012). The causal role of phoneme awareness and letter-sound knowledge in learning to read:

combining intervention studies with mediation analyses. *Psychological Sciences*, 23(6):572-577

Jusczyk, P.W. (2000). *The discovery of spoken language*. Cambridge, Massachusetts: The MIT Press.

Karp, S. A. & Konstadt, N. (1971). *Children's Embedded Figures Test*. Princeton, NJ: Educational Testing Service.

Kagan, J., Moss, H.A., Sigel, I.E. (1973). Psychological significance of styles of conceptualization. In Wright, J.C. & Kagan, J. (Eds.), *Basic Cognitive Processes in Children*. Chicago: The University of Chicago Press.

Kilpatrick, D. A. (2015). *Essentials of assessing, preventing, and overcoming reading difficulties*. Hoboken: John Wiley & Sons.

Kirchner-Nebot, T. & Amador-Campos, J. A. (1999). Reading ability and differential cognitive profiles of girls and boys. *Perceptual and Motor Skills*, 89, 853-862.

Miller, A. (1987) Cognitive styles: an integrated model. *Educational Psychology*, 7(4), 251-268, DOI: [10.1080/0144341870070401](https://doi.org/10.1080/0144341870070401)

National Reading Panel (NRP) (2002). *Preventing reading difficulties in young children*. Washington, DC: National Academy Press.

Paramo, M. F. & Tinajero, C. (1990). Field dependence/independence and performance in school: An argument against neutrality of cognitive style. *Perceptual and Motor Skills*, 70, 1079-1087.

- Perney, V. H. (1976). Effects of race and sex on field dependence-independence in children. *Perceptual and Motor Skills*, 42, 975-980.
- Ramirez, M. & Castaneda, A. (1974). *Cultural democracy, bicognitive development and education*. New York: Academic Pres Inc.
- Ramirez, M., Castaneda, A., & Herold, P. (1974). The relationship of acculturation to cognitive style among Mexican Americans. *Journal of Cross-Cultural Psychology*, 5, 424-433.
- Riding, R. J. & Cheema, I. (1991). Cognitive styles: an overview and integration. *Educational Psychology*, 11, 193-215.
- Riding, R. J. & Rayner, S. G. (1998). *Cognitive styles and learning strategies: Understanding style differences in learning and behavior*. London: David Fulton Publishers Ltd.
- Robertson, C, & Salter, W. (1997). *The Phonological Awareness Test*. East Moline, IL: LinguiSystems.
- Saracho, O. N. (1984). The Goodenough-Harris Drawing Test as a measure of field-dependence/independence. *Perceptual and Motor Skills*, 59, 887-892.
- Shade, B. (1982). Afro-American cognitive style: A variable in school success? *Review of Educational Research*, 52(2), 219-244.
- Sigel, I. E. (1967). *Sigel Cognitive Style Sorting Task*. Princeton, NJ: Educational Testing Service.
- Simpson, F., Portis, S. C., & Wieseman, R. (1994). *Changing the cognitive style of preprofessional students*. Paper presented at the Annual Conference of the Mid-South Educational Research Association, Nashville, TN.

Sprugevica, I. & Høien, T. (2003). Early phonological skills as a predictor of reading acquisition:

A follow-up from kindergarten to the middle of grade 2. *Scandinavian Journal of Psychology*, 44, 119-124.

Widiger, T. A., Knudson, R.M., & Rorer, L.G. (1980). Convergent and discriminate validity of

measures of cognitive styles and abilities. *Journal of Personality and Social Psychology*, 39, 116-129.

Witkin, H. A., & Goodenough, D. R. (1986). Cognitive styles: Essence and origins.

*Psychological Issues* 1, Monograph 51.