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The Discrimination of Printed Words by Prereading Children

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Abstract

In addition to the discrimination of individual printed letters, beginning readers must learn to perceive individual letters within complex, whole-word stimuli. The present study shows that the discrimination of letters presented individually does not automatically entail the discrimination of 3-letter printed words that differ only in the first letter (e.g., sat, mat). Thirty-two children ranging in age from 3½ to 5½ years participated in two studies. All showed highly accurate discrimination of individual letters in identity matching-to-sample procedures before being exposed to the word-matching task. On the word-matching task, 21 of the 32 children showed accuracy of less than 85%, and 11 of these showed accuracy of 65% or less. Word-discrimination accuracy did not improve in retests of a subset of children after periods ranging from 3 weeks to 3 months. In Study 2, six children who initially showed relatively low word-matching accuracy were taught using fading procedures. Moreover, generalization to untaught words was shown. These results extend basic laboratory studies that have shown difficulties discriminating multi-element stimuli despite the discrimination of the individual component elements.

Keywords

printed-word discrimination; complex stimuli; matching to sample; reading; children

In developing instruction for a complex academic skill, the first step is to analyze the skill, that is, to break the skill into its component parts. The extent to which instruction establishes a skill with minimal errors reflects, in part, whether all of the component skills have been identified and taught (Baer, 1982; Skinner, 1968). The focus of our research program is on the development of the alphabetic principle---the knowledge that letters within printed words represent phonemes within spoken words. The alphabetic principle is a form of relational learning in which the related elements---phonemes and letters---are abstracted from larger units---spoken and printed syllables. Abstraction is a form of discrimination in which an element of a complex stimulus controls responding (Catania, 1998).

Within the reading literature, the abstraction of the phonemes that make up a spoken syllable is termed *phonemic awareness*. Recognizing that the words “mat”, “mop”, and “mug” all begin with the same sound is an example of phonemic awareness. Children who have this

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skill have learned one component of the alphabetic principle (Adams, 1990; National Reading Panel, 2000; Snow, Burns, & Griffin, 1998).

The second component of the alphabetic principle is the printed word. Relative to phonemic awareness, perceiving individual letters within printed words has received less attention. This may be because the skill is taken for granted in children who discriminate letters that are presented individually. Lack of instruction in the discrimination of printed words can lead to difficulties, however, especially when words with overlapping letters are encountered. Words that have letters in common (e.g., sat, sam) are more difficult to discriminate than words with no overlapping letters (e.g., sat, dog) (Treiman & Zukowski, 1996; Vellutino & Scanlon, 1986; Walpole, Roscoe, & Dube, 2007).

The influence of printed-word discrimination on learning sound-print relations is shown in a study by Birnie-Selwyn & Guerin (1997). Typically developing children aged 4½ to 7 years were taught to select, from among three printed words, the word corresponding to a spoken-word sample (i.e., an arbitrary-matching-to-sample procedure). Each child learned two different word sets. In one word set, words differed from one another by one or two letters, and the in-common letters were in the same positions across words. For example, given the spoken word “snow,” the printed-word choices were snow, slow, and snap. In the other word set, words had few letters in common, for example, snow, nice, and rest. During acquisition, all six children made more errors learning the set with letters in common.

Given that previous studies involving printed words have shown learning difficulties related to printed-word discrimination when word discrimination was a component in a relational-learning task, from an instructional programming standpoint, it would be valuable to study word discrimination separately, that is, free of additional task requirements. Saunders, Johnston, and Brady (2000) extended the study of discriminative control by multielement stimuli by showing discrepancies between single-letter matching and consonant-vowel-consonant (CVC) word matching in 4–5 year old typically developing children. Moreover, the CVC-word task required children to select, from among two printed words (e.g., sat and mat), the word that was identical to a printed-word sample (e.g., sat). Thus, the discrimination had to be based on the onset consonant because the other two letters were the same. These minimally different word pairs are of interest because sets of words that differ only in the onset consonant are taught early in many reading curricula (e.g., cat, hat, bat). In addition, such CVC words have been used in an extensive and influential program of research on the development of the alphabetic principle in prereading preschool children, which rests to some extent on the assumption that children will readily make these discriminations (Byrne, 1998).

