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5 The Phonological Hypothesis as a Valuable Framework for Studying the Relation of Dialect Variation to Early Reading Skills

Nicole Patton Terry
Georgia State University
and
Haskins Laboratories
Hollis S. Scarborough
Haskins Laboratories

The important contributions of phonological skills and knowledge to the process of learning to read are firmly established. The seminal insights of Shankweiler and his colleagues at Haskins Laboratories, referred to here as the phonological hypothesis, drew attention to the notion that the phonological component of language is most critical for reading acquisition, and that many reading difficulties in both young novice and older poor readers can be attributed to limitations in phonological skills, knowledge, and awareness. Over the past several decades, an abundance of empirical evidence has accrued in support of the phonological hypothesis as an explanatory model of reading acquisition and reading disabilities.

A hallmark of strong theories is their capacity to inspire corollary hypotheses that impel research along new paths. In this chapter, we describe how our approach to studying the relation of early reading to dialect variation has been fruitfully influenced by the phonological hypothesis and by past research on the phonological deficits that can underlie reading disabilities. We focus on two phonological factors, phonological awareness and phonological precision, discussing how weaknesses in each might contribute to explanations of the relationship between children's usage of nonmainstream speech patterns and their early reading achievement. Finally, we report a study in which we tested some differing hypotheses associated with these two explanations.

LANGUAGE VARIATION AND NONMAINSTREAM AMERICAN ENGLISH DIALECTS

Language variation is a general term that refers to the differences in language usage that are observed across different speakers, settings, and circumstances. Some language variation arises in response to regional or social pressures on language, and language varieties that are shared by a geographically or culturally defined group of speakers are called dialects of the language (Wolfram, Adger, & Christian, 1999; Wolfram & Schilling-Estes, 2006). In the United States, dozens of regional and social variants of English have been identified (Wolfram & Schilling-Estes). The spoken dialect that is most typical of formal contexts—and, notably, the one that adheres most closely to conventional written English—has been termed "school English" or "standard English" or "mainstream American English" (MAE). The numerous dialects that are used in everyday communication and in informal contexts are referred to as "vernacular" or "nonmainstream American English" (NMAE).

Speakers of different American dialects can usually understand one another quite readily. This is because NMAE dialects share a majority of their phonological, lexical, morphosyntactic, and pragmatic features with one another and with MAE. Indeed, dialects are differentiated by the frequency with which particular forms are used and the contexts in which they are produced, rather than just by whether specific features are produced or not produced. For instance, speakers of MAE and African American English (AAE) produce the regular present progressive affix in *running* as *runnin'* but the latter do so more frequently (Wolfram & Schilling-Estes, 2006). Sociolinguistic evidence has established firmly that NMAE dialects are not impoverished forms of English, but rather are complex alternative language systems that are as rule governed as MAE in their form, content, and use (Charity, 2008; Green, 2004; Gutiérrez-Clellen & Simon-Cereijido, 2007; Oetting & Garrity, 2006; Wolfram et al., 1999; Wolfram & Schilling-Estes, 2006).

Recent studies of language variation among children in the United States have yielded detailed descriptions of Southern American English (Oetting & McDonald, 2001), Creole English (Oetting & Garrity, 2006), Appalachian English (Garn-Nunn & Perkins, 1999), Latino English (Gutiérrez-Clellen & Simon-Cereijido, 2007), and AAE (Craig & Washington, 2006; Horton-Ikard & Miller, 2004; Pearson, Velleman, Bryant, & Charko, 2009) at young ages.

LANGUAGE VARIATION AND EARLY READING ACHIEVEMENT

Learning to read depends heavily on facility with spoken language, especially phonology. To acquire basic word recognition and decoding skills, young children must learn to map printed words onto their existing knowledge about the sounds of spoken words. It is thus reasonable to suppose that novice readers could be at a disadvantage if their spoken dialect differs substantially from the version of English that is represented in school texts. Consequently, it has long been hypothesized that language variation might contribute to the reading difficulties

that are experienced by large numbers of disadvantaged and minority children, many of whom speak NMAE dialects (Charity, Scarborough, & Griffin, 2004; Labov, 1995; Terry, Connor, Thomas-Tate, & Love, 2010; Washington & Craig, 2001; Wolfram et al., 1999). Similarly, some recent international research has explored literacy gaps in relation to students' usage of Australian Aboriginal English, Spoken Arabic Vernacular, Hawaii Creole, and various dialects encountered in Sweden, Norway, Greece, and The Netherlands (Driessen & Withagen, 1999; Saiegh-Haddad, 2003; Siegel, 2007; Yiakoumetti, 2007).

In the United States, most studies have focused on the AAE dialect and its relation to literacy among African American students. Findings from early studies did not consistently or strongly support the hypothesized relationship between AAE usage and reading achievement, probably due to the aspects of their methodology (Washington & Craig, 2001). Recent investigations, however, have documented a substantial inverse relationship between children's production of AAE features in speech (as measured by sentence repetition, text reading, or discourse production) and their early literacy skills, including recognition of printed words, decoding of pseudo-words, text comprehension, and spelling (Charity et al., 2004; Connor & Craig, 2006; Kohler et al., 2007; Terry, 2006; Terry et al., 2010). For instance, Charity et al. reported substantial negative correlations between children's reading scores and their AAE feature usage during story imitation in large samples of African American students in kindergarten through second grade. Similarly, Craig and Washington (2004) observed that African American first through fifth graders who produced AAE features more frequently in spontaneous discourse tended to do less well on reading tests.

