1. **Introduction**

Research on phonological aspects of second language acquisition (SLA) has been built in large part upon a foundation of Labovian sociolinguistics. A major goal of such research is to describe and explain systematic variation in linguistic phenomena with reference to such factors as speech situation, discourse topic, speech situation, and interlocutor roles and relationships.

In the most clearly articulated work in this tradition to date, Tarone (1979, 1982, 1983) posits speech style as the locus of variation in interlanguage (IL) development. The principle claim made is that learner speech "varies systematically with elicitation task" in terms of phonological, morphological, and syntactic structure (Tarone 1983, p. 142), and that this variability must be accounted for by an adequate model of SLA. While earlier studies have provided support for this claim, Tarone (1983) notes the serious need for longitudinal studies with data collected on different communicative tasks which reflect different speech styles, e.g. spontaneous conversation, elicitation, oral reading, and grammaticality judgments.

The present study directly addresses this need through a longitudinal analysis of natural speech produced by an adolescent Vietnamese learner of English.

2. **Variation in interlanguage phonology**

2.1. Speech style, systematicity, and attention. In a recent statement of her position, Tarone (1983) argues,
on the basis of data she reviews from a number of studies, for the superiority of a "continuum paradigm" over either a "Chomskyian paradigm" (as espoused by Adjemian (1976, 1981)) or Krashen's Monitor Theory (1976, 1981) in accounting for variable IL speech production. The continuum paradigm Tarone advocates is derived, in essence, from Labov's (1969) exposition of the "observer's paradox." She (1983, p. 152) proposes that IL be viewed as a continuum of styles, style being defined specifically in terms of the "amount of attention paid to language form." The style which occurs when the least attention is paid to speech is called the "vernacular" and exhibits the greatest systematicity (in the sense of internal consistency). Put another way, this least-attended-to style shows the least variability. The style at the other end of the continuum is called "careful style." Data from this style include those obtained under formal circumstances, where speech is being systematically observed, such as experimental task situations and structured interviews with unfamiliar researchers. The careful or "superordinate" style appears to exhibit more variability than the vernacular in that it is more often "permeated" by either target language (TL) or native language (NL) phenomena.

Tarone views learners' shifting along the continuum of styles as a direct function of the amount of attention paid to language form. She claims (1982, p. 73) that it is necessary to distinguish style shifting from register shifting, the "sociolinguistic ability to speak casually in casual situations, or formally in formal situations," pointing out that learners may very well learn only one register of the TL initially and
yet may later manifest systematically different production under changing circumstances. With subsequent acquisition of other registers, a complex interaction between register and style shifting presumably arises.

Tarone notes the methodological correlates of viewing IL as a systematically variable continuum of styles. She points out the necessity of collecting data from as many styles as possible to allow accurate identification of regularities within and among them, and the "relative influence of TL, NL and 'pidgin-like' structures (1983, p. 155). Such procedures are crucial, Tarone claims, to the construction of a viable model of the linguistic system underlying IL performance.

2.2. Task variation and IL development. The relationship between style-shifting, or, put another way, task variation, and IL development toward the TL should be observable, Tarone (1983, p. 155) suggests, as a movement of a TL structure from appearance in the most careful to the vernacular style. The continuum paradigm predicts "that while TL structures move over time from the careful style to the vernacular, as part of the process of acquisition, those IL structures [i.e., pidginized structures] which spontaneously appear in the vernacular would gradually be replaced by them.

Concretizing styles as communicative tasks (spontaneous conversation, oral reading, a structured interview, elicited intuition statements, elicited imitation, etc.) would not seem to alter the continuum paradigm's predictions. The greatest systematicity should be apparent in the task in which the least
attention is paid to language form and, concomitantly, the highest degree of variability should be noted in the task where the most attention is paid to speech, for example, elicited imitation or oral reading. Developmentally speaking, the acquisition of TL forms should take place first in speech produced on more formal tasks and then spread subsequently to the least formal communicative tasks.

2.3. Phonological variables. To date, the particular phonological variables examined with respect to sociolinguistic variation in SL performance seem to have been restricted primarily to segmental phonemes such as /r/ in Japanese and Thai learners of English (Dickerson 1974, Dickerson and Dickerson 1977, Beebe 1980) and /θ/ for Arabic learners of English (Schmidt 1977). It seems reasonable to ask whether learners treat other kinds of phonological phenomena, e.g. consonant clusters, syllable structure, stress, and intonation) differently than they do phonemes. At least one study (Sato 1983) has shown some interaction between segments and syllable structure; specifically, syllable position—initial or final—was seen to affect target-like production of consonant clusters in English IL.