In the Saunders et al. (2000) study, word-matching trials for one word pair were randomly presented with differential reinforcement until the child met a criterion of four consecutive correct responses. Then, a new word pair was presented (e.g., set and met) until the accuracy criterion was met. All children initially showed difficulty discriminating printed words even though their discrimination of single letters was nearly perfect and the printed-word discrimination was based on the same two onset consonants across multiple word pairs. Saunders et al. study was limited, however, in at least two ways. First, it included only four

participants. Second, it did not evaluate generalization to words with onset letters that differed from the onsets of the taught words. Thus, the two studies presented here expand upon the earlier one by examining word discrimination in a larger sample of prereading children.

The purpose of the present studies was to: (a) determine whether the discrimination of alphabet letters presented individually predicts the discrimination of CVC words that differ only in the first letter (Study 1); (b) determine whether relatively low accuracy on CVC-word matching could be changed through training (Study 2); and (c) given effective training, evaluate generalization to CVC-word pairs with the same initial consonants as the taught words, and to other CVC word pairs that differ only in the first letter (Study 2).

Study 1

Study 1 asked whether prereaders who discriminate individual alphabet letters also discriminated CVC words that differ only in the first letter. We assessed both individual-letter discrimination and CVC-word discrimination using an identity-matching-to-sample (IDMTS) procedure (Carnine, 1980).

Method

Participants—The parents of 3-to-5-year-old nonreading, typically developing children who were enrolled in two university-affiliated preschools were invited to volunteer their children for the study. The two preschools were similar in that most days, meals/snacks, play, nap/rest times, circle times, free-choice activities, and group activities were a large part of their curriculum. Neither preschool was teaching alphabet letters or reading at the time of data collection. The only reading-related activity was that teachers read books to the children in large groups.

Thirty-eight parents gave consent and 35 children agreed to participate. We also had a daily assent procedure. Participants were asked whether they wanted to play at the computer, and those who declined were not asked again that day. Children who declined for 3 days were no longer asked. Three children were discontinued before the CVC-word matching task was presented. The average age of the 32 participants was 53 months (range = 43 – 68 months).

The children participated in two cohorts, each from a different preschool. Cohort 1 finished the study before Cohort 2 began. For purposes of participant description, we tested two important pre-literacy skills: vocabulary and letter naming. On the Peabody Picture Vocabulary Test III (Dunn & Dunn, 1997), age-equivalent scores for the majority of children were above their chronological age. The average score was 69 months (range = 43 – 135 months). Only one child (Patty) had an age equivalent that was more than two months below her chronological age. We tested lowercase letter-naming accuracy for all 26 alphabet letters. The accuracy ranged from 0% to 100% ($M = 52\%$). Letter-naming accuracy for each child is shown on Figure 1.

Apparatus and Stimuli—Sessions were conducted in a small, private room near the classroom. The child sat facing a touch-screen-equipped iMac computer placed on a child-

sized table. The experimenter sat behind and to the right of the participant. All sessions were conducted with match-to-sample software written by Dube (1991), which presented the matching tasks, and recorded responses and session duration. Printed letters were in Geneva font size 24, approximately ½ by ½ inch in size. Pairs of words beginning with the letters r and t were used.

Procedure—A session of 20–26 trials was conducted two mornings per week. Mean session duration was under four minutes (brevity was facilitated by the computerization of trial presentation and response recording).

