Published in final edited form as:
Top Lang Disord. 2010 ; 30(3): 176–188. doi:10.1097/TLD.0b013e3181efc378.

Differentiating Speech Sound Disorders From Phonological Dialect Differences:

Implications for Assessment and Intervention

Shelley L. Velleman, PhD and **Barbara Zurer Pearson, PhD**
Department of Communication Disorders, University of Massachusetts, Amherst

B. Z. Pearson, S. L. Velleman, T. J. Bryant, and T. Charko (2007) demonstrated phonological differences in typically developing children learning African American English as their first dialect vs. General American English only. Extending this research to children with speech sound disorders (SSD) has key implications for intervention. A total of 148 children (4–12 years) with SSD, 72 learning only general American English and 76 learning African American English first, took the Dialect Sensitive Language Test (DSLT; H. Seymour, T. Roeper, & J. G. de Villiers, 2000) phonology subtest. Mismatches to target forms were categorized as phonotactic vs. segmental. The scores of the children with SSD were below Dialect Sensitive Language Test norms; overall dialect differences in mismatch frequency were not identified. However, individual consonants were mastered in different orders by dialect, even among children with SSD. Phonotactic vs. segmental dialect differences were emergent but nonsignificant at age 6 years. Intervention targets should be chosen per dialect-specific segmental orders of acquisition and phonotactic priorities.

In many parts of the United States, African American English (AAE) is the predominant dialect among African American children entering kindergarten (Craig, Thompson, Washington, & Potter, 2003; Jackson & Pearson, in submission). They acquire general American English (GAE) as a second dialect in school, but the phonological characteristics of AAE tend to persist in their speech longer than other AAE features (Craig et al., 2003). About 50% of children who begin kindergarten speaking AAE still exhibit some AAE phonological features in fifth grade (Craig & Washington, 2004; Jackson & Pearson, in submission). Because several key features of AAE phonology appear to overlap with identifiers of speech sound delay/disorder (SSD) in the phonology of GAE, distinguishing difference from disorder in AAE speakers is problematic (Stockman, Boult, & Robinson, 2008). We use *Diagnostic Evaluation of Language Variation* (*DELV*; Seymour, Roeper, & de Villiers, 2003, 2005) normalization data to investigate some ways dialect and speech sound disorders or delays are distinct in children learning GAE as their second dialect. There are clear implications for intervention as well as for assessment; speech segments (e.g., liquids and fricatives) and structures (e.g., initial vs. final consonant clusters) should be targeted in different orders for children from the two different dialect groups.

CONTRASTS BETWEEN GAE AND AAE PHONOLOGY

There is general agreement among dialectologists that the phonological systems of GAE and AAE differ in several significant respects. Differences between the two phonologies, displayed in Table 1, are found less in the inventories of segments (the phonetics of the language) than in the ways in which the segments are used (the phonotactics). The only

Corresponding Author: Shelley L. Velleman, PhD, Department of Communication Disorders, 358 N Pleasant St, University of Massachusetts Amherst, Amherst, MA 01003 (velleman@comdis.umass.edu).

phonemes of AAE that are not generally considered to be the same as those of GAE are the interdental fricatives /ð/ and /θ/ (Green, 2002;Stockman, 2006), which tend to be replaced by alveolar stops in initial position and by labial fricatives or alveolar stops in medial and final contexts (Bailey & Thomas, 1998;Pollock et al., 1998;Rickford, 1999;Stockman, 1996). Other patterns of usage in AAE include frequent variable weakening of postvocalic consonants, such as devoicing and glottalization of stops and fricatives, vowelization of liquids, and nasalization of vowels to preserve the effects of omitted final nasals (see later). Other prevocalic AAE--GAE omissions affect /r/ intersyllabically, when it is syllabic, and in clusters, as well as postvocalically (Bailey & Thomas, 1998;Pollock & Berni, 1996;Rickford, 1999;Wolfram, 1991).

As shown in Table 1, the frequencies of occurrence of complex phonotactic structures (syllable or word structures, like consonant codas or clusters) also differ in AAE versus GAE, causing further differences in where and how often phonetic elements (segments) are used (Pearson, Velleman, Bryant, & Charko, 2009). Final obstruents, especially stops and nasals, are often unpronounced, but they are nonetheless considered to be present in the underlying representations of adult AAE speech, because they generally appear before word-initial vowels and pauses. Furthermore, they leave traces when they are omitted; vowels are lengthened before absent voiced but not voiceless consonants and nasalized before absent final nasals (Moran, 1993). Different coda morphemes (/-t/, /-d/, /-s/, /-z/) are also omitted for grammatical reasons (e.g., plural vs. third singular) at different rates.

Final consonant clusters also are reduced or omitted more in AAE phonology than in GAE. In GAE, a consonant is typically deleted from a cluster of 3; in AAE, a consonant is often deleted from a cluster of 2 (Bailey & Thomas, 1998; Rickford, 1999). Like final singletons, full clusters occur more often before onsetless (vowel-initial) words, indicating that these final clusters are nonetheless represented in the underlying shape of the word (Bailey & Thomas, 1998; Laing, 2003; Rickford, 1999).

Trochaic stress (stressed syllable first) is more predominant in AAE than in GAE. Initial and medial weak syllables tend to be omitted (e.g., Mississippi → Missippi; Bailey & Thomas, 1998; Rickford, 1999), and stress may be shifted, as in “UMbrella” (Wolfram, 1991).