In general, though, the issue of which particular feature is appropriate to posit as a linguistic variable has not received serious discussion in the SLA literature. Researchers select features that learners apparently find difficult in the SL. While this practice is understandable, it might be interesting to include more than one kind of feature in a study of IL variation in an attempt to broaden the scope of IL analysis.

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3. A longitudinal study of task variation in IL phonology

3.1. Purpose of the study.
The continuum paradigm offers a plausible means of accounting for the variable phenomenon that is IL speech. It makes explicit claims regarding the continuum nature of IL systems and the systematic variability of IL speech in different situations. The present study provides additional empirical evidence with which the continuum paradigm can be evaluated. It does so through a longitudinal analysis of IL speech from a Vietnamese learner of English. The phonological features examined are word-final consonants and word-final consonant clusters, both of which seem subject to variable production by Vietnamese learners of English. The specific research questions addressed are:

1. To what extent does target-like production of word-final consonants (Cs) and word-final consonant clusters (CCs) vary with communicative task?
2. To what extent is there change over time in the production of word-final Cs and CCs on different communicative tasks?
3. To what extent is task variability in the production of word-final Cs and CCs neutralized by first language transfer?

3.2. Method.

3.2.1. Subject. The subject in this study was Thanh, an adolescent Vietnamese boy who was about 12 years old upon arrival in the U.S. He was a boat refugee who, along
with a younger brother, was somehow separated from other family members during their departure from South Vietnam and who spent roughly two months in a Malaysian refugee camp before being placed with a white, middle-class foster couple in Philadelphia, Pennsylvania. Since his arrival in the spring of 1981, he has lived with this couple, who have provided a home for other Southeast Asian refugees over the last several years. Their previous foster children, all older teenagers or young adults, have moved out on their own or gone to live with newly arrived family members after a year or two.

Thanh has been enrolled in a local public school in a predominantly black, working- to middle-class community outside Philadelphia. He has never received any ESL instruction since there are no ESL classes or teachers available in his school.

Although he began attending school a few weeks after arriving in Philadelphia, both Thanh and his teachers report that he remained quite and uncomprehending for much of the spring 1981 school term. He interacted with other children only minimally. Because of a prolonged teacher strike the following fall, he did not return to school until November 1981, roughly a month after data collection for this study began.

Thanh is literate in Vietnamese and received tutoring out in Vietnamese through the period of observation. He did not have any English instruction in Vietnam.

3.2.2 Relevant facts about Vietnamese. Vietnamese is a monosyllabic tone language (see descriptions Liêm 1967, Binh and Gage 1975, Thompson 1965). It is labelled because a large
proportion of its words consists of single syllables, and tonal because pitch variations signal meaning differences for otherwise homophonous words.

According to Liêm (1967), Vietnamese has 22 consonants, but only eight of them can occur as codas, i.e., syllable-finally. These are /p, t, k, m, n, w/ and /y/. Moreover, these consonants are either unreleased or coarticulated. As for consonant clusters, none occur syllable-finally; and all fourteen possible syllable-initial clusters take only /w/ as a second member.

The major syllable type for Vietnamese, according to Ruhlen (1975), is (C)CVC. This is corroborated by a tally of the frequency of syllable types in Liêm's (1967) phonemic syllable inventory for Saigon Vietnamese. Of the 4,467 phonemic syllables identified by Liêm, 77% end in consonants. Since words are overwhelmingly monosyllabic, the term syllable-final can be roughly equated with word-final in Vietnamese.

From these facts it can be suggested that final consonants in English will be easier for a Vietnamese speaker to produce than final consonant clusters. Also, manner of articulation of final consonants in English might be affected, given the preference in Vietnamese for unreleased and/or coarticulated final consonants.

3.2.3. Data collection. The data for this study were collected over ten months through weekly audiotaping of visits between Thanh and myself, primarily in the home context. The following arrangement had been made with his foster parents: I would provide weekly conversation sessions in exchange for
data on his English acquisition. It was agreed that no instruction would be provided, although some help with homework tasks would be given. This condition was maintained throughout the ten-month period of the study.

