ABSTRACT: Four phonological awareness tasks were administered to 21 university students enrolled in a phonetics course. Scores on the phonological awareness tasks were correlated with four measures of phonetic transcription skill at various points during the phonetics course and a subsequent articulation disorders course. Moderate to high correlations were found between overall performance on the phonological awareness tasks and the four transcription tasks. The lowest performers on the phonological awareness tasks also proved to be the poorest transcribers. Several poor transcribers showed difficulty with two specific phonological awareness tasks: phoneme switching and phonetic reversal. Implications for teaching phonetics are discussed.

KEY WORDS: phonological awareness, university students, phonetics, phonetic transcription

Instructors who have taught courses in phonetics frequently note that some students master phonetic transcription skills quickly and easily whereas others, although academically competent, experience great difficulty with transcription. The reasons that some students seem to have inordinate difficulty with phonetic transcription are not immediately apparent. One factor that may contribute to the diversity of phonetic transcription skills among students is a difference in phonological awareness abilities.

Phonological awareness refers to the explicit understanding of the sound structure of language, including the awareness that words are composed of syllables and phonemes (Catts, 1991b). Phonological awareness includes not only understanding, but also the ability to manipulate speech segments at the level of phonemes (Cunningham, 1990). Recently, there has been a great deal of interest in the relationship between phonological awareness and academic skills such as reading and spelling in young children. For example, there is considerable evidence that phonological awareness is a reliable predictor of reading ability in children (Bradley & Bryant, 1983; Catts, 1991a; Lundberg, Olofsson, & Wall, 1980; Mann & Liberman, 1984; Share, Jorm, Maclean, & Matthews, 1984; Stanovich, Cunningham, & Cramer, 1984; Swank & Catts, 1994). There is, however, little information available regarding the phonological awareness abilities of adults.

One group of adults for whom phonological awareness skills would seem to be more critical than for most is students in communication disorders. One of the early courses for most such students is phonetics. Phonetics is the science concerned with the production and perception of speech sounds. It involves the description and classification of speech sounds relative to a set of standardized sounds (Nicolosi, Harryman, & Kresheck, 1996). Phonetics courses typically include a portion in which students are taught to transcribe speech using the International Phonetic Alphabet (IPA). Because the IPA represents a one-to-one relationship between sound and symbol, transcribing spoken words in phonetic script would seem to require an explicit understanding of the sound structure of a language and an ability to manipulate speech segments at the level of phonemes. Those are the very skills used to define phonological awareness.
For many years, the classic textbook by Van Riper and Smith (1979) was used frequently in teaching phonetics. This text provided many exercises that could be described as phonological awareness tasks. Tasks such as phoneme counting, phoneme matching, and phonetic reversals were used. More recent texts such as those by Edwards (1992) and Shriberg and Kent (1995), while including many excellent features, place little or no emphasis on phonological awareness tasks. If a significant number of students majoring in communication disorders have phonological awareness skills that need to be developed further, then perhaps phonetics instructors should incorporate phonological awareness activities into their phonetics courses.

The purpose of the present study was to assess the phonological awareness skills of undergraduate students enrolled in a phonetics course in a university department of communication disorders and to determine how those phonological awareness skills related to various measures of phonetic transcription skill.

**METHOD**

**Participants**

Participants were 21 undergraduate students (20 females, 1 male) who were enrolled in a phonetics course at Auburn University during either the winter or the summer quarter. The participants, who ranged in age from 20 to 24 years, were all communication disorders majors in the first year of their professional course sequence. None had received previous training in phonetic transcription. All participants passed a pure-tone hearing screening prior to the start of the study and reported no speech problems and no history of neurological disorders.

**Procedure**

Participants were administered four tasks to assess different types of phonological awareness skills. The four tasks involved phoneme switching, phonetic reversal, phoneme counting, and vowel matching.

- **Task I, phoneme switching**: Participants were presented with 20 two-word phrases in which the initial phoneme of each word had been transposed. For example, the phrase *bad hair* was produced on a stimulus tape as *had bear*. Participants were asked to record what they thought to be the intended utterance. Participants were not provided with written cues for this task and had to rely only on the auditory stimulus.