GAE PHONOLOGICAL DEVELOPMENT IN CHILDREN LEARNING AAE FIRST

Many previous studies of AAE phonological development have relied on standardized tests normed primarily on GAE speakers (Haynes & Moran, 1989; Seymour & Seymour, 1981). Others have focused only on particular phonemes or processes (Haynes & Moran, 1989; Seymour, Green, & Huntley, 1991). Little normative data has been collected on the features shared by the two dialects where timeframes for acquisition may nonetheless differ (Pearson et al., 2009; Stockman, 1996), although Seymour and Seymour (1981) and Stockman (2006) have suggested that prevocalic /r/ typically develops earlier in AAE than in GAE.

Pearson et al. (2009) confirmed that the earlier mentioned GAE-AAE differences in frequencies of occurrence of various consonants and word and syllable shapes result in differing timetables for the acquisition of American English consonants depending on dialect. In their study, 537 typically developing (TD) children learning AAE first mastered most consonants and clusters at a 90% accuracy level in final position later than 317 learning GAE only, reflecting adult dialect differences. Overall dialect effects were not observed in initial position, but AAE-first dialect children mastered some later-developing consonants (e.g., /r/, /s/) earlier. Children whose first dialect was AAE also tended to master some initial clusters (kl-, pl-, kr-, gr-, pr-, sp-, st-, and skr-), and, unexpectedly, some final singletons (-s, -z) and one final cluster (-rs) at earlier ages than children learning GAE only. (Note: The developmental milestones from Pearson et al. are included within the results tables given later in this article.)

Other effects of the salient phonotactic differences between the dialects were also noted in the analysis by Pearson et al. (2009). The AAE-first speakers demonstrated greater differences in accuracy between initial and final positions; for example, at age 4, AAE-first learners had mastered 18 consonants in initial position but only 10 in final position. In contrast, GAE-only learners had mastered equal numbers (16) of consonants in both positions.

According to Velleman, Pearson, Bryant, and Charko (under review), children learning AAE first also demonstrate greater disruption from target sounds falling in unstressed syllables; for this group only, for example, there was a significant difference between the accuracy of their productions of [d] in “dusty” (which has stress on the syllable containing [d]) vs. in “destroy” (in which the syllable with [d] is unstressed). Similarly, children learning AAE were far more likely to reduce the [-st] in the unstressed syllable at the end of “dentist” than the same cluster at the end of “toast,” even when both were followed by the same initial consonant in the next word ([ð]).

Velleman et al. (under review) further tested how AAE-first and GAE-only children’s productions differed when they did not match the GAE target. The authors focused on initial clusters because TD children continue to demonstrate mismatches for initial clusters as late as age 6 (Seymour, 2004). Furthermore, dialect patterns predict no differences for them. In fact, no differences by dialect in overall number of mismatches were observed in initial position. Each mismatch was classified as phonotactic (syllable or word structure change resulting from the omission, movement, or addition of a segment/some segments) or segmental (individual consonant change; that is, the substitution or distortion of a sound). As predicted, the AAE-first group had a greater proportion of phonotactic mismatches than the GAE-only group. Even at age 4, when all children produce phonotactic mismatches, the relative numbers of phonotactic versus segmental mismatches was significantly different by dialect, and the gap widened at 5 and 6 years. Thus, it was concluded that different mismatch patterns and acquisition sequences are typical in these two dialects. For these reasons, Velleman et al. (under review) argued for a different trade-off between phonotactic and segmental faithfulness in the two dialect groups. For example, AAE-first children were more likely to simplify word shapes by reducing clusters or putting a vowel between two consonants (e.g., “buh-ridge”). However, these phonotactic simplifications permitted them to pay greater attention to segments, which gave the AAE learners somewhat greater accuracy than the GAE-only children on later consonant sounds such as /r/ and /s/. In contrast, GAE-only children maintained more complex word shapes so that they had fewer phonotactic mismatches to GAE targets, but they produced less accurate segments overall.

The question addressed in this study was whether similar distinctions between the dialect groups would hold within a group of children learning AAE first who meet criteria as having SSD compared with a group of children with SSD learning GAE only. Several relationships are possible. For example, the pattern for children with SSD may be the same as that found in TD children, with greater difference found between initial position and final position mismatches for AAE-first children compared with children learning GAE-only. These were framed as questions about alternative possibilities. Will the divergence in the proportion of phonotactic and segmental mismatches by dialect be greater among the SSD groups than they were for TD children? Or, will patterns of speech sound disorder overwhelm dialect differences between the SSD dialect groups?

METHODS

Participants

The participants were 148 children aged 4–12 years from throughout the United States. All participants were preidentified as having speech sound delays or disorders by their own school speech--language pathologists (SLPs), who were familiar with local dialects; all also scored more than 1 *SD* below the mean on the *DELV-Norm Referenced* (*DELV-NR*) phonology subtest. The same methods as in Pearson et al. (2009) and Velleman et al. (under review) were followed: The children took the unpublished *Dialect-Sensitive Language Test* (*DSLT*; Seymour et al., 2000) as part of the national field-testing for the *DELV* tests (Seymour, Roeper, & de Villiers, 2003, 2005). The children had either GAE (*N* = 72) or AAE (*N* = 76) as their first/primary dialect. Criteria for AAE-first membership were African American background (by parent self-report), residence in a predominantly African American community according to the census (U.S. Bureau of the Census, 2000), and AAE usage reported by the child's teacher or SLP. Southern children and those whose parents had high school educations or less were especially recruited, as AAE may be more prevalent in these groups (Craig, Washington, & Thompson-Porter, 1998; Stockman, 1996). Fifty-two percent were from the Southern United States; 32% were from the North Central United States; 11% from the West, and 5% from the Northeast. Boys outnumbered girls, as expected on the basis of disorder prevalence figures. Table 2 provides demographic details.