Reading achievement and AAE usage in this population are both known to vary, however, with the student's age, grade, gender, socioeconomic status (SES), and discourse context (Charity et al., 2004; Craig & Washington, 2004; Thompson, Craig, & Washington, 2004; Washington & Craig, 1998). It thus bears noting that the relationship between AAE usage and reading achievement remains substantial even after taking these factors into account (Charity et al.; Terry et al., 2010).

EXPLAINING THE RELATIONSHIPS BETWEEN NMAE USAGE AND READING ACHIEVEMENT

Two main hypotheses have been put forward to explain the association between using more NMAE features and achieving less well in reading. They postulate quite different explanatory mechanisms: (a) *linguistic interference* or *mismatches* between spoken and written language, and (b) a child's *linguistic awareness* and *flexibility* of feature usage in speech. Note that these are not mutually exclusive explanations. Thus, both the *interference/mismatch* and *awareness/flexibility* hypotheses about the role of dialect usage in reading acquisition could be valid, and each might account for the acquisition of different facets of the reading skill or may exert influence during different periods of development.

Both hypotheses focus on the role that dialect usage is posited to play in the child's acquisition of basic word recognition and decoding skills. To map knowledge of spoken words onto their printed forms, novice readers must discover and use the many regular correspondences between spellings (graphemes) and sounds (phonemes) of the language. Although dialects differ in every domain of language (phonology, morphology, syntax, semantics, and pragmatics), the phonological hypothesis and supporting evidence indicate that the phonological component is especially important for learning to read. In discussing the two hypotheses, therefore, we will focus mainly on the phonological domain.

Although developed primarily to explain reading difficulties of AAE-speaking students, the two hypotheses can reasonably be applied, we think, to children who speak other NMAE dialects that, like AAE, are phonologically distinct from MAE, are associated with low social status, and are not represented well by standard English orthography. In fact, Terry et al. (2010) found that the relation between NMAE usage and literacy skills was similar for African American and White children who spoke AAE and Southern American English. These findings suggest that the contribution of dialect differences to reading achievement may be similar across various NMAE dialects, regardless of the speaker's race or ethnicity.

Linguistic Interference/Mismatch Hypothesis

According to the *interference/mismatch* hypothesis, children who speak NMAE dialects experience greater interference between written and spoken language than do children whose oral dialects align more closely with printed spellings (Baratz, 1969; Goodman, 1969; Labov, 1995; Shuy, 1969; LeMoine, 2001). In languages like English, for which the writing system is not fully transparent, every novice reader will encounter some mismatches between written words and their spoken pronunciations. According to the interference/mismatch viewpoint, the frequency of mismatches is increased for NMAE speakers because their speech aligns more poorly with the spelling patterns of the words they are trying to read. For instance, a child who routinely reduces final consonant clusters (e.g., who says "tol" for *told*) might be puzzled by the presence of two letters rather than just one at the end of the printed word. Similarly, a child who produces stops that are realized as labiodentals in MAE (e.g., "dey" for *they*) might find it confusing that different graphemes (*th* and *d*) seem to be used to spell the same speech sound (e.g., the initial /d/s in "dey" and "dog"). Children who encounter many such mismatches are likely to find the learning of grapheme–phoneme correspondences to be a more complex and confusing task than children who encounter fewer mismatches.

According to this hypothesis, therefore, the NMAE speaker's difficulty in learning to read is directly related to the frequency with which mismatches occur between printed words and the way a child pronounces those words. The aforementioned relationship that has been consistently observed in past research—between the usage of nonmainstream features and difficulty in acquiring early reading skills—is thus consistent with this hypothesis (Charity et al., 2004; Terry, 2006; Terry et al., 2010).

Linguistic Awareness/Flexibility Hypothesis

An alternative explanation for the relationship has recently been put forth, stimulated by the emphasis on the facilitative role of phonological awareness and other metalinguistic skills in contemporary accounts of reading acquisition based on the phonological hypothesis. "Metalinguistic awareness" is the capacity to think intentionally about language rather than just to use it communicatively (Scarborough & Brady, 2002; Tunmer, Pratt, & Herriman, 1984). By the late preschool years, children typically exhibit their emerging metalinguistic skills in multiple language domains, including phonological awareness (understanding that spoken words consist of smaller elements of sound), lexical awareness (grasping the concept of the word as a constituent element of speech), and syntactic awareness (appreciating that sentences are comprised of systematically arranged words and phrases). Research within the phonological hypothesis framework has yielded considerable evidence that a beginning reader's level of metalinguistic awareness, especially in the phonological domain, is related robustly to progress in early reading, and that training in metaphonological skills facilitates early reading acquisition (Ehri et al., 2001; National Reading Panel, 2000; Scarborough, 1998).

Preschoolers also become aware that what one says, and how one says it, should take into account the setting and the listener(s). For example, 4-year-old African American children have been observed to produce fewer AAE features in formal than informal speech (Connor & Craig, 2006), suggesting that by the time they enter school, some are familiar with both the AAE and MAE dialects and their appropriateness in different settings. Young children also become cognizant of the differences between languages and between individual speakers of the same language, and are aware of their associations with cultural and racial differences (Hirschfield, 1989; Kuczaj & Harbaugh, 1982). These insights can be seen as a sign of nascent "dialect awareness" that is probably associated with the child's developing metalinguistic insight in other language domains. Indeed, negative correlations have been observed between AAE usage and linguistic awareness in beginning readers (Connor & Craig; Terry, 2006; Terry et al., 2010).