- **Task II, phonetic reversal**: Participants were presented with a list of 20 words written orthographically on a response sheet and spoken on a stimulus tape. Participants were instructed that sequencing the sounds in each word from last to first would create another word. For example, *knife* backwards is *fine*. Participants were asked to write the word made by reversing the sequence of sounds for each of the 20 words.

- **Task III, phoneme counting**: Participants were provided with a list of 20 words written orthographically on a response sheet and spoken on a stimulus tape. They were instructed to count the number of sounds in each word and record that number on a response sheet. It was emphasized that participants were to count *sounds*, not letters.

- **Task IV, vowel matching**: Participants were presented with 20 sets of five words each. Each set of words included a model and four foils. All words were written orthographically on a response sheet and spoken on a stimulus tape. Participants were instructed to circle the word from among the four foils that contained the same vowel sound as the model word.

The stimulus items used in these tasks are presented in their entirety in the Appendix. The instructions provided to the participants also are included in the Appendix. The phonological awareness tasks were based on published phonological awareness tasks such as those presented for children by Goldsworthy (1998). The vocabulary was altered to be more suitable for adults. The vowel matching task (Task IV) was adapted from Van Riper and Smith (1979).

The phonological awareness tasks were administered during the first week of the phonetics course. The assessment tasks were administered to each group of participants (the winter quarter class and the summer quarter class) via a tape-recorded presentation conducted by one of the authors. A high-quality reel-to-reel tape player with an external amplifier and speaker was used. The participants were positioned so that all participants were seated approximately 4–10 feet from the speaker. Instructions were presented to the participants via the tape-recorded presentation and on a printed response sheet that was provided to each participant. The tasks were presented in a counterbalanced order so that the first group of participants received the tasks in the order 1, 2, 3, 4 and the second group of participants received the tasks in the order 4, 3, 2, 1. For each task, participants were instructed to listen to the words presented on the tape and record their responses on the response sheet provided by the examiner.

Each phonological awareness task included 20 items. The participants’ performance on each task was determined by counting the number of items performed correctly. The number of items correct on each of the four tasks, as well as the total number of items correct on all four tasks, was recorded.

Phonetic transcription skills were assessed during the phonetics course (taught by one of the authors) and during a course in articulation disorders (taught by the other author) that was taken two quarters after the phonetics course. These transcription measures included the following:

- **The total score on eight transcription quizzes given as part of the phonetics course.** Each student was administered eight 40-point transcription quizzes at various points during the phonetics course. The transcription quizzes consisted of single words and connected speech samples spoken by an adult with normal speech. Students were to transcribe the
utterances in phonetic script. Only broad phonetic transcription was required.

- **A timed phonetic-to-orthographic transcription task at the end of the phonetics course.** Three quotations in phonetic script, taken from an exercise in the Van Riper and Smith (1979) phonetics text, were presented to each participant. Participants were given 3 minutes to transcribe each passage in orthographic transcription.

- **A timed orthographic-to-phonetics transcription task administered at the end of the phonetics course.** The first 50 words of the “Rainbow Passage” were presented in orthographic form to the participants, who were given 3 minutes to transcribe the passage phonetically.

- **The total score on seven transcription quizzes given in the undergraduate course in articulation disorders that was taken two quarters after the phonetics course.** These transcription quizzes consisted of single words and connected speech spoken by children and adults, with normal and disordered articulation. Two quizzes required the use of narrow transcription.

For all transcription tasks, the score recorded was the total number correct. The scores on each of the four phonological awareness tasks, the total phonological awareness score, and each of the four transcription measures were correlated and individual patterns were examined.

## RESULTS

### Phonological Awareness Skills

The range, mean, and standard deviation of scores obtained on the phonological awareness tasks administered at the start of the phonetics course are presented in Table 1. Although there was a wide range of abilities demonstrated on all four tasks, participants demonstrated the widest range of skills on Task I (phoneme switching) and Task II (phonetic reversal).

### Transcription Skills

The range, mean, and standard deviation for the scores obtained on the four transcription tasks are presented in Table 2. A wide range of abilities is demonstrated by these transcription scores.

## Correlations Between Phonological Awareness and Transcription

The phonological awareness tasks and the transcription scores were compared using a series of Pearson product moment correlations. The resulting correlation matrix is presented in Table 3.