Materials

Materials for the study derived from the DSLT (Seymour et al., 2000), a precursor to, and superset of, the *DELV* tests. The phonology subtest included 66 items with 132 target consonants. The study items consisted of all 110 DSLT tokens in initial or final position, 40 segmental and 34 cluster types. Fifty-five targets were contrastive, that is, expected to differ by dialect, such as /ð/ in final position, whereas 55 were noncontrastive, that is, expected to elicit the same responses in all children regardless of dialect. The focus was only on consonants. Each phoneme or consonant cluster was tested in initial and final position, when possible (although initial /p/ was inadvertently omitted). Some final consonants and clusters tested were prevocalic (i.e., before a vowel-initial word), some preconsonantal, and some phrase- or sentence-final, depending on whether the item was intended to differ by dialect. Examiners described the 66 picture stimuli using preset sentences (e.g., "I see a ma**sk**"). The child was asked to repeat the sentence verbatim.

The test was given in quiet schoolrooms by SLPs supervised (long-distance) by a psychological corporation SLP. The phonology section was given next to last. Results were recorded by hand on preprinted record forms. Each target was coded as being a singleton consonant or cluster, and as initial, medial, or final. (Medial targets were not examined for these analyses.) Each production was coded as matching the target or not. Mismatches were analyzed to determine whether the production was different from the target phonotactically (i.e., omission, movement, or addition of segments, clusters, or syllables) or segmentally (i.e., substitution or distortion of consonants).

Reliability

The research group had few audiotapes of the children's responses for purposes of reliability, but 60 examiners made audiotapes of selected test sections. The tapes gave a record of the children and how their performance was interpreted by the examiners. There was 94% phoneme-by-phoneme agreement between the SLPs' records and scoring of a small number of tapes that were retranscribed by the authors (see also Pearson et al., 2009).

RESULTS

Overall accuracy

The children with SSD performed much less accurately than the children in the TD group for all target types and positions (singleton or cluster, initial or final; see Table 3). The GAE-only children with SSD produced more mismatches in final position than the AAE-first TD children. Even at the ages of 11 and 12 years, children with SSD produced a higher average number of initial cluster mismatches per target (6.5) than TD AAE-first children (4.3, not shown in the table), most of whom were 4–6 years old.

Overall, the two dialect groups of children with SSD produced about the same mean number of mismatches (38) on these items. (*Note*: To facilitate comparisons across types and positions with unequal numbers of tokens, the mismatch totals were extrapolated to the same number of tokens in Table 3.) The numbers of mismatches were not significantly different by dialect in any position, whether singletons or clusters, $F(1, 146) < 1$, *ns*. Final singletons, which had been found to be robustly different between the two TD groups (Pearson et al., 2009), with more children with AAE-first omitting them, showed a slight but nonsignificant dialect effect for the groups with SSD, $F(1, 146) = 2.69$, $p = .103$, $\eta^2 = .018$. In this case, as well, more children learning AAE first omitted the final singletons.

For all children with SSD, initial singletons were the most likely and final clusters were the least likely to match adult GAE targets. In the previous study, final position had yielded more mismatches than initial position for the TD AAE-first children but not the TD GAE-only children (Pearson et al., 2009). Apparent word position differences for the two dialect groups with SSD (in rows 3 and 4 of Table 4) were nonsignificant (position, $F(1, 137) = 1.29$, $p = .26$, $\eta^2 = .009$); Dialect, $F(1, 137) < 1$, *ns*, $\eta^2 = .009$); position by dialect, $F(1, 137) = 3.72$, $p = .06$, $\eta^2 = .03$). The trend seen in the interaction reflects the fact that the initial and final values for the GAE only group were almost identical, whereas the analogous values for the AAE first group slightly favored initial position. However, to compare the SSD results to the TD results in Pearson et al. (2009), we focus only on initial clusters for the remaining analyses.

Initial singletons

As shown in Table 5, the very earliest consonants (/b, d, w, m, n, h/) were mastered by age 4 years by all children, regardless of speech sound disorder or dialect. The children with SSD were delayed on most other sounds, some by several years, regardless of dialect group. For example, TD children mastered the velar stops /k, g/ in initial position by age 4 years. In contrast, as shown in Table 5, these consonants were not mastered by children with SSD until at least age 6 years. Affricates and later fricatives (/v, z, θ, ð/) were particularly late, as was /r/. However, the only sounds that were not produced with 90% accuracy in initial position even by age 12 years were /ð/ for both AAE groups (TD and SSD) and /r/ for the GAE children with SSD.