Matching to sample: Each participant experienced both individual-letter matching and CVC-word matching sessions, yielding 32 replications of this within-subject comparison. The simpler task, letter matching, was presented first. This order ensured that the child could perform the MTS task, *per se*, before encountering word matching. Because the goal was to determine whether accurate individual-letter matching predicted accurate CVC-word matching, we presented the CVC-word matching task only if the child showed highly accurate letter matching. Every response in both training and test sessions produced differential feedback. At the end of every session, praise and a tangible item chosen by the child (i.e., a pencil or a sticker) were given, regardless of accuracy.

Individual-letter-matching sessions contained 26 trials, with each letter of the alphabet serving as the sample once. A minimum of two MTS sessions was presented for Cohort 1. Because there was virtually no difference across the two sessions for Cohort 1, Cohort 2 received a minimum of one session. Letter-matching accuracy of at least 90% in one session was required before proceeding to the CVC-word test. Only two children required more than the minimum number of sessions to demonstrate this; their procedures will be described with the results.

During the first trial of letter matching, the participants were told to “Touch the letter when it shows up on the screen, then try to match the same letter by touching it.” The task was briefly demonstrated if needed. Trials began with the presentation of a letter in the center of the screen (the sample). Touching the sample letter produced, in two of the four corners of the screen, one letter that was identical to the sample and one that was different. Each corner contained the correct letter approximately equally often; the sample remained on the screen (simultaneous matching). Touching the letter that was identical to the sample produced a 2-second auditory jingle and a colorful array of stars. Touching the nonidentical letter produced a 1-second black screen. A new trial began 2 seconds after feedback ended. Each of the 26 letters served as the sample once and as the incorrect choice once.

The CVC-word-matching sessions operated like letter-matching sessions, but contained 20 trials. There were 10 pairs of words. Within each word pair, one word began with the letter r and one word began with t, and the other two letters were the same. The onset letters r and t were chosen because, like the onsets used in our previous study (m and s), they are among the first few consonants introduced in reading instruction (e.g., in Direct Instruction; Englemann, Haddock, & Bruner, 1983). The word pairs were: rap/tap, rah/tah, rex/tex, rem/tem, rik/tik, rin/tin, row/tow, rod/tod, rug/tug, and rub/tub.

In a session, each pair of words appeared as choice stimuli on two trials, and each word in the pair served as the sample (and thus the correct choice) on one of these two trials. Words were presented in random order, but the sample word could not begin with the same letter for more than three consecutive trials. Note that several of the “words” were not real words. Using some nonwords expanded the number of word pairs that could be used. Given that the study focused on visual discrimination, and the children were nonreaders, presumably there was no functional difference between words and nonwords.

To determine whether CVC-word-matching accuracy would remain lower than letter matching in the absence of instruction, seven children whose accuracy on CVC-word MTS was 70% or below were retested after periods of 3 weeks to 3 months. The seven children, whose names are underlined on the figure, were selected for the retest based on low word-matching accuracy and availability.

Results

For each of the 32 children who completed the study, Figure 1 shows the percentage of trials on which a correct response was made for individual-letter matching and word matching (the third and fourth bars, respectively). Cohort 1 received a minimum of two sessions of each matching task, and data for the second session are shown unless otherwise noted. Cohort 2 (marked**) received one session of each MTS task. Although our primary goal was to determine whether there was a discrepancy between individual-letter matching and CVC-word matching accuracy, we also include the results of the letter-naming test for each child. The first two bars for each participant show the percentage of all alphabet letters named correctly, and the percentage correct for the onset letters of the CVC words used in the study, r and t.

Letter matching—The striped bars show that accuracy on letter matching was always at least 90% before word-matching sessions were presented, and 24 children showed accuracy of 100%. Two participants, Aron and Dana, required more than the minimum number of sessions to demonstrate high accuracy. Aron initially showed intermediate accuracy, and achieved 100% accuracy in one additional letter-matching session. Dana initially showed chance accuracy. After a single “demonstration” session in which familiar pictures, rather than letters, were used as stimuli, the letter-matching task was presented again, and accuracy was 96%.