Thanh's foster mother was present during most of the data collection sessions, as was his brother Tai. Other occasional participants included his foster father, family friends, and friends of the researcher.

3.2.4. Corpus. The data for the analysis consist of speech samples taken at four points during the ten-month period of the study: the first, fourth, seventh, and tenth months. These will be referred to as Times 1, 2, 3, and 4, respectively.

Each time sample contains data from four different communication tasks. At Times 1, 2, and 3, these tasks are 1) free conversation, 2) oral reading of continuous text, and 3) elicited imitation of words and short phrases. At Time 4, the oral reading task is replaced by text recitation, an oral presentation of previously written and rehearsed text. Combining the data from all four tasks, each time sample amounts to roughly 450–500 words in running speech.

3.2.5. Analysis. All the speech on the tapes for each sample was transcribed using the IPA. For each task, the data were then coded for the following:

1. word-final consonants in the categories: stops, fricatives, approximants, and nasals
2. target final consonants
3. segment modification processes for single consonants:
a) deletion
b) feature change

4. word-final consonant clusters
5. target final consonant clusters
6. segment modification processes for clusters:
   a) deletion (of the entire cluster)
   b) reduction (of the cluster)
   c) feature change (of some member of the cluster or the entire cluster)
   d) reduction and feature change

The tokens for each of these categories were then tallied and percentages calculated. Observed differences between performance on tasks over time were tested for significance ($\alpha=.05$) using the Chi-square test.

3.3. Results.

3.3.1. Task variation in word-final consonant production. Each of the four samples will be taken in turn, beginning with Time 1, the results for which are given in Table 1. The highest percentage of target-like final consonants (TFCs) is produced by Thanh in imitation (nearly 79%), followed by reading (62%) and conversation (52%). The differences among these tasks is statistically significant ($X^2=11.25, df=2, p<.005$). It turns out, further, that this result is primarily attributable to the significantly higher frequency of TFCs in imitation than in conversation ($X^2=8.93, df=1, p<.005$). While TFCs were more frequent in imitation than in reading and more frequent in reading than in conversation, neither of these comparisons is statistically significant ($X^2=3.71, df=1, p>.05$)
and $X^2=3.40$, df=1, $p > 0.05$, respectively).

(Table 1 about here)

TFCs produced by Thanh at Time 2 are shown in Table 2. It can be seen that the relative frequencies of TFCs do not vary significantly with the three tasks ($X^2=4.11$, df=2, $p > 0.10$). However, a comparison of TFCs for conversation (72.41%) and reading (61.65%) does yield a significant difference ($X^2=4.48$, df=1, $p < 0.05$).

(Table 2 about here)

Table 3 shows the results at Time 3. In this case, significant variation in target-like production is evident with task ($X^2=7.19$, df=2, $p < 0.05$), with the lowest percentage of TFCs occurring in reading (63.7%), followed by conversation (73.55%) and imitation (79.45%). Comparing each pair of tasks separately reveals significant differences in TFCs between conversation and reading ($X^2=3.97$, df=1, $p < 0.05$) and between reading and imitation ($X^2=4.93$, df=1, $p < 0.05$) but not between conversation and imitation ($X^2=0.7762$, df=1, $p > 0.25$).

(Table 3 about here)

Finally, the findings for Time 4 are shown in Table 4. Here, performance of TFCs varies only minimally with the three tasks: 69% for conversation, 71% for recitation, and 73% for imitation. The differences are not statistically significant ($X^2=0.4228$, df=2, $p > 0.50$).

(Table 4 about here)

At this point, it is helpful to compare target-like production of FCs by task across all four samples. Results are shown in Table 5. Of interest is the fact that target-like production is highest on imitation tasks at all times except Time 2, where it is highest for conversation. Furthermore, contrary to expectations, more target-like production occurs in conversation than in reading at both Times 2 and 3.

(Table 5 about here)
3.3.2. Task variation in word-final consonant cluster production. Performance of target-like final consonant clusters (TFCCs) at Time 1 is shown in Table 6. It can be seen that no significant difference obtains in Thanh's production of TFCCs in conversation, reading and imitation ($X^2=3.30$, df=2, $p>.10$). It is also important to note that the percentage of TFCCs is quite low on all tasks: 6% on conversation, 18% on reading, and 13% on imitation.