Pearson et al. (2009) reported that dialect affected order of acquisition of consonants for TD children. In the present study, similarly, some SSD order of acquisition dialect differences were observed. These are shown in boldface in Table 5. GAE-only children with SSD mastered /t, k, g, ʃ, ð/ earlier than those learning AAE first. In contrast, children with SSD learning AAE first were earlier in their mastery of /f, j, tʃ, dʒ, s, v, r/. Many of these sounds could not be tested for dialect differences by Pearson et al. (2009), being already above a 90% criterion by age 4 years. The delays of children with SSD thus provide a wider window to observe dialect differences. It is notable that the most challenging consonant for both the SSD and the TD AAE-first groups was /ð/. Once again, however, /θ/---the voiceless cognate of /ð/---did not differ by dialect.

The two most consistently advanced consonants for Pearson et al.'s (2009) TD AAE-first children, in all positions and target types, were /r/ and /s/. These two consonants were also areas of relative strength for the AAE-first participants with SSD. They mastered /s/ by age 6 years, the same age as the GAE TD participants, but 2 years behind the AAE TD participants. However, the GAE-only participants with SSD did not master /s/ until age 8 years. Similarly, the AAE-first group with SSD mastered /r/ at age 12 years, 8 years later than the AAE-first TD group, while the GAE-only participants with SSD still had not mastered this consonant by this oldest age in the study. Thus, SSDs resulted in delays in acquisition of many consonants for both groups but still did not completely obscure the dialect differences previously found for TD children.

Initial consonant clusters

All children with SSD were very late in acquiring initial consonant clusters, regardless of dialect (Table 6). For example, while the TD children studied by Pearson et al. (2009) had mastered /gl-/ by age 5 years, the children with SSD did not produce this cluster with 90% accuracy until many years later, by age 10 (AAE-first group) or 12 (GAE-only group). The AAE-first children in this cross-sectional study seemed somewhat inconsistent, probably because of smaller numbers in the older groups; 90% criteria reached at one age sometimes dropped at subsequent ages. Yet, they clearly mastered several initial clusters, including /r/ clusters /br-, dr-, tr-, θr-/; velar + /l/ clusters /kl-, gl-/; and /sk-/, at earlier ages than the GAE-only participants. Thus, as for TD children, the advanced skills on later singleton consonant sounds shown by AAE-first learners with SSD also extended to many clusters containing these sounds. The GAE group with SSD was earlier only on the /s/ + stop clusters /sp-, st-/.

Segmental versus phonotactic mismatches for initial clusters

Mismatches were divided into those that were phonotactic (omissions, movements, additions) versus segmental (substitutions, distortions). Overall, mismatches differed quite significantly by type, with an average of 5.4 phonotactic mismatches and 9.3 segmental ones (F [1, 136] = 20.09, p <.0005, η^2 = .129), and by age (F[5, 136] = 8.87, p <.0005, η^2 = .235), but not by dialect (F[1, 136] < 1, p = .940). There were no interactions with dialect. Unlike the results of Pearson et al. (2009), Figures 1 and 2 illustrate that the proportions of phonotactic versus segmental mismatches were actually more similar to each other at ages 4 and 5 years in the GAE-only with SSD group. The youngest AAE-first children produced more segmental than phonotactic mismatches. Like the TD results, the percentages of phonotactic mismatches dropped off more quickly in the GAE-only group than the AAE-first group at ages 6 and above. Yet, although there were significant differences between mismatch types at these ages, there was no main effect for dialect (all F values < 1, *ns*), nor did any interactions with dialect reach significance.

DISCUSSION

Not surprisingly, these children preidentified with SSD performed far worse on the DSLT phonology subtest than their TD counterparts. In fact, this follows from the selection procedure: they were selected as SSD because of their double diagnosis: they were identified as having speech sound disorders by their own SLPs and by scoring more than 1 *SD* below the mean on the *DELV-NR* phonology domain, which is a subset of the DSLT phonology subtest.

More important, the features of the speech sound disorders of the AAE-first and the GAE-only were alike in many ways despite their dialect differences. Unlike Pearson et al.'s (2009) TD children who differed by dialect in final position, the children with SSD did not differ by dialect with respect to their overall number of mismatches to GAE targets in any position. The challenges of the targets obscured dialect differences for the children with SSD. That is, their overall scores on this phonology subtest of the DSLT were indicative of their disorder and not affected by their dialect.

The only sounds that both groups of participants with SSD in this study produced at the expected age (for TD children) were six of those that Shriberg (1993) dubbed the “early 8” consonants: /b, d, w, m, n, h/. With respect to the other two consonants in this Shriberg category, /p/ was not included in the test due to an oversight and these children were delayed in their mastery of /j/ despite its “early” status. GAE-only children with SSD produced /t/, a “middle 8” consonant, at the expected age (4 years), but AAE-first children with SSD did not master it until age 5 years. Other “middle 8” consonants were delayed by 2 years (/k, g/ for GAE participants with SSD) to 6 years (/tʃ, dʒ/ for GAE participants with SSD). “Late 8” consonants were mastered 2 years later (e.g., /s/ for all participants with SSD) to 8 years later (/r/ for AAE-first learners) by participants with SSD than by those who were TD (based on Pearson et al., 2009). The delays in mastery of “late 8” sounds could not be determined for some consonants, as these consonants had not been mastered even by age 12 years by some groups (/r/ for GAE-only learners with SSD; /ð/ for AAE-first learners, regardless of ability group).