CVC-word matching—Overall, accuracy was substantially lower in the word-matching task, and there was much greater variation across participants--ranging from 20–100%. Despite nearly perfect letter matching, the majority of the children (21 of 32) showed accuracy of less than 85%, and 10 children showed accuracy of 65% or less. Accuracy in retests that were given to seven children after a period of 3 weeks to 3 months showed little-to-no change, remaining well below that of individual-letter-matching. Whether or not a child showed high (i.e., 80% or above) accuracy in the CVC-word simultaneous MTS was not strongly predicted by whether or not the child named the two onset letters (i.e., *r* and *t*). For example, 4 of the 14 who did not name both onset letters showed accuracy of 80% or above, while 7 of the 18 who named one or both of the letters showed accuracy below 80%.

Discussion

Study 1 demonstrated a discrepancy between preschool children's discrimination of individual alphabet letters and their discrimination of printed CVC words that differed only in the onset letter. That is, despite showing high accuracy on individual-letter matching, many children showed intermediate to chance accuracy on the CVC-word-matching task. The discrepancy occurred even though the same two initial consonants were presented on every word-matching trial, subsequent letters were the same and thus not relevant to the discrimination, and every trial produced feedback. These findings are consistent with those of a previous study that used different onset letters (m and s) and involved only four participants (Saunders et al., 2000). Further, the CVC-word-matching accuracy had not changed when a subset of the present children was re-tested after 3 months. Because the 10 of 32 children showed accuracy of 65% or less and the discrimination skill had not developed at the 3-month re-test, Study 2 was conducted to provide training to children lacking in word-discrimination skills.

Study 2

The goal of Study 2 was to determine whether instructional programming would improve CVC-word-matching accuracy. A positive teaching outcome would show that the initial difficulties with CVC-word matching were due to lack of explicit training. A second goal was to determine whether learning to match one pair of words would promote generalization to additional word pairs with (a) the same onset consonants as in the taught words, and (b) many different onsets.

Method

Participants—Seven children from Cohort 2 who showed accuracy of less than 85% in the initial test of CVC-word matching participated.

Procedures

CVC-word discrimination training: To control for extra-experimental influences, we staggered the onset of the teaching procedures across participants. Three children, Sean, Troy, and Phil, began the teaching procedures immediately after the CVC-word matching test that was given at the end of Study 1. For the four remaining participants, three (Stacy), five (Tim), six (Ruth), and 10 (Vera) weeks elapsed without training. Then, the CVC-word matching test was given for the second time, followed by the training procedures. Additional tests given after training was completed will be described below

To capitalize on the participants' high letter-matching accuracy, we used a size-fading procedure that began with identity matching of the two individual onset letters (r and t). When added to the onset letters, the second two letters were much smaller; their size increased gradually across trials. Training was conducted with a single pair of CVC words that began with r and t but was not used in Study 1 (ref and tef). As in Study 1, all teaching and test sessions included feedback on every trial.

MTS training sessions had 30 trials. The initial letters were presented as samples quasi-randomly, with no more than three consecutive trials having the same sample. The size-fading procedure had nine steps. In the first step, the second two letters of the sample and comparison stimuli (i.e., *ef*) were tiny and barely visible. Each time the child selected the correct comparison stimulus for four consecutive trials within a fading step, the size of the second two letters increased, over nine steps. The corresponding font sizes were Geneva 1, 6, 8, 10, 12, 14, 16, 18, and 24. The onset letters (i.e., *r* and *t*) were always font size 24.

A minimum of 36 trials was necessary to complete all size-fading steps. Because sessions were limited to 30 trials, at least two sessions were necessary to complete the training. After the first session, each session began at least one step earlier in the fading sequence (i.e., at least one font size smaller) than the largest font size on which criterion was met in the previous session. That is, the children repeated at least one step on which criterion had been met. When a child achieved four consecutive correct responses on the final step, in which all letters were the same size, the session ended.