According to the linguistic *awareness/flexibility* hypothesis, the reading difficulties of children who speak NMAE dialects can be traced to a general insensitivity to language variation with regard to both structure and usage (Charity et al., 2004; Connor, 2008; Connor & Craig, 2006; Terry, 2006, 2008; Terry et al., 2010). Hence, children who produce many NMAE features in a context that presupposes MAE (e.g., taking a test or conversing with an unfamiliar adult at school) appear not to appreciate that a less colloquial register would be more appropriate, and thus may be demonstrating weak metalinguistic awareness in the pragmatic domain. This contextual inflexibility is likely to be an indication of a more general limitation in metalinguistic awareness that extends to other aspects of language, including phonological awareness.

According to this viewpoint, therefore, it is not the production of NMAE features itself that impedes the child's progress in learning to read. Rather, as the phonological hypothesis framework would posit, *any* child with limited linguistic

awareness—regardless of dialect—is at increased risk for difficulty in early reading. The usage of NMAE features in speech is thus a marker of this other, more universal, risk factor for future academic difficulties.

METALINGUISTIC AWARENESS: PREDICTED RELATIONSHIPS WITH NMAE USAGE AND EARLY READING

The interference/mismatch and awareness/flexibility hypotheses are in disagreement with respect to the role of linguistic awareness. According to the former, the relationship of NMAE usage to reading is direct. That is, difficulty in mapping NMAE speech onto standard English orthography (which most closely represents MAE) is viewed as the main obstacle to learning to read for an NMAE-speaking novice reader. Although phonological awareness also may contribute to success in early reading (as is consistently found for MAE speakers), frequent NMAE production would be expected to affect the reading skill independently of this.

According to the linguistic awareness/flexibility hypothesis, the relationship of dialect to reading is indirect. Dialect variation among novice readers reflects differences in sensitivity to language that also would be evident on more conventional measures of metalinguistic skills, such as phonological awareness tests. Hence, it would be predicted that NMAE usage would correlate inversely with phonological awareness as well as with reading, and that the relationship between dialect and early reading skills would be mediated by phonological awareness.

Because the two hypothesized explanatory mechanisms are not mutually exclusive, it is possible that there could be both direct and mediated effects of speech variation on early reading, and thus that the predictions of both viewpoints would receive support. In our research, therefore, one question we addressed was whether the relationship of dialect variation to reading is mediated (fully or partially) by linguistic awareness.

PHONOLOGICAL REPRESENTATIONS OF WORD PRONUNCIATIONS BY NMAE SPEAKERS

According to the phonological hypothesis and the research in support of it, other aspects of phonological processing besides metalinguistic awareness can contribute to difficulties in learning to read. Several recent studies on the underpinnings of reading disabilities have examined the "precision" of young children's phonological representations of words. During the preschool years, children accumulate and store a wealth of information about the meanings and pronunciations of several thousand words, and the phonological representations of known words become more complete and well specified at the phonemic level (Fowler, 1991; Metsala & Walley, 1998). When the time comes to learn to read, this stored information is available to be mapped onto print. A novice reader whose phonological representations contain imprecise or incomplete information about how words are pronounced, therefore, would be at a disadvantage in learning to decode print.

Fowler and Swainson (2004) investigated this notion by asking first graders to judge the acceptability of puppets' pronunciations of familiar words (e.g., "popsicle" vs. "poksicle" vs. "potsicle"). Greater tolerance for multiple variants was exhibited by the poorer readers than the better readers, suggesting that the former were somewhat confused about precisely how the words should be pronounced. Similarly, in a longitudinal study of children at risk for dyslexia, reading outcomes in second grade were predicted by performance on a naming test in which kindergartners were encouraged to say familiar words with exaggerated clarity of pronunciation (Elbro, Borstrom, & Petersen, 1998). Furthermore, the precision of phonological representations has been correlated not just with reading skills but also with phonological awareness (Elbro et al.; Swan & Goswami, 1997a, 1997b).

With regard to children who speak NMAE dialects, Charity et al. (2004) noted that it cannot be assumed that their overt speech reflects everything that they know about the pronunciations of words. They reasoned that mismatches between print and speech will only be a major obstacle to cracking the reading cipher if there is also a mismatch between print and stored phonological representations of words. To date, however, no studies have previously addressed the question of how much NMAE speakers know about alternative pronunciations of words.

Phonological Representation of Words: Predicted Relationships to NMAE Usage and Early Reading Skills

The interference/mismatch and awareness/flexibility hypotheses differ in their assumptions about a child's stored knowledge of the phonological features of spoken words. The former presumes that lexical representations of word pronunciations coincide closely with overt speech for NMAE-speaking students, and thus that MAE features are not usually represented in their lexicons. Accordingly, a child who says "fas" for *fast* is assumed to be unaware of the presence of a final /t/ in the MAE pronunciation of the word, resulting in a mismatch when the letter *t* is encountered in reading.

In contrast, the awareness/flexibility hypothesis allows for the possibility that children's mental representations include more information than is evident from overt speech. That is, if a child who says "fas" knows that the word *fast* ends with an unrealized /t/, the presence of a printed *t* will not create a mismatch with stored knowledge. Hence, more generally, if a child who produces many NMAE features in speech has stored knowledge of the alternative MAE pronunciations that align better with print, then speech–print mismatches would be fewer, more easily resolved, and not likely to account for the relation between dialect differences and reading skill. The second major goal of our study was to investigate how NMAE and MAE features are represented phonologically in the mental lexicons of novice readers who vary widely in their spoken production of NMAE features.