All of the participants with SSD in this study had particular difficulty with clusters. Their earliest age of mastery for any of the initial clusters tested was 8 years for /kl-/ by AAE-first learners (10 years for GAE-only children), 4–5 years later than their TD counterparts, depending on dialect. Ten initial clusters still remained to be mastered beyond age 12 years for the GAE participants with SSD; four remained for those learning AAE first.

Despite similar overall scores for the two dialect groups, specific consonants differed in order of mastery. As expected on the basis of dialect, children learning AAE first rarely produced the GAE phoneme /ð/. They demonstrated more substitutions and deletions with /t, k, g, ʃ/ and the initial clusters /sp-/ and /st-/. However, they mastered some other consonants (especially several fricatives including /s/, both affricates, and /r/) and some other initial clusters (especially those including /r/) in advance of children learning GAE only. These results verify previous findings of different phonological milestones for children from the two dialect groups.

Velleman et al. (under review) predicted and found a dialect difference with respect to proportions of phonotactic versus segmental mismatches in children with TD (more phonotactic mismatches in the AAE-first group). That is, when the children learning AAE first produced a mismatch, it was more likely to be phonotactic (omission, movement, or addition change); when children learning GAE produced a mismatch, it was more likely to be segmental (substitution or distortion). This finding was not replicated in the current study. In fact, nonsignificant trends suggest that younger children with SSD learning GAE-only produced more phonotactic mismatches than those learning AAE first. This pattern appeared to reverse above age 6 years but was not statistically significant.

Clinical implications

These results confirm the clinical value of a dialect-neutral phonology test: the DSLT did differentiate children prediagnosed with SSD from TD children, regardless of dialect. The results also confirm the critical importance of recognizing that, although some differences are obscured by phonological impairment, dialect still does impact consonant order of acquisition. Norms based on GAE-only groups of children are not appropriate for children whose first dialect is not GAE. Even the norms provided by most current phonological tests are based on census figures, with the result that the performances of the children learning AAE first are averaged in with those of very many children learning other dialects, most notably GAE. This averaging is highly likely to obscure dialect differences such as those reported in this study. Tests such as the *DELV-NR* (the norm-referenced test that was derived from the DSLT and that includes only items that are appropriate for children from either dialect group, i.e., noncontrastive items) have been specifically designed to base diagnostic conclusions only on test items that are dialect-neutral.

The findings of this group of studies have important consequences for intervention as well as for assessment. Given that most of the “early 8” sounds (Shriberg, 1993) were mastered on time by children with SSD, regardless of dialect, these most likely will not be targets for treatment. However, /j/ is an exception: It was mastered 2 years later by AAE learners with SSD than TD AAE learners (at age 6 years) and even later by GAE learners with SSD (at age 8). Thus, this consonant may need to be targeted in therapy despite its “early” status.

With respect to dialect differences, AAE scholars (e.g., Green, 2002; Stockman, 2006) have proposed that [ð] is not a phoneme in AAE. Our findings for TD children learning AAE, reported in Pearson et al. (2009), support this suggestion; this consonant had not been mastered by 90% of the TD AAE learners even at age 12 years. Thus, while production of this voiced interdental fricative may be targeted in dialect-instruction programs intended to complete an AAE-first child’s mastery of GAE, its absence in the segmental repertoire of such a child cannot be considered to be pathological (i.e., it is neither a disorder nor a delay).

The phonotactic patterns (syllable and word structure rules) of AAE are also key to designing interventions for this population. Obstruent and nasal consonants, in particular, are optional in final position in this dialect; clusters are often reduced in this position as well. Therefore, it is extremely difficult, and inappropriate, to differentiate final-position omissions and reductions with respect to dialect versus disorder. Attempting to teach new phonemes or clusters in final position first to a client whose first language is AAE would be a misguided approach. Targets should be addressed in initial position and then in medial position. When production in final position becomes a goal, phrases should be used in which the consonant or cluster goal is followed by a vowel (e.g., “dog ears” or “last August,” not “dog bones” or “last year”). Also, targeted accuracy levels should be much lower for consonants and clusters in final position than in initial or medial position. It is not appropriate to expect /t/ to be produced 90% of the time in final position, for example. (See Table 1 for further details about consonants and clusters that are more or less likely to be produced in a GAE manner and also about contexts in which they are more or less likely to be produced.)

A similar principle applies to unstressed syllables. Unstressed syllables in initial position are often omitted in AAE; consonants in such syllables are more subject to mismatches in AAE learners, as seen in Velleman et al. (under review) for /d/. Clusters in unstressed syllables are also more vulnerable (e.g., /-st/ in “dentist” versus “toast”). For these reasons, new sounds always should be targeted in stressed syllables in initial position for children whose first dialect is AAE.

The consistent finding that dialect impacts order of acquisition also has important consequences for intervention with children whose first dialect is AAE. Given the acquisition patterns found here, SLPs should consider targeting /t, k, g, ʃ, ð/ later in children learning AAE first, while /j, f, s, v, tʃ, dʒ, r/ may be targeted earlier than is typically done for children learning GAE only. The /s/ and /r/ consonants are a particular relative strength among AAE learners (vs. GAE learners), even those with SSD. Recall also that /s/ and /z/ were acquired earlier by TD AAE learners even in final position, as was the cluster /-rs/, despite the nonfavored status of final position in that dialect. Thus, these sounds should be addressed earlier in therapy with the AAE population than in GAE learners with SSD.