Inspection of Table 3 reveals that the correlations between the phonological awareness tasks and the transcription tasks range from $r = .306$ to $r = .760$. Of the 16 correlations between individual phonological awareness tasks and transcription tasks, 10 reached the level of significance at the $p < .01$ level. The total phonological awareness score has a moderate to high correlation, with all four measures of transcription skill ranging from .598 to .816. All correlations between total phonological awareness scores and scores on the transcription tasks also were statistically significant ($df = 19, p < .01$).

## DISCUSSION

### Phonological Awareness and Phonetic Transcription Skills

Participants in the present study demonstrated a wide range of abilities on the phonological awareness tasks employed. This tends to support the suggestion posited earlier in the present study that students may bring varying levels of phonological awareness abilities to phonetics classes. One implication of this finding is that although their students

<table>
<thead>
<tr>
<th>Task</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTO  (max = 190)</td>
<td>73–183</td>
<td>136.62</td>
<td>34.16</td>
</tr>
<tr>
<td>OTP  (max = 50)</td>
<td>18–46</td>
<td>32.29</td>
<td>8.52</td>
</tr>
<tr>
<td>QUIZ1 (max = 320)</td>
<td>270–316</td>
<td>301.86</td>
<td>11.80</td>
</tr>
<tr>
<td>QUIZ2 (max = 70)</td>
<td>42–69</td>
<td>57.00</td>
<td>8.16</td>
</tr>
</tbody>
</table>

Note. SD = standard deviation; PTO = phonetic-to-orthographic transcription; OTP = orthographic-to-phonetic transcription; QUIZ1 = total on transcription quizzes in phonetics course; QUIZ2 = total on transcription quizzes in articulation course.
typically are adults, it may be an error for phonetics instructors to assume that all students in their classes have fully developed the metalinguistic prerequisites required to analyze and manipulate the phonetic structure of their language. This is especially true when one considers that many current undergraduate students may be products of so-called “whole language” reading approaches that, in most cases, eschew phonics and do not provide students with the skills to “sound out” words.

Participants, as expected, also demonstrated a wide range of phonetic transcription skills. These skills did not appear to vary much over time as the quiz scores from the phonetics course had a fairly high correlation ($r = .802$) with the quiz scores from the articulation course that was taken two quarters later. The four transcriptions tasks, as displayed in Table 3, were fairly well correlated with each other (in the range of $r = .636$ to $r = .802$), suggesting that they were likely assessing similar abilities.

Further examination of Table 3 indicates that the total phonological awareness scores were moderately and significantly correlated with performance on the four phonetic transcription tasks. Reviewing the individual phonological awareness skills, it can be seen that Task IV, vowel matching, was the only individual phonological awareness task that was significantly correlated with all of the transcription measures. Task IV was not significantly correlated with phonological awareness Tasks I and II, which suggests that the vowel matching task may tap a skill that is quite different from the skills required in Tasks I and II. Informal inspection of the errors on the transcription tasks does indicate that many transcription errors were vowel errors or voicing errors.

Participants With the Highest and Lowest Phonological Awareness Scores

Although the numbers are small, we feel that it is worthwhile to examine more closely the performance of the participants who exhibited the best and the worst total phonological awareness scores. Analyzing only the participants who obtained the five highest and five lowest total phonological awareness scores (see Table 4), it can be seen that the phonological awareness tasks in the present study identified at least three students who performed poorly on virtually all subsequent transcription tasks in both the phonetics and the articulation disorders courses. Participant 16 and Participant 13 obtained the two lowest total phonological awareness scores. Those two participants also scored among the five lowest on all subsequent transcription tasks. Participant 12 obtained the third lowest score on total phonological awareness and also was among the five lowest performers on three of the four transcription tasks. The one exception for Participant 12 was total quizzes in phonetics course (QUIZ1). On that task, she received the eighth lowest score.

Table 3. Correlations among the scores obtained on phonologic awareness tasks and phonetic transcription tasks.