At Time 2, however, the situation changes, as shown in Table 7. Thanh produces significantly different frequencies of TFCCs on different tasks ($X^2=13.64$, df=2, $p<.005$). Both reading and imitation yield higher frequencies of target clusters than does conversation—29% and 27% as compared with 5%—and each comparison achieves statistical significance: reading and conversation ($X^2=10.76$, df=1, $p<.005$), and imitation and conversation ($X^2=7.03$, df=1, $p<.01$). TFCC production does not differ significantly, however, between reading and imitation ($X^2=.009$, df=1, $p>.90$).

Results at Time 3 are shown in Table 8. It can be seen that significantly different frequencies of TFCCs occur in conversation (22%), reading (31%) and imitation (47%) ($X^2=9.81$, df=2, $p<.01$). Comparisons of each pair of tasks reveal that this result derives from the differences between conversation and imitation ($X^2=8.57$, df=1, $p<.005$) and not to the lesser differences in target-like production between conversation and reading ($X^2=1.46$, df=1, $p>.20$) or between reading and imitation ($X^2=3.39$, df=1, $p>.05$).

Finally, results for Time 4 are shown in Table 9. TFCCs
range from a low of 6% for recitation, through 15% for conversation, to a high of 32% for imitation. As at Times 2 and 3, task differences are significant ($X^2=9.50$, df=2, $p < .01$). As for two-task comparisons, significant differences emerge between conversation and recitation ($X^2=7.62$, df=1, $p < .01$) and between recitation and imitation ($X^2=7.62$, df=1, $p < .01$) but not between conversation and imitation ($X^2=1.64$, df=1, $p > .10$).

(Table 9 about here)

Examining the four samples together in Table 10 provides an overall picture of Thanh's word-final consonant cluster production over the 10-month period. At Times 1 and 2, TFCC percentages are quite low: 6% and 5%, respectively. The highest percentage of TFCCs is for reading in these two samples. In contrast, at Times 3 and 4, the most favorable context for TFCCs is imitation, with 47% and 32%, respectively. A striking low of 6% is observed in the recitation data at Time 4.

(Table 10 about here)

3.3.3. Task variation in word-final consonant and consonant cluster production over time. The developmental findings with respect to variable final consonant and cluster production on different tasks are best introduced in general terms first. The figures for Thanh's total production of final consonants are given in Table 11 and those for final clusters, in Table 12.

Table 11 shows that TFC production generally increases over time. It amounts to nearly 59% at Time 1, 68% at Time 2, 72% at Time 3, and 70% at Time 4. Overall, the change over time in TFC production from the beginning to the end of the 10-month period amounts to a gain of 10%. It should be noted that the percentage at Time 1, 60%, was not low to begin with.

(Table 11 about here)
Thanh's production of TFCCs provides an interesting contrast. Table 12 shows that TFCC production improves over time through Time 3, but then drops drastically at Time 4. From a low of about 12% at Time 1, a high of only 31% is achieved at Time 3. In other words, there is an obvious difference in TFC and TFCC production. As illustrated in Figure 1, figures for the former are always dramatically higher than those for the latter.

Developmental changes in TFC and TFCC production on different tasks are displayed in Figures 2 and 3. In the case of final consonants, Figure 2 (which may be examined in conjunction with Table 5) shows that the relative ranking of the tasks changes from one time to the next. For example, TFC production is lowest (52%) on conversation at Time 1 but highest for this task at Time 2 (72%), in the middle at Time 3 (74%), and lowest again at Time 4 (69%). Imitation is the most favorable context for TFC production at Time 1, not so at Time 2, and again the most favorable context at Times 3 and 4. It should also be recalled that significant task differences occur at Times 1 and 3 but not at Times 2 and 4. In other words, TFC production does not vary consistently with task over time.

Developmental findings for TFCC production are shown in Figure 3, in conjunction with Table 10. It is first important to point out that TFCC production never exceeds 50% on any task in any time sample. The extremes range from 5.41% in conversation at Time 1 to 47.17% in imitation at Time 3.

With respect to the relative ranking of tasks in the four time samples, conversation remains the least favored task for
TFCC production in the first three samples. It is supplanted by text recitation at Time 4. The gap between conversation and imitation in TFCC production widens after Time 1 and persists through Time 4. As in the case of final consonants, the relative ranking of TFCCs changes over time. While reading remains the most favored task at Times 1 and 2, it is supplanted by imitation at Time 3. Imitation also ranks highest in percentage of TFCCs at Time 4, when compared with conversation and recitation.