METHOD

Participants

The sample included 55 typically developing children (25 boys and 30 girls) in prekindergarten and kindergarten whose ages ranged from 4.3 to 6.4 years ($M = 5.4$). All were native speakers of American English. The sample was racially and economically diverse, and included 26 (47.3%) White, 22 (40.0%) African American, 4 (7.3%) Latino, and 3 (5.5%) Asian American children.

The participants attended two elementary schools and associated preschools in an urban-fringe district in Connecticut. School reports indicated that the sites varied in the socioeconomic and racial diversity of the students. The percentage of students eligible for the federal free and reduced lunch programs was 6% at one school, which was located in a mainly middle-SES neighborhood, and 51% at the other, which served several middle and working class neighborhoods. Fewer minority students were enrolled at the middle-SES school (24%) than at the lower-SES school (67%).

Measures of Language Variation

By recruiting a mixed-race and mixed-SES sample from Northeastern United States, we expected to obtain considerable variation in the children's dialect usage, including phonological features of MAE, AAE, and several NMAE regional dialects (eastern New England, western New England, and New York City). Dozens of phonological and morphosyntactic features that are more characteristic of NMAE (especially AAE) dialects than MAE have been described in detail in many sources (e.g., Green, 2004; Labov, Ash, & Boberg, 2006; Washington & Craig, 2002; Wolfram & Schilling-Estes, 2006). In selecting the stimuli for our measures (see Appendix), we focused primarily on some NMAE features that are frequently produced in the region: reduction of final consonant clusters (e.g., "tol" in lieu of "told"); omission of postvocalic /r/ (e.g., "pahk" in lieu of *park*, "sistuh" in lieu of *sister*); realization of labiodental fricatives as other obstruents (e.g., "dis" in lieu of *this*; "wif" in lieu of *with*); devoicing of final stops (e.g., "bet" in lieu of *bed*); and substitution of the regular present progressive affix (e.g., "tryin" in lieu of *trying*).

Although phonological representations of words in the lexicon are not directly observable, researchers have designed several experimental measures to examine them indirectly (Elbro et al., 1998; Fowler & Swainson, 2004) and to assess the phonological skills of children who speak NMAE dialects (Charity et al., 2004; Rodekohr & Haynes, 2001). We adapted these approaches to assess children's usage of and knowledge about the phonological features of MAE and NMAE and the relation between them. Each task included dialect-sensitive items (i.e., words or pseudo-words with features that can be pronounced differently in NMAE than SAE) and two tasks also included dialect-neutral items (i.e., for which the pronunciation would be the same regardless of dialect). Tasks were presented

on a laptop using Microsoft PowerPoint illustrations that, for the two tasks with spoken stimuli, included prerecorded audio clips that the examiner activated by clicking on-screen sound buttons. To insure accuracy of scoring, all sessions were audio recorded.

Sentence Imitation

Children's usage of MAE and NMAE features in their speech was measured with Charity et al.'s (2004) sentence imitation task. The child listened to a story spoken in MAE and was asked to repeat verbatim each sentence immediately after it was presented. While viewing the story's on-screen illustrations, the child heard audio clips of an adult White female MAE speaker reading 2 practice items and 15 test sentences, in which 18 phonological and 19 morphosyntactic dialect-sensitive items were embedded. The percentage of items on which the child produced an NMAE alternative rather than the MAE target was computed for each set, yielding a phonological score and a grammatical score.

Picture Naming: Conventional Versus Precision Instructions

To assess the knowledge of word pronunciations, differences between casual and deliberate speech were examined in a picture naming task that contrasted conventional naming instructions with requests for greater precision. On each of the 27 trials with dialect-sensitive stimuli (see Appendix), the child was first shown a picture of a common object and asked to say its name (conventional instructions). If the target word was not produced (e.g., *mask* was called "face"), the examiner prompted the child for an alternative. Then child was asked to say the word again "slowly and clearly" (precision instructions). The examiner modeled this with a practice item (*umbrella* pronounced as "ummm-BREL-luh") that all children were able to repeat in the same exaggerated manner. Similar tasks were used by Elbro et al. (1998) and Fowler and Swainson (2004) with 4- to 7-year-olds to examine the precision of pronunciations in relation to early reading skills.

For those items the child was able to name with the target word, the responses were scored for pronunciation. Each response was classified as the MAE pronunciation (e.g., "toothbrush"), as a correct NMAE alternative (e.g., "toofbrush"), or as a pronunciation that was not correct in either SAE or NMAE (e.g., "toothbuss"). The percentage of each response type was computed for each type of instruction (i.e., conventional and precision).

Acceptability Judgments

Knowledge about alternative word pronunciations also was examined by asking the children to judge the acceptability of different pronunciations of 10 familiar dialect-sensitive words (see Appendix). A picture of the object was displayed above four robots that were "learning how to say words." The child was asked to listen carefully as each robot tried to name the picture, and to judge whether that robot's version was an "okay" way to say the word. After each variant had been judged, the next trial began with the display of a new picture. This task had to be terminated for two children who apparently could not understand the instructions.

Similar tasks were used by Elbro et al. (1998) and Fowler and Swainson (2004) to assess the precision of phonological representations of young children.

The four variant pronunciations were the MAE version (e.g., *breakfast*), two correct NMAE alternatives (e.g. *breakfas'* and *breffis*), and a version containing a speech error that was unrelated to dialect (e.g., *bweakfast*). The robots' voices were prerecorded by four adult speakers (two African American bidialectal NMAE-MAE speakers, one male and one female, and two White MAE speakers, one male and one female). One pronunciation per speaker was heard per trial, counterbalanced so that each child heard NMAE, MAE, and speech error pronunciations by all four robots. The percentage of pronunciations that were judged to be acceptable was scored for each stimulus type.