<table>
<thead>
<tr>
<th></th>
<th>PA1</th>
<th>PA2</th>
<th>PA3</th>
<th>PA4</th>
<th>TOTPA</th>
<th>PTO</th>
<th>OTP</th>
<th>QUIZ1</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA2</td>
<td>.747*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA3</td>
<td>.577*</td>
<td>.550*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA4</td>
<td>.368</td>
<td>.495</td>
<td>.698*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTPA</td>
<td>.861*</td>
<td>.900*</td>
<td>.734*</td>
<td>.685*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTO</td>
<td>.557*</td>
<td>.741*</td>
<td>.689*</td>
<td>.692*</td>
<td>.816*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTP</td>
<td>.306</td>
<td>.570*</td>
<td>.562*</td>
<td>.611*</td>
<td>.625*</td>
<td>.774*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>QUIZ1</td>
<td>.460</td>
<td>.455</td>
<td>.500</td>
<td>.587*</td>
<td>.598*</td>
<td>.636*</td>
<td>.742*</td>
<td></td>
</tr>
<tr>
<td>QUIZ2</td>
<td>.459</td>
<td>.484</td>
<td>.579*</td>
<td>.760*</td>
<td>.668*</td>
<td>.704*</td>
<td>.747*</td>
<td>.802*</td>
</tr>
</tbody>
</table>

* Indicates significance at $p < .01$ ($p$ of .01 for 19, df = .549)

Note. PA1 = phoneme switching; PA2 = phonetic reversal; PA3 = phoneme counting; PA4 = vowel matching; TOTPA = total on phonologic awareness tasks; PTO = phonetic-to-orthographic transcription task; OTP = orthographic-to-phonetic transcription task; QUIZ1 = total on transcription quizzes in phonetics course; QUIZ2 = total on transcription quizzes in articulation course.

Table 4. Ranking on four transcription tasks of participants who received the five highest and five lowest total phonological awareness scores.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Total PA</th>
<th>PTO</th>
<th>OTP</th>
<th>QUIZ1</th>
<th>QUIZ2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top 5 scores</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P#2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2(tie)</td>
<td>1(tie)</td>
</tr>
<tr>
<td>P#9</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2(tie)</td>
<td>1(tie)</td>
</tr>
<tr>
<td>P#14</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>P#1</td>
<td>4</td>
<td></td>
<td>*</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>P#19</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Bottom 5 scores</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P#20</td>
<td>17</td>
<td>20</td>
<td>*</td>
<td>20</td>
<td>*</td>
</tr>
<tr>
<td>P#8</td>
<td>18</td>
<td></td>
<td>*</td>
<td>18</td>
<td>*</td>
</tr>
<tr>
<td>P#12</td>
<td>19</td>
<td>17</td>
<td>17</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>P#13</td>
<td>20</td>
<td>19</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>P#16</td>
<td>21</td>
<td>21</td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
</tbody>
</table>

* Not among the five highest or lowest scores on this task.

Note. PA = phonological awareness; PTO = phonetic-to-orthographic transcription task; OTP = orthographic-to-phonetic transcription task; QUIZ1 = total on transcription quizzes in phonetics course; QUIZ2 = total on transcription quizzes in articulation course.
Although the vowel matching task may have had some predictive value regarding transcription skill for the group as a whole, with regard to participants whose scores fell among the five lowest on one or more transcription tasks, none exhibited their lowest phonological awareness scores on vowel matching. Twelve different participants scored among the five lowest on one or more transcription tasks. Of those twelve, eight had their poorest phonological awareness performance on Task II (phonetic reversal), and four had their lowest performance on Task I (phoneme switching).

Conversely, two of the participants whose scores were among the five highest total phonological awareness scores (Participants 9 and 19) also scored among the five highest in all subsequent transcription tasks. No comment can be made on individual phonological awareness tasks for these high-performing participants because they demonstrated high scores across the board.

CONCLUSIONS AND FUTURE RESEARCH

It appears from the results of the present study that it might be possible to construct a brief phonological awareness assessment instrument that has the potential to identify students who are “at risk” for difficulty in developing phonetic transcription skills. Additional research is needed to identify the specific type of phonological awareness tasks that best predict those students who may be at risk. Although the vowel matching task was significantly correlated with all transcription tasks in the present study, participants who demonstrated the poorest transcription skills performed most poorly on the phoneme switching and phonetic reversal tasks. The number of participants on which that observation is based is quite small, and it must be noted that one participant who performed poorly on phoneme switching and phonetic reversal scored well on the transcription tasks.