Generalization tests: Following successful training, two different 20-trial generalization tests were presented. The first was the same as the CVC-word matching sessions used in Study 1; it contained 10 pairs of words beginning with *r* and *t*. Consistent with the baseline test, feedback was given. If test accuracy was not at least 90%, additional fading training was given (described with the results). Upon the demonstration of at least 90% accuracy on the first generalization test, a second test determined whether or not high identity-matching accuracy would be shown with different initial letters. The generalization session contained 20 trials of CVC-word MTS, with a total of 17 different onset letters (see Appendix A). Note that, although all responses produced feedback, the feedback could not have increased accuracy with any specific sample stimulus, because each printed word was presented only once.

Results

For the seven children who received training, Figure 2 shows CVC-word matching accuracy on the initial test of 10 word pairs with onset consonants *r* and *t*, on the retest of these words after 3–10 weeks (for four participants), and on the generalization tests. The four children who did not begin training immediately after Study 1 (Stacy, Tim, Ruth, and Vera) showed little change in accuracy in a second pretest given 3–10 weeks later (note: these retest data are also shown in Figure 1). Table 1 shows, for each fading session, the number of correct responses and the total number of trials presented in each fading step. For example, in each of the first five fading steps, Stacy made four correct selections in the first four trials (i.e., 4/4), which met the criterion to move to the next step (indicated by a plus sign). For all seven children, accuracy was nearly perfect in the first three steps of training, when the second two letters were very small.

Five of the children completed training in two or three 30-trial sessions, making few errors. Of these five, Stacy and Tim made almost no errors. Vera, Sean, and Ruth made several errors in one or two of the steps. For example, in Sean's first exposure to Step 5 (in Session 1), 11 trials were completed before he met the criterion of four consecutive correct trials.

The last two bars of Figure 2 show that, after completing the fading sequence, these five children demonstrated accuracy of at least 90% on the generalization tests. One test was the same as the initial CVC-word matching test (Generalization Test 1) and the other involved pairs of words with many different onsets (Generalization Test 2). Vera declined further participation after the first generalization test.

The other two children made many errors on the last two fading steps (Steps 8 and 9). Phil declined further participation after three teaching sessions, having met criterion on the next-to-last step. Troy completed all nine steps in the first three sessions, but then scored 75% on the first generalization test. We then presented additional fading sessions, which began with Step 7, because Troy had previously completed Step 7 without error. Session 4, the first retraining session, ended erroneously after 21 (instead of 30) trials. In Sessions 4 and 5, Troy made errors in Steps 8 and 9, but he completed these steps without error in Session 6. He then scored 90% on both generalization tests.

Discussion

The size-fading procedure taught the CVC-word discrimination to six of seven children, in most cases with very few errors. Two children (Phil and Troy), however, made many errors in the last few teaching steps. To minimize errors, teaching procedures should include smaller fading steps and/or a “back-up” procedure that returns to an earlier teaching step when errors are made.

Once it was taught with a single word pair, CVC-word matching generalized to other word pairs that had the same onsets (i.e., *r* and *t*) and also to 10 untaught word pairs containing 17 different onset letters. Thus, the generalized skill of discriminating printed words based on the onset letter was shown after minimal training. Worth noting is that these were typically developing children who were relatively advanced (based on a measure of vocabulary). For less advantaged children, it might be necessary to train additional exemplar word pairs to achieve generalization.

Although the teaching procedure was effective, the study was not designed to show that the specific procedure used (i.e., size fading) was necessary. It is possible that an equivalent number of additional CVC-word sessions would have produced high accuracy in some participants. Worth noting, however, is that the majority of the participants who received the fading procedures met the fading-training criterion, with minimal errors, in 2–3 sessions. On the CVC-word-matching test, however, the seven participants (three of whom participated in Study 1 only) who were given a second session after a period of 3 to 12 weeks made many errors, and did not show substantial improvement despite high accuracy discriminating the letters *r* and *t*. Moreover, some errors occurred even with the fading procedure. Taken together, these findings suggest that mere differential reinforcement of CVC matching would likely have generated substantial errors for some students, as well as failure to master the task. These outcomes would not be consistent with best practice in behaviorally based teaching procedures. Moreover, errors might decrease interest in participating in the teaching sessions.