Pseudo-word Repetition

To assess encoding and reproduction of novel phonological sequences, many researchers have used pseudo-word repetition tasks (Brady, Poggie, & Rapala, 1989; Fowler & Swainson, 2004). Ours also was used to examine children's knowledge of the correspondences between SAE features and permissible AAE alternatives. Children were told that an on-screen robot wanted to teach them to "say robot words just like he does," and that they should listen carefully and try to imitate what was said. The 20 trials (see Appendix) included 10 dialect-sensitive items (e.g., "re-noy-tist") intermixed with 10 dialect-neutral items of similar phonological complexity (e.g., "de-bof-tidge"), which ranged from 3 to 5 syllables in length. Each dialect-sensitive item contained a targeted feature that could legitimately be pronounced differently in a real word by a NMAE speaker (e.g., the final consonant cluster /-st/). The corresponding dialect-neutral pseudo-word included a feature that could not be pronounced differently (e.g., the final consonant cluster /-dʒ/). The child's pronunciation of the targeted portion was scored as a verbatim reproduction; an appropriate substitution of a NMAE alternative for the MAE feature; or an incorrect repetition or omission of the feature. Percentages of response types were computed separately for dialect-sensitive and dialect-neutral items.

Measures of Early Literacy Skills

Two subtests of the *Woodcock-Johnson Tests of Achievement, Third Edition* (WJ3; Woodcock, McGrew, & Mather, 2001) were administered in standardized format. The *Letter–Word Identification* test was used to assess how well children could read aloud printed letters and words. The *Sound Awareness* test assesses phonological awareness by requiring the child to rhyme words and to manipulate sounds within words by deleting, adding, or reversing syllables and phonemes. Raw scores were converted to standard scores based on published norms.

Procedure

Each child was individually examined at school during three brief sessions within a 2-week period. Two female examiners, one African American and one White, each administered all tasks to approximately half of the participants; both used

MAE during testing sessions. For the three tasks with spoken responses, high percentages of agreement between two independent scorers were obtained: sentence imitation (95.6%), picture naming (98.3%), and pseudo-word repetition (86.4%).

RESULTS

We first divided the sample into subgroups of children who used relatively few versus many phonological NMAE features in speech, and then compared their performance on the experimental measures of language variation. In subsequent analyses, we applied regression methods to examine the relationships of children's early reading and phonological awareness skills to their production and stored knowledge of MAE and NMAE features. Prior to analysis, arcsine transformations were applied to percentage scores from the experimental measures. Preliminary analyses indicated no effect of the examiner's race on children's performance on any measures, so this variable was excluded.

Comparison of High- Versus Low-NMAE Subgroups

NMAE feature usage, as measured on the sentence imitation task, varied widely in this group of children, ranging from 0% to 93% ($M = 33.7$, $SD = 25.8$ for phonological scores and $M = 18.5$, $SD = 22.2$ for grammatical scores). Because phonology was the focus of our research questions, only the phonological scores from the sentence imitation task were used to create subgroups for analyses. The 25 children (4 White, 17 African American, 3 Latino, and 1 Asian American) who produced NMAE features on 30% or more of the items were assigned to the high-NMAE usage group ($M = 56.8\%$, $SD = 19.1$, range 31–93). The remaining 30 children (22 White, 5 African American, 1 Latino, and 2 Asian American) formed the low-NMAE group ($M = 14.4\%$, $SD = 9.6$, range 0–29). Given that the two sentence imitation scores correlated strongly with one another ($r = .79$), it is not surprising that the mean grammatical scores of these groups also differed (33.7% vs. 5.8%, respectively). Although age ranges were similar for the subsamples, the high-NMAE group was significantly younger, on average ($M = 5.3$ years, $SD = 0.6$, range 4.4–6.4), than the low-NMAE group ($M = 5.6$ years, $SD = 0.5$, range 4.3–6.4); hence, age was included as a covariate in all analyses of group differences. Separate one-way or two-way analyses of covariances (ANCOVA's) were used to compare group performance (summarized in Figure 5.1) on the picture naming and precision, acceptability judgments, and pseudo-word repetition tasks.

In the picture naming task, the children produced the target word for 83.6% of the pictures, indicating that the stimulus words were quite familiar. We first examined whether NMAE features were produced less often under "precision" than conventional naming instructions, particularly by the high-NMAE group. A 2 × 2 mixed model ANCOVA included instruction type as the within-subject repeated measure and group as the between-groups factor. There was a strong main effect of group, with the high-NMAE group producing more NMAE responses, $F(1, 52) = 20.757$, $p < .001$, $\eta_p^2 = .289$, but only weak and nonsignificant effects for instruction type,