Finally, task variation over time proves more consistent for TFCC production than for TFC production. Recall that significant differences obtain for every sample but the first. In other words, Thanh's production of TFCCs does vary with task over time.

3.3.4. Neutralization of task variation in consonant and cluster production by first language transfer. Two findings emerge here. The first is that production of TFCs far exceeds that of TFCCs over the entire period of study. See Figure 1 again for this difference. The second finding is the lack of significant differences in TFCC production at Time 1 and a reversal in the subsequent 3 samples. Refer to Table 6 for the relevant percentages at Time 1: about 6% TFCCS in conversation, 18% in reading, and 13% in imitation. Of interest also, as mentioned earlier, is that none of these percentages is very high.
3.4. Discussion.

The first research question (To what extent does target production of word-final Cs and CCs vary with communicative task?) can be answered in two parts. For word-final single consonants, significant task variation occurred in two samples but not in two others. Thus it must be concluded that task variation is inconsistent for word-final consonants. Perhaps this result is due partly to the fact that target-like production was high from the very beginning (59%) and was therefore not so prone to variation.

The second part of the answer to Research Question 1, concerning word-final consonant clusters, is more positive. It was shown that significant task variation occurred in every sample after the first, confirming the findings of previous studies (Dickerson and Dickerson 1977, Schmidt 1977, Beebe 1980). The lack of significant differences in the first sample may have been due to the generally low percentages of target-like production on all tasks. More will be said about this in the discussion of Research Question 3, below.

The second research question addressed the issue of task variation over time. Again, the results for word-final single consonants were mixed, suggesting that target-like production of this feature does not vary consistently with task over time. The findings for word-final cluster production, on the other hand, indicate that this feature does show consistent task variability over time.

What is of theoretical interest is that task variation differed so much more for word-final consonant clusters than
for word-final consonants. If production of segments and segment sequences can exhibit such a difference, what might be obtained for non-segmental phonological phenomena? These findings clearly suggest that the choice of phonological features to be analyzed merits more careful selection in subsequent work. Perhaps the more general point to be made is that all linguistic forms identified as variables—whether phonological, morphological, syntactic, or discoursal—cannot be assumed to yield similar patterns, at least with respect to task variability.

The different results obtained for word-final consonants as opposed to clusters must also be examined in light of another well-documented source of phonological variation: the linguistic environment of the segment(s) being analyzed. This is, in fact, the next step in further analysis of the data presented here.

The findings for the third research question (to what extent is task variability in the production of Cs and CCs neutralized by first language transfer?) provide further evidence of first language influence on IL phonological structure. Earlier, it was pointed out that Vietnamese favors the closed syllable and, secondly, does not allow final consonant clusters. These characteristics of the first language are reflected in the IL: a much greater frequency of target-like production of final consonants than clusters; and second, a lack of significant task variation in word-final cluster production in the first sample.

It seems reasonable to argue that if clusters are extremely difficult for Vietnamese learners of English, in the early stages of acquisition they may not be able to alter their performance very much, whatever the communicative task they are engaged in.
and however much attention they pay to articulation.


The findings of this study raise an important question for the continuum paradigm: is it sufficient to define style solely in terms of the attention paid to language form? Recall that careful style is claimed to result from maximal attention to form and to be most permeable to target and native language structures. In this study, however, a greater incidence of target-like production of word-final consonants occurred in the 'vernacular style'--conversation--than in the 'careful style'--reading--in two of the samples. Also, the task of text recitation clearly required a high degree of attention to language form on the part of the learner. Yet, the percentage of target word-final cluster production on this task was less than half that for conversation, the 'vernacular style,' in the last sample. What may be happening here is that such tasks require a great deal of attention, but this attention must be paid, not simply to language form but also to other demands on real-time discourse production: recall and encoding of rhetorical structure, lexical items, clause sequencing, etc. Phonological phenomena such as consonant clusters appear to rank low on this list of demands on the learner. The point here, with respect to the notion of a continuum of styles in IL, is that the definition of style solely in terms of the amount attention paid to language form may be an oversimplification.

Finally, there may also be a conceptual problem with the
notion of style shifting in relation to register shifting. It may be helpful to characterize style-shifting psycholinguistically and register-shifting, sociolinguistically, as Tarone has done. What seems problematic, however, is that register-shifting must also be described ultimately in psycholinguistic terms. That is to say, native speakers engaged in register-shifting accomplish such behavior also as a function of differential attention paid to language form. What seems different about second language learners is not this process per se, but the fact that they do not have access to the second language norms about which linguistic forms are associated with which social parameters.