It also is possible that some children would not need all of the fading steps. This might be an important question from an efficiency standpoint. Given that only four consecutive correct responses were required to move to the next step, however, and computerization allowed very rapid presentation of trials, very little additional time was required to complete all steps.

General Discussion

The primary finding of the present studies was that the discrimination of individual letters does not automatically entail the discrimination of three-letter printed words that have letters in common. Because skilled reading requires discriminative control by printed words, these findings have implications for teaching. Printed-word discrimination should not be taken for granted based on the learner's letter-discrimination skills. For children who are having difficulties learning relations between spoken and printed words, it would be prudent to determine whether incomplete printed-word discrimination is hindering progress.

Better still would be to prevent errors by designing instruction so as to ensure the acquisition of this important component skill (see Saunders, 2011). Study 2 demonstrated the effectiveness of procedures designed to teach the discrimination of printed words containing overlapping letters by emphasizing the critical differences between printed words. Explicit instructional attention to printed-word discrimination could reduce acquisition errors in reading-related tasks that include word discrimination as a component. The study by Birnie-Selwyn & Guerin (1997) allows an example. In that study, children learned to select printed words upon hearing a spoken word. Acquisition was slower, and more errors were made, when the printed-word choices had letters in common (e.g., slow, snow) relative to words that did not have letters in common (e.g., snow, nice). It is likely that errors in the former task would be reduced if discrimination between the printed-word choice stimuli had been taught *before* attempting to teach the spoken-word-to-print task (see Saunders & Spradlin, 1993).

The results of the generalization tests can be characterized as demonstrations of abstraction. Abstraction involves a discrimination based on a single property of a stimulus, with generalization across all stimuli having that property (Catania, 1998). In this study, accurate matching involved stimulus control by the initial consonants, and not by the rest of the word. Put colloquially, the word pairings (e.g., rag/tag) forced the children to focus on (i.e., abstract) the first letter of the printed word. Of course, comprehensive instruction would not be limited to words differing only in the first letter, as children might learn to ignore the rest of the word. We focused on initial consonants as the first teaching goal because developmental accounts of individual-word reading suggest that stimulus control by the initial consonant tends to develop before the remainder of the word (Ehri, 1992), and because words differing only in onsets are often taught very early in reading instruction (e.g., cat, mat, sat).

How general is the finding of printed-word discrimination difficulties? Such difficulties, albeit in different positions within a word, have been demonstrated in typically developing older children for whom reading instruction is already underway. Early in reading

instruction, for example, children often omit the second letter of an onset blend, thus confusing words like snow and slow (Birnie-Selwyn & Guerin, 1997; Treiman & Zukowski, 1996). Errors in the vowel position within a CVC word, such as saying “bad” when shown the word bed, have been documented in elementary-school-aged struggling readers (e.g., McCandliss, Beck, Sandak, & Perfetti, 2003). Also, it has been suggested that, in the early stages of reading acquisition, many children read words based on a subset of the constituent letters. In fact, such incomplete stimulus control is so prevalent that it has been defined as a phase of individual-word reading acquisition in a prominent developmental account of individual-word reading (i.e., the “partial-alphabetic phase,” Ehri, 1992). Worth noting is that, if the word pairs that we used had no letters in common (e.g., cat, bug), it is likely that many more children would have shown high accuracy. Such word pairs, however, would not promote attention to individual letters within the printed words, a skill that is integral to progress in reading. Finally, these examples from the reading literature are consistent with basic-research findings of restricted stimulus control shown with stimuli that have more than one letter-like element (e.g., Dube, Kledaras, Iennaco, Stoddard, & McIlvane, 1993; Stromer, McIlvane, Dube, & Mackay, 1993). Thus, the present study bridges not only the applied and basic literature in behavior analysis, but also the research literature in the area of reading.