With regard to initial clusters, AAE-first children show particular strengths with respect to /r/ clusters (/br-, dr-, tr-, θr-/) and velar clusters (/kl-, gl-, sk-/). The /s/ + stop clusters /sp-, st-/ may be especially challenging for them. Again, these findings should be taken into account in determining the order in which goals will be addressed with AAE-speaking children with SSD.

As always in the field of speech--language pathology, individual differences must be carefully identified and taken into account. There is no cookbook for phonological assessment and intervention. Diagnostic therapy and/or more in-depth analysis is often required to determine which patterns are present, which patterns interfere the most with intelligibility, and which sounds are stimulable, not to mention which words will have the most functional and social power for the client. Individual children may have had more or less relative exposure to GAE and AAE or to different dialect “density” levels of AAE. All of these factors will impact the child’s speech sound patterns and should therefore impact intervention decisions. Each child is a new mystery---and a new promise.

Acknowledgments

This study was supported by National Institute of Health contract N01-DC-8-2104 (Harry Seymour, principal investigator) and National Science Foundation Award BCS-0318135 (Shelley Velleman, principal investigator). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

The authors thank The Psychological Corporation and the speech--language pathologists who assisted them in collecting the data, a host of dedicated graduate and undergraduate students, our colleagues in the University of Massachusetts NIH Working Groups on AAE, and, of course, the participants and their families.

References

Bailey, G.; Thomas, E. Some aspects of African-American vernacular English phonology. In: Mufwene, S.; Rickford, JR.; Bailey, G.; Baugh, J., editors. African-American English: Structure, history, and use. New York, NY: Routledge; 1998. p. 85-109.

Craig HK, Thompson CA, Washington JA, Potter SL. Phonological features of child African American English. Journal of Speech, Language, and Hearing Research 2003;46:623–635.

Craig HK, Washington JA. Grade-related changes in the production of African American English. Journal of Speech, Language, and Hearing Research 2004;47:450–463.

Craig HK, Washington JA, Thompson-Porter C. Average C-unit lengths in the discourse of African American children from low income, urban homes. Journal of Speech, Language, and Hearing Research 1998;41:433–444.

Green, LJ. African American English: A linguistic introduction. New York, NY: Cambridge University Press; 2002.

Haynes WO, Moran MJ. A cross-sectional developmental study of final consonant production in southern Black children from preschool through third grade. Language, Speech, and Hearing Services in the Schools 1989;20:400–406.

Jackson JE, Pearson BZ. Developmental trends for features contrastive between African American English and General American English. Language, Speech, and Hearing Services in Schools. (in submission). Manuscript submitted for publication.

Labov, W. The logic of non-standard English. In: Williams, F., editor. Language and poverty. Chicago, IL: Markham Publisher; 1970. p. 153-189.

Laing SP. Assessment of phonology in preschool African American Vernacular English speakers using an alternate response mode. American Journal of Speech Language Pathology 2003;12:273–281. [PubMed: 12971816]

Moran M. Final consonant deletion in African American children speaking Black English: A closer look. Language, Speech, and Hearing Services in the Schools 1993;24:161–166.

Pearson BZ, Velleman SL, Bryant TJ, Charko T. Phonological milestones for African American English-speaking children learning mainstream American English as a second dialect. Language, Speech, and Hearing Services in Schools 2009;40:229–244.

Pollock, K.; Berni, MC. Vocalic and postvocalic /r/ in African American Memphians. Paper presented at the annual meeting of New Ways of Analyzing Variation in English; Las Vegas, NV. 1996.

Pollock, K.; Bailey, G.; Berni, MC.; Fletcher, DG.; Hinton, LN.; Johnson, IA., et al. Phonological features of African American Vernacular English. 1998. Retrieved April 7, 2008, from http://www.rehabmed.ualberta.ca/spa/phonology/features.htm

Rickford, JR. African American vernacular English: Features, evolution, educational implications. Malden, MA: Blackwell; 1999.

Seymour H. A noncontrastive model for assessment of phonology. Seminars in Speech and Language 2004;25(1):91–100. [PubMed: 15088235]

Seymour, H.; Green, L.; Huntley, R. Phonological patterns in the conversational speech of African American children. Paper presented at the American Speech-Language-Hearing Association Convention; Atlanta, GA. 1991.

Seymour, H.; Roeper, T.; de Villiers, JG. Dialect Sensitive Language Test (DSLT). San Antonio, TX: The Psychological Corporation; 2000. Unpublished manuscript

Seymour, H.; Roeper, T.; de Villiers, J. Diagnostic Evaluation of Language Variation Screening Test (DELV-ST). San Antonio, TX: The Psychological Corporation; 2003.

Seymour, H.; Roeper, T.; de Villiers, J. Diagnostic Evaluation of Language Variation---Norm-Referenced Test (DELV-NR). San Antonio, TX: The Psychological Corporation; 2005.

Seymour H, Seymour CM. Black English and Standard American English contrasts in consonantal development of four- and five-year-old children. Journal of Speech and Hearing Disorders 1981;46:276–280.

Shriberg LD. Four new speech and voice-prosody measures for genetics research and other studies in developmental phonological disorders. Journal of Speech Language and Hearing Research 1993;36:105–140.

Stockman, I. Phonological development and disorders in African American children. In: Kamhi, AG.; Pollock, KE.; Harris, JL., editors. Communication development and disorders in African American children: Research, assessment, and intervention. Baltimore: Brookes; 1996. p. 117-153.