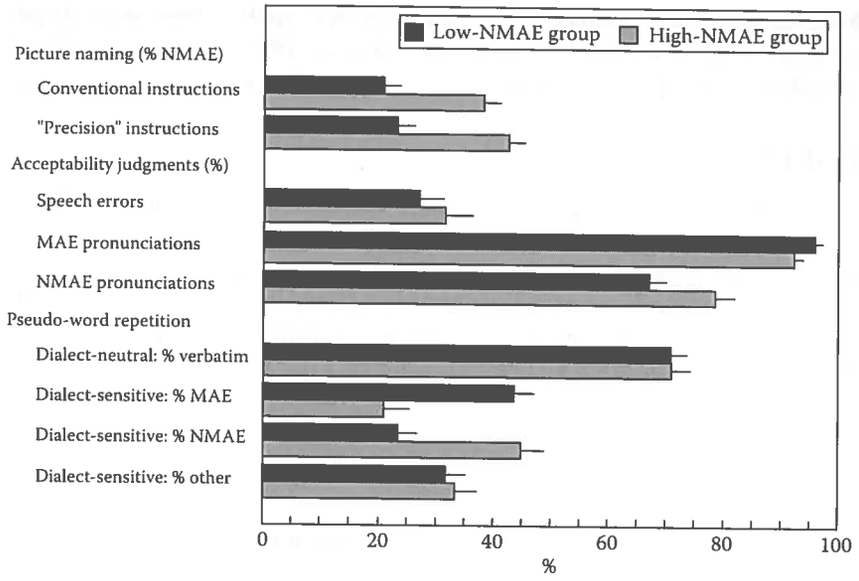

FIGURE 5.1 Comparison of the high-NMAE and low-NMAE dialect groups on their usage and knowledge of NMAE and MAE pronunciations of words. Mean age-adjusted percentages are plotted. The error bars extend 1 SE from the mean.

$F(1, 52) = 0.201$, $p = .656$, $\eta_p^2 = .004$, and for the interaction, $F(1, 52) = 0.554$, $p = .460$, $\eta_p^2 = .011$. Thus, asking children to pronounce known words more slowly and distinctly did not lead to production of more MAE features by the NMAE speakers.

On the acceptability judgments task, we examined whether the groups differed in their tolerance for alternative pronunciations of dialect-sensitive words. A 2 × 2 mixed model ANCOVA was carried out with stimulus type (MAE vs. NMAE variants) as the within-subject repeated measure and group as the between-groups factor. Main effects were weak for both group, $F(1, 50) = 0.197$, $p = .669$, $\eta_p^2 = .004$, and stimulus variants, $F(1, 50) = 0.124$, $p = .726$, $\eta_p^2 = .002$, but there was a substantial interaction effect, $F(1, 50) = 8.342$, $p = .006$, $\eta_p^2 = .143$. As can be seen in Figure 5.1, although both groups accepted nearly every MAE pronunciation and not quite as many NMAE items, this difference between stimulus types was larger for the low-NMAE than for the high-NMAE group.

On the pseudo-word repetition task, verbatim imitations of the dialect-neutral items were produced about equally often by the two groups, $F(1, 52) = 0.093$, $p = .762$, $\eta_p^2 = .001$, indicating that their ability to phonologically encode and reproduce novel stimuli was equivalent. For the dialect-sensitive items, a 2 × 2 mixed model ANCOVA with response type (verbatim vs. NMAE substitution) as the within-subject repeated measure yielded negligible main effects of group, $F(1, 52) = 0.623$, $p = .434$, $\eta_p^2 = .012$, and type of response, $F(1, 52) = 0.421$, $p = .510$, $\eta_p^2 = .008$. However, there was a strong interaction effect, $F(1, 52) = 16.617$, $p < .001$, $\eta_p^2 = .242$. As illustrated in Figure 5.1, the high-NMAE group's imitations included an NMAE substitution about twice as often as they contained a verbatim (MAE) reproduction of the targeted feature of the pseudo-word. For the low-NMAE group, this pattern of responding was reversed.

It bears noting that very few speech errors (less than 5% of responses) were made by either group on the picture naming task, and that on the acceptability judgments task, the pronunciations containing dialect-irrelevant speech errors were usually rejected, at similar rates, by both groups, $F(1, 50) = 0.405$, $p = .528$, $\eta_p^2 = .008$. Also, although both groups sometimes produced responses that were consistent with neither MAE nor NMAE, they did so with similar frequency (see Figure 5.1).

Summary scores were created such that higher values would reflect greater usage or knowledge of language variation. For the picture naming (combined) and pseudo-word repetition tasks, we computed the percentage of NMAE pronunciations out of the number of items on which either an NMAE or MAE pronunciation was used. For the judgment task, we computed the percentage of NMAE targets accepted out of the summed percentages for NMAE and MAE targets. All were reliably intercorrelated (median $r = .51$, range .31 –.74), so to simplify subsequent analyses, we created an overall dialect differences factor score that was based on a principal components analysis of the four phonological summary scores. This factor, which correlated with age ($r = -.33$, $p = .014$), was then regressed on age so that the age-adjusted residuals could be analyzed as the overall measure of a child's relative usage and knowledge of MAE versus NMAE features.

Relationships Between Dialect Differences and Early Literacy Skills

To examine word reading skill in relation to language variation, two regression analyses were conducted with Letter–Word Identification scores ($M = 107.6$, $SD = 10.2$) as the dependent measure, school as a surrogate for SES (entered first and accounting for 2% of the variance), and the age-adjusted dialect factor score as a predictor variable. In the second regression, Sound Awareness scores ($M = 109.9$, $SD = 14.4$) were also included as a predictor. The reading and awareness measures correlated with each other ($r = .57$, $p < .001$) and inversely with the dialect factor ($r = -.30$ and $-.42$, respectively, $p < .03$). Means for the high- and low-NMAE groups, respectively, were 104.1 ($SD = 13.9$) and 109.0 (10.1) for Letter–Word Identification, and 105.7 (14.0) and 113.3 (13.1) for Sound Awareness.

If there is a mediating effect of phonological awareness on the relation of NMAE usage to early reading skills, then the beta weight for the dialect variable should be greatly reduced when analyzed alongside phonological awareness (Baron & Kenny, 1986). This pattern was indeed obtained. In the first regression, the beta weight for dialect was –.292 ($p = .045$). In the second, with Sound Awareness included, the total R^2 increased from .094 to .308, and the beta weight for the dialect factor decreased to –.092. Similarly, this beta value decreased from –.252 to .002 when we repeated the regression analyses, but with the grammatical score from the sentence imitation task entered (after age-adjustment and

arcsine transformation) in lieu of the dialect factor. All the regression results suggest that metalinguistic awareness fully mediated the relationships between dialect differences and early reading achievement.