If it is demonstrated that “at-risk” phonetics students could be identified early, they then could be offered enrichment activities to prepare them better for transcription tasks. The data, at this point, are too limited to suggest with certainty that phonological awareness activities should be included in such remedial work for these at-risk students. However, this appears to be an appropriate area for additional study. Specifically, future research is planned to examine further the relationship between students’ performance on phoneme switching and phonetic reversal tasks and their ability to master phonetic transcription. Moreover, and perhaps more importantly, the question that needs to be examined is whether training and practice on phonological awareness tasks will result in improved phonetic transcription skills in adult learners. It is the answer to this question that may alter the way in which many instructors approach teaching phonetic transcription.

REFERENCES


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APPENDIX. FOUR PHONOLOGICAL AWARENESS TASKS AND INSTRUCTIONS PROVIDED TO SUBJECTS

Task I. Phoneme Switching

You are going to hear a series of two-word phrases. However, in each phrase, the first sound of the first word and the first sound of the second word have been transposed. Listen as the phrase with the transposed sounds is produced; then write what you think the real phrase is. For example, if the speaker said *dit sown*, you would write *sit down*. Remember, listen to the sounds. Do not concern yourself with letters or spelling. Consonant clusters are treated as a single sound so *near clight* would be *clear night*.

1. had bear (bad hair)
2. dasta pish (pasta dish)
3. carine mernal (marine colonel)
4. bity sus (city bus)
5. dever clevil (clever devil)
6. mean kwuther (queen mother)
7. ganny note (nanny goat)
8. boft sed (soft bed)
9. ben tucks (ten bucks)
10. bother mear (mother bear)
11. cocal vord (vocal cord)
12. wowly lerm (lowly worm)
13. enought shunes (show tunes)
14. saf hister (half sister)
15. jade croke (crude joke)
16. dreet sweam (sweet dream)
17. bug toat (tug boat)
18. racid pliver (placid river)
19. wable tine (table wine)
20. falad sork (salad fork)

Task II. Phonetic Reversal

You will hear several words. Each word is phonetically reversible; that is, sequencing the sounds from last to first creates another word. For example *stop* backwards is *pots*. Remember to think about the sounds and not the spelling. Consonant clusters are treated as a single sound so *near clight* would be *clear night*.

1. sick (kiss) 11. scott (talks) (tox)
2. fix (skiff) 12. scope (pokes)
3. enough (funny) 13. light (tile)
4. foe (oaf) 14. Knicks (skin)
5. rope (pour) 15. kneel (lean)
6. nuts (stun) 16. peace (seep)
7. isle (lie) 17. gave (vague)
8. ice (sigh) 18. might (time)
9. cool (Luke) 19. knack (can)
10. lewd (dual) 20. nose (zone)

Task III. Phoneme Counting

You will hear the speaker produce the 20 words listed below. After the speaker produces the word, indicate in the space provided the number of speech sounds in each word—not letters, but sounds. For example, the word *these* has only three sounds: the voiced *th*, the long *ee* sound, and the final *z*.

1. soul (3) 11. gnome (3)
2. church (3) 12. shoe (2)
3. psychology (8) 13. cough (3)
4. coot (3) 14. psalm (3)
5. cute (4) 15. calf (3)
6. psyche (4) 16. pea (2)
7. ought (2) 17. kneel (3)
8. ax (3) 18. chew (2)
9. oak (2) 19. cheese (3)
10. loose (3) 20. know (2)

Task IV. Vowel Matching

Below is a list of words, each followed by four other words. Listen as the speaker produces the word in the “target” column. Then circle the word from the “choices” columns that has the same vowel sound as the target word.

1. shoe toe two* know cook
2. eight flag kick lack made*
3. farm warm worm tar* clown
4. break crate* pear trick creak
5. burn irk* pour torn ear
6. been queen men* mean seen
7. took soon good* boom blue
8. ankle pain lane all fang*
9. some go up* gone salt
10. creed fling flea* fly deer
11. dead knead feed sell* track
12. stood food lewd crud crook*
13. crimp hip* send crept mean
14. rug stump* stop ruin rook
15. news shook bump niece blue*
16. fur hairy hurry* Mary merry
17. clean lie tense grief* tile
18. rip tinkle* test real rhyme
19. known goon town load* stood
20. guess cheese crass floss met*

* indicates correct answer.