Stockman I. Evidence for a minimal competence core of consonant sounds in the speech of African American children: A preliminary study. Clinical Linguistics & Phonetics 2006;20(10):723–749. [PubMed: 17361923]

Stockman I, Boult J, Robinson G. Multicultural/multilingual instruction in educational programs: A survey of perceived faculty practices and outcomes. American Journal of Speech-Language Pathology 2008;17:241–264. [PubMed: 18663109]

U.S. Bureau of the Census. Current Population Survey, October 2000: School Enrollment Supplemental File [CD-Rom]. Washington, DC: Bureau of the Census; 2000.

Velleman SL, Pearson BZ, Bryant TJ, Charko T. Phonotactic versus phonetic development in African American English. (under review). Manuscript submitted for publication.

Wolfram, W. Dialects and American English. Englewood Cliffs, NJ: Prentice Hall; 1991.

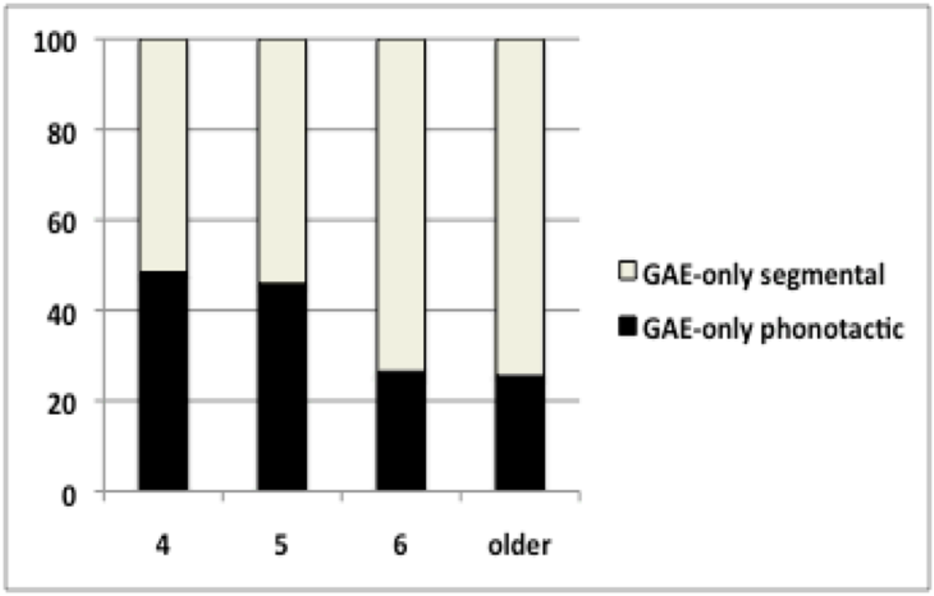

Figure 1.
Phonotactic versus segmental mismatches: GAE-only participants. GAE = General American English.

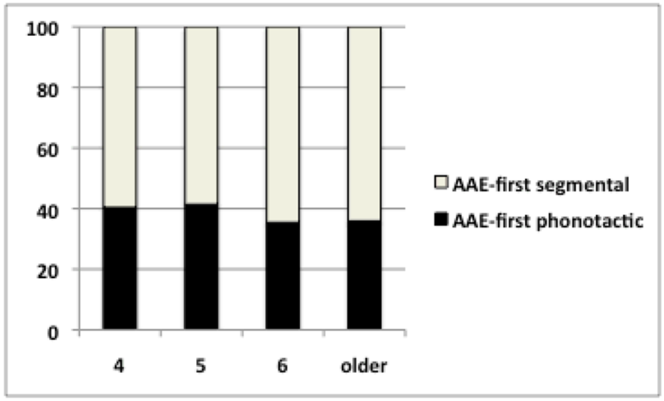

Figure 2.
Phonotactic versus segmental mismatches: AAE-first participants. AAE = African American English.

Table 1

Phonetic (segmental) and phonotactic (structural) differences between AAE and GAE

Difference	Example
Phonetic differences	
Final obstruents (stops, fricatives, and affricates): Devoiced	[ketʃ] for ‘cage’
Final /d/: Glottalized	[mæʔ] for ‘mad’
/l/: Vowelized or absent, especially in final position and before labials	[hɛp] for ‘help’
/r/: Vowelized or absent	
intersyllabically	[stoʊi] for ‘story’
in syllabic contexts	[bʌɾə] for ‘butter’
postvocalically	[hɑd] for ‘hard’
in clusters, specifically after /θ/ and in unstressed syllables	[θo] for ‘throw’
Hyperarticulated postvocalically	[tʃɛrə] for ‘chair’
Interdental fricatives (/θ/,/ð/): replaced by	
alveolar stops in initial position	[diz] for ‘these’
labial fricatives or alveolar stops in medial and final contexts	[bæf] for ‘bath’
Specific initial clusters substituted	
/str-/ realized as [skr-]	[skrit] for ‘street’
/kj-/ realized as [kr-]	[krut] for ‘cute’
Final consonants absent, especially	
obstruents, especially voiced, coronal, and/or stop	[mæ:] for ‘mad’
vowel lengthening preserved if voiced	[kæ̃:] for ‘can’
nasals; vowel nasalization preserved	
Final clusters reduced	[fæs] for ‘fast’
Initial weak syllables absent from iambic words	[bɑʊʔ] for ‘about’
Medial weak syllables absent, particularly in reduplicated contexts	‘Missippi’ for ‘Mississippi’
Initial weak syllables stressed (trochaicization)	‘POlice’
[final] /s / + stop metathesized – lexically specified?	[æks] for ‘ask’