DISCUSSION

Given the enormous scientific and practical value of the phonological hypothesis account of reading acquisition and reading disabilities, we were inspired to consider the relationship of dialect differences to reading in terms of two aspects of phonological processing that have been linked to early reading achievement: metalinguistic awareness and the precision of phonological representations. The results provided clear answers to the two main questions that we set out to address.

Are both NMAE and MAE features of words represented phonologically in the mental lexicons of novice readers who use many NMAE features in overt speech, or does lexical knowledge coincide closely with spoken pronunciations of words?

We compared picture naming, acceptability judgments, and pseudo-word repetitions for subgroups characterized by high versus low frequency of NMAE usage in sentence imitation. Not surprisingly, the children in the high-NMAE group produced many more NMAE features in their spoken responses on the naming and repetition tasks. On the judgment task, however, they almost always accepted MAE pronunciations of words in addition to the NMAE variants. Furthermore, the other subgroup, who consistently used few NMAE features in their own speech, also accepted both MAE and NMAE versions as "okay" ways to say familiar words. These findings, which are consistent with other recent results (Connor & Craig, 2006), suggest that knowledge of both dialects was strong and quite similar for our two groups, despite the marked differences in their patterns of overt speech. Moreover, it is striking that the high-NMAE group made mostly dialect-appropriate substitutions when imitating dialect-sensitive pseudo-words, in essence "translating" correctly from one dialect to the other. Doing so requires considerable knowledge about which MAE features have NMAE alternatives, and when it is permissible to produce them.

Although poorer readers have been shown to mispronounce familiar words and accept multiple pronunciations of words more frequently than better readers (Fowler & Swainson, 2004), these differences were not seen between our dialect groups. (Variability within each group suggests, of course, that some children in each group may have had relatively poor phonological precision.) The results are thus more compatible with the idea that on average, the phonological representations of NMAE speakers do not contain less adequate information about the ways words can permissibly be pronounced, and that the precision of their phonological representations is not responsible for their difficulties in reading acquisition. Rather, these youngsters appeared to know a great deal about alternative pronunciations of familiar words, and to know enough about MAE to enable a successful mapping of stored representations onto print.

It must also be emphasized that the speech and memory capabilities of the two groups were very similar. Both groups produced few speech errors during naming and usually rejected pronunciations that contained speech errors rather than dialect differences in the acceptability judgments task. This demonstrates that the children could readily distinguish legitimate MAE and NMAE pronunciations from wrong ones. Furthermore, the high- and low-NMAE speakers were nearly equally proficient at imitating the dialect-neutral pseudo-words verbatim, indicating that encoding and reproduction of novel phonological input was unimpaired.

Are dialect differences related directly to reading achievement, or is the link mediated (fully or partially) by phonological awareness?

As previously found by us and by others (Charity et al., 2004; Connor & Craig, 2006; Terry et al., in press), NMAE usage was correlated with word reading and phonological awareness skills in this sample of beginning readers. According to the interference/mismatch hypothesis, difficulty in mapping NMAE speech onto standard English orthography is the main obstacle to reading acquisition by NMAE-speaking children. Our regression analyses yielded no support for this direct relationship, however. Instead, phonological awareness fully mediated the contribution of dialect differences to the prediction of reading achievement. That is, the contribution of dialect variation to reading scores was negligible when phonological awareness was included as a predictor in the analyses. This finding is highly consistent with the linguistic awareness/flexibility hypothesis, which postulates that dialect variation among novice readers reflects more general differences in children's sensitivity to language variation.

The major findings thus converged in supporting the linguistic awareness/flexibility hypothesis about the relation between dialect variation and early reading skill. By the time children begin learning to read, it appears that those who have been exposed to multiple dialects have become quite knowledgeable about acceptable alternatives for pronouncing words, regardless of whether they produce all variants routinely in their speech in settings that presuppose MAE. By this age, many children also understand that the way one speaks should be flexibly adjusted so as to be contextually appropriate, and that using NMAE features may be perceived as inappropriate in school and other formal settings, including clinical tests and research tasks administered by an unfamiliar adult (Connor & Craig, 2006; Terry et al., in press). The observed correlation in our sample between dialect measures and phonological awareness thus suggests that children who do not produce predominantly MAE pronunciations in a research setting may have weaker metalinguistic skills than their classmates, probably not just in phonology but also in other domains of language.

Linguistic awareness has been shown to greatly facilitate learning to read. Children who realize that spoken words are made up of syllables and smaller sound elements (phonemes) can more readily appreciate how the orthographic system represents these aspects of language on the printed page. Whether or not they are speakers of NMAE dialects, novice readers who have not yet attained these insights will be at a disadvantage in learning to read. In light of this, the finding that

phonological awareness fully mediated the relationship between NMAE usage and early reading skills is not surprising. Frequent NMAE production among beginning readers during formal contexts that call for MAE thus appears to be a marker for differences in awareness, rather than a direct influence on reading acquisition.

The foregoing conclusions must be interpreted with some caution, however. First, our racially and socioeconomically diverse sample was drawn from a single metropolitan area in the northeastern United States, so the findings might not generalize to other populations, particularly to children who encounter less linguistic diversity in their daily lives. The sample also consisted only of 4- to 6-year-old novice readers, and other factors probably contribute to reading difficulties of older NMAE-speaking children. For instance, instructional and motivational influences, and linguistic interference at the morphosyntactic and discourse levels, may be greater impediments to successful reading at older ages.