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APPENDIX A

Sample and Distracter Words in the Test for Generalization to 17 New Onsets

Sample	Distracter	Sample	Distracter
ban	lan	cob	mob
daz	taz	fum	zum
gev	kev	hic	vic
jar	sar	kof	qof
led	fed	mus	jus
niq	biq	pax	nax
quh	wuh	rep	dep
sig	cig	sit	pit
tow	xow	vul	rul
xej	hej	zok	gok

Figure 1.

The percentage of correct responses for naming the letters r and t, letter matching, and word matching. Names of children who received a second test of word matching after 3 weeks to 3 months are underlined.

Note. * Letter matching following supplemental training. ** Participants from the second cohort.

Figure 2.

The percentage of correct responses in CVC-word matching across children. White bars show the pretest and post-test of CVC words: these sessions contained 10 different word pairs with the initial consonant letters *r* and *t*. The word “training” signifies training identity matching for one word pair (ref & tef). The gray bars show tests for generalization to word pairs with 17 different initial consonants.

Note: Vera declined the second generalization test.

Table 1

Number of Correct Trials/total Number of Trials per Training Step

		Training steps							
Participant and Session	1	2	3	4	5	6	7	8	9
Sean	1	6/7 ⁺	4/4 ⁺	4/4 ⁺	4/4 ⁺	9/11 ⁺			
	2			4/4 ⁺	4/4 ⁺	4/4 ⁺	4/4 ⁺	4/4 ⁺	8/10 ⁺
	3							4/4 ⁺	4/4 ⁺
Troy	1	4/4 ⁺	4/4 ⁺	4/4 ⁺	4/5 ⁺	7/9 ⁺	3/4 ⁻		
	2				4/4 ⁺	4/4 ⁺	4/4 ⁺	8/16 ⁻	
	3						4/4 ⁺	4/4 ⁺	8/16 ⁺
	4						4/5 ⁺	7/16 ⁻	
	5							11/21 ⁺	5/9 ⁻
	6							4/4 ⁺	4/4 ⁺
Phila	1	4/4 ⁺	4/4 ⁺	4/4 ⁺	6/7 ⁺	4/4 ⁺	5/7 ⁻		
	2				4/4 ⁺	4/4 ⁺	6/8 ⁺	4/4 ⁺	9/14 ⁻
	3						4/4 ⁺	7/9 ⁺	10/17 ⁺
Stacy	1	4/4 ⁺	4/4 ⁺	4/4 ⁺	4/4 ⁺	4/4 ⁺	5/6 ⁺	4/4 ⁺	
	2						4/4 ⁺	4/4 ⁺	4/5 ⁺
Tim	1	4/4 ⁺	4/4 ⁺	4/4 ⁺	4/4 ⁺	4/4 ⁺	4/4 ⁺	5/6 ⁺	
	2						4/4 ⁺	4/4 ⁺	4/4 ⁺
Ruth	1	4/4 ⁺	4/4 ⁺	4/4 ⁺	4/4 ⁺	4/6 ⁺	5/8 ⁺		
	2				5/6 ⁺	11/17 ⁺	4/4 ⁺	3/3 ⁻	
	3					4/4 ⁺	4/4 ⁺	4/4 ⁺	4/4 ⁺
Vera	1	4/5 ⁺	4/4 ⁺	4/4 ⁺	6/7 ⁺	4/4 ⁺	5/6 ⁻		
	2			4/4 ⁺	4/4 ⁺	7/10 ⁺	4/4 ⁺	4/4 ⁺	4/4 ⁺

Note: A plus sign (+) indicates criterion met; a minus sign (-) indicates criterion not met.

Phil was discontinued after completing Step 8.

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