Note. AAE = African American English; GAE = general American English. Adapted from “Phonological Milestones for African American English-Speaking Children Learning Mainstream American English as a Second Dialect,” by B. Z. Pearson, S. L. Velleman, T. J. Bryant, and T. Charko, 2009, *Language, Speech, and Hearing Services in Schools, 40*, pp. 229–244. “Some Aspects of African-American Vernacular English Phonology,” by G. Bailey and E. Thomas, 1998, In S. Mufwene, J. R. Rickford, G. Bailey, & J. Baugh (Eds.), *African-American English: Structure, History, and Use* (pp. 85–109). New York, NY: Routledge; *African American Vernacular English: Features, Evolution, Educational Implications* by J. R. Rickford, 1999, Malden, MA: Blackwell; “Phonological Features of African American Vernacular English,” by K. Pollock, G. Bailey, M. C. Berni, D. G. Fletcher, L. N. Hinton, I. A. Johnson, et al., 1998, Retrieved April 7, 2008, from http://www.rehabmed.ualberta.ca/spa/phonology/features.htm; “Phonological Development and Disorders in African American Children,” by I. Stockman, 1996, In A. G. Kamhi, K. E. Pollock, and J. L. Harris (Eds.), *Communication Development and Disorders in African American Children: Research, Assessment, and Intervention* (pp. 117–153). Baltimore: Brookes; Wolfram, W. (1991). *Dialects and American English*. Englewood Cliffs, NJ: Prentice Hall.

Table 2

Participants by dialect group, gender, and parent education level

Female		Male	Total	Mean parent education level[a]
African American English	26	50	76	2.8
General American English	25	47	72	3.0
Total	51	97	148	

[a] 2.0 = some high school; 3.0 = high school diploma (not more).

Table 3

Mismatches per child by dialect and clinical status: Average mismatches by child by type and position, adjusted for unequal number of tokens

	Initial		**Final**	
	Singleton	**Cluster**	**Singleton**	**Cluster**
AAE-1st (TD)	0.54†	4.34	4.30*†	5.89‡
GAE-only (TD)	0.41	4.20	1.40*	2.19‡
AAE-1st (SSD)	5.19	14.98	9.80	21.00
GAE-only (SSD)	5.31	16.38	8.10	21.37

Note. There were 31, 25, 35, and 19 tokens, respectively, of the target types in the column headings (Initial Singleton, Initial Cluster, etc) so as to make the totals comparable; all types were extrapolated to a basis of 35 tokens. That is, for this table, the number of initial singleton mismatches for each group was multiplied by 1.13, initial clusters by 1.4, and final clusters by 1.8. Cells with the same symbols are significantly different from each other, $p < .05$.

NIH-PA Author Manuscript
NIH-PA Author Manuscript

Table 4

Mismatches per child by dialect and clinical status: Average mismatches by child by age, SSD only, actual numbers

	Age (years)					
	4	**5**	**6**	**7–8**	**9–10**	**11–12**
AAE-1st (SSD)	24	16.1	15.3	10.9	5.7	6.5
GAE-only (SSD)	21.2	18.9	12.6	9.3	7.3	6.8

Table 5

Age of Initial Consonant Mastery[a] by Speech Status and First Dialect

Consonant	Typically developing		Speech sound disorder/delay	
	GAE	AAE	GAE	AAE
(p), b, d, w, m, n, h	4	4	4	4
t	4	4	***4***	5
k, ʃ, g	4	4	***6***	8
f, j	4	4	8	***6***
tʃ, dʒ	4	4	10	***8***
l	4	4	8	8
s	6	***4***	8	***6***
v	5	5	10	***8***
z	5	5	10	10
θ	6	6	10	10
r	6	***4***	>12	***12***
ð	***8***	>12	***10***	>12

Note. Bold italic values indicate that that dialect group mastered the sound before children with the same speech status but from the other dialect group

[a]"Age of Mastery" is the age at which 90% of the children in that group matched the target production.

Table 6

Age of initial consonant cluster mastery[a] by speech status and first dialect

Consonant	Typically developing		Speech sound disorder/delay	
	GAE	AAE	GAE	AAE
br-, dr-	4	4	>12	***10***
tr-	***4***	5	>12	***10***
kl-	5	***4***	10	***8***
pl-	5	***4***	10	10
gl-	5	5	12	***10***
kr-	6	***4***	>12	***10***[b]
sm-	6	**5**	10	10
gr-, pr-	6	**5**	>12	***10***[b]
sp-	6	**5**	***12***	>12
st-	6	**5**	***10***	12
fr-	6	6	>12	***10***[b]
sk-	6	6	>12	***12***
skr-	8	***6***	>12	>12
Φr-	***8***	10	>12	***10***
shr	***8***	12	>12	>12
str-	***8***	>12	>12	>12

Note. Bold italic values indicate that that dialect group mastered the sound before children with the same speech status but from the other dialect group.

[a]"Age of Mastery" is the age at which 90% of the children in that group matched the target production.

[b]Mastery at age 10, but not 12.