In summary, our findings suggest that using NMAE does not, in itself, place a child at risk for difficulty in learning to read. Rather, it may be an indication that a child has not developed the metalinguistic insights that underlie contextually appropriate flexibility of language usage and an appreciation of the phonological structure of words. We would also speculate that linguistic awareness would enable a bidialectal child to overcome confusion, if any is experienced, about which stored phonological representations are most closely mapped onto printed spellings. Nevertheless, the weak linguistic awareness signaled by inappropriate NMAE usage may be a source of difficulty in early reading acquisition. Fortunately, it is a risk factor than can readily be addressed through appropriate instruction.

Educational Implications

Several literacy instruction programs for students who speak NMAE dialects have been implemented in the United States and abroad (Fogel & Ehri, 2000; LeMoine, 2001; Siegel, 2007; Wheeler & Swords, 2006). Typically designed for upper elementary and older students, these programs mainly provide explicit teaching of MAE and its relation to NMAE through contrastive analysis activities and the provision of dialect-relevant reading materials. These programs have produced mixed, but generally positive, outcomes. As yet, however, there is insufficient evidence regarding the critical components of the instruction and the mechanisms that underlie student learning.

Our findings suggest that it would also be fruitful to provide instruction at the preschool and early elementary levels, and to focus on encouraging metalinguistic insight among young NMAE speakers in the phonological, lexical, syntactic, and pragmatic domains. Instruction could foster a greater appreciation that different people speak English differently, that language usage varies across settings, and that words and sentences contain smaller elements that can be isolated and manipulated. Appropriate activities might, for instance, include games and songs that promote phonological awareness and other metalinguistic insights, role playing with literature that uses different language styles, infusing contrastive analysis activities with discussions of contexts for language formality, and so forth. As literacy instruction with a print focus is introduced in the primary grades, the

links between oral and written language can be scaffolded onto this foundation. According to the linguistic awareness hypothesis, this approach to early instruction would effectively support NMAE speakers in acquiring basic reading skills and would be of greater benefit than instructing them in MAE. Our results indicate that young AAE speakers already have receptive knowledge of MAE forms, and this receptive knowledge should be sufficient for acquiring reading skills, particularly if students are guided to exploit their stored knowledge appropriately. Fortunately, effective age-appropriate instruction to strengthen metalinguistic awareness (e.g., Brady, Fowler, Stone, & Winbury, 1994; Ehri et al., 2001) can benefit all novice readers, irrespective of differences in spoken dialect use.

CONCLUDING REMARKS

We have found the phonological hypothesis to be a valuable framework in which to study the relation of dialect variation to early reading skills. Our findings regarding the phonological representations and phonological awareness skills of beginning readers who varied in NMAE usage are highly consistent with the phonological hypothesis and quite inconsistent with the longstanding hypothesis that mismatches between overt speech and printed spellings are the main source of early reading difficulty in this population. Additional research on phonological skills and knowledge in relation to language variation is likely to deepen our understanding of how oral language relates to reading achievement, and to guide the design of improved instructional approaches for fostering metalinguistic and reading skills, especially for children who speak nonmainstream versions of English.

APPENDIX: ITEMS ON EXPERIMENTAL TASKS CREATED FOR THE STUDY

TABLE 5.A.1
Picture Naming Task

bed	bathtub	butterfly
broom	skateboard	pajamas
Mask	playground	stethoscope
Ghost	birthday cake	(corn) on the cob
scissors	(fire) hydrant	ironing (board)
flower	Handcuffs	(Ronald) McDonald
toothbrush	elephant	refrigerator
mushroom	basketball	helicopter
hanger	swimming (pool)	thermometer

Note: Targeted MAE forms with NMAE alternatives underlined. Some pictures were from the Boston Naming Test (Goodglass, Kaplan, & Weintraub, 1983).

TABLE 5.A.2
Acceptability Judgments Task

MAE Version	NMAE Versions		Speech Errors
goldfish	gol'fish	go'fish	goldfiss
bathroom	bafroom	bathroo'	bassroom
feather	fevver	feathuh	fezzer
candycane	cannycane	candyca'e	caddycane
breakfast	breakfas'	breffis	bwekfast
rockinghorse	rockin'horse	rockinghawse	rockerhorse
Gingerbread	gingerbret	ginge'bread	ginzerbread
Merry-go-round	merry-go-roun'	merry-go-rount	mewwy-go-round
salad dressing	salad dressin'	salat dressing	shalad dressing
jack-in-the-box	jack-in-de-box	jack-innuh-box	jack-in-the-bots

TABLE 5.A.3
Pseudo-word Repetition Task

Dialect Sensitive	Dialect Neutral
de-TOOV-ing	re-BING-ish
re-NOY-tist	de-BOF-tidge
AL-bo-NEETH	IM-po-MOOF
TIG-o-BUND	GAT-o-DUNK
DIN-zer-WEL-sher	WAN-chel-COY-bel
STRAD-yu-TISH-un	SPROG-yu-COSH-us
Co-ZECK-ing-flon	tu-VING-en-sham
DECK-a-DOTH-ity	BIT-a-BAFF-ity
UN-ca-NAY-buh-lind	IM-ba-LOO-duh-nance
FAVE-o-POFF-i-ter	SAZE-o-TESS-i-tin

Note: Stressed syllables are typed in uppercase. Targeted forms are underlined.

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