To summarize, a longitudinal case study of task variation in IL phonology has been shown to provide limited support for the continuum paradigm. Task variability has been seen to depend partly upon the particular linguistic variable examined; different developmental patterns were identified for English word-final consonants as opposed to word-final consonant clusters. In this case, systematic task variation was demonstrated for word-final clusters but not for word-final single consonants in the English IL of a Vietnamese learner.
### Table 1

**Time 1: Task variation in word-final consonant production**

<table>
<thead>
<tr>
<th></th>
<th>Conversation</th>
<th>Reading</th>
<th>Imitation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>#</td>
<td>#</td>
<td></td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td><strong>Target</strong></td>
<td>104</td>
<td>128</td>
<td>33</td>
<td>265</td>
</tr>
</tbody>
</table>
|          | 52.00%       | 61.54%  | 78.57%    | 58.89%
| **Non-Target** | 96          | 80      | 9         | 185   |
|          | 48.00%       | 38.46%  | 21.43%    | 41.11%
| **Total** | 200          | 208     | 42        | 450   |
|          | 100.00%      | 100.00% | 100.00%   | 100.00%

(Conv. x Rdg. x Imit., $X^2=11.25$, df=2, p<.005)

(Conv. x Imit., $X^2=8.93$, df=1, p<.005)

### Table 2

**Time 2: Task variation in word-final consonant production**

<table>
<thead>
<tr>
<th></th>
<th>Conversation</th>
<th>Reading</th>
<th>Imitation</th>
<th>Total</th>
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<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td><strong>Target</strong></td>
<td>126</td>
<td>82</td>
<td>20</td>
<td>228</td>
</tr>
</tbody>
</table>
|          | 72.41%       | 61.65%  | 64.52%    | 67.46%
| **Non-Target** | 48          | 51      | 11        | 110   |
|          | 27.59%       | 38.35%  | 35.48%    | 32.54%
| **Total** | 174          | 133     | 31        | 338   |
|          | 100.00%      | 100.00% | 100.00%   | 100.00%

(Conv. x Rdg. x Imit., $X^2=4.11$, df=2, p>.1, n.s.)

(Conv. x Rdg., $X^2=4.48$, df=1, p<.05)
Table 3

Time 3: Task variation in word-final consonant production

<table>
<thead>
<tr>
<th></th>
<th>Conversation #</th>
<th>Conversation %</th>
<th>Reading #</th>
<th>Reading %</th>
<th>Imitation #</th>
<th>Imitation %</th>
<th>Total #</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
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<td>73.55</td>
<td>93</td>
<td>63.70</td>
<td>58</td>
<td>79.45</td>
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<td>73</td>
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<td>495</td>
<td>100.00</td>
</tr>
</tbody>
</table>

(Conv. x Rdg. x Imit., $X^2 = 7.19$, df=2, p<.05)
(Conv. x Rdg., $X^2 = 3.97$, df=1, p<.05)
(Rdg. x Imit., $X^2 = 4.93$, df=1, p<.05)

Table 4

Time 4: Task variation in word-final consonant production

<table>
<thead>
<tr>
<th></th>
<th>Conversation #</th>
<th>Conversation %</th>
<th>Recitation #</th>
<th>Recitation %</th>
<th>Imitation #</th>
<th>Imitation %</th>
<th>Total #</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
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<td>114</td>
<td>70.81</td>
<td>40</td>
<td>72.73</td>
<td>405</td>
<td>69.83</td>
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<tr>
<td>Non-Target</td>
<td>113</td>
<td>31.05</td>
<td>47</td>
<td>29.19</td>
<td>15</td>
<td>27.27</td>
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<td>100.00</td>
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<td>100.00</td>
<td>580</td>
<td>100.00</td>
</tr>
</tbody>
</table>

(Conv. x Rec. x Imit., $X^2 = .4228$, df=1, p>.50, n.s.)
Table 5
Target-like production of word-final consonants by task

<table>
<thead>
<tr>
<th>Task</th>
<th>Sample 1</th>
<th></th>
<th>Sample 2</th>
<th></th>
<th>Sample 3</th>
<th></th>
<th>Sample 4</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>Conversation</td>
<td>104</td>
<td>52.00</td>
<td>126</td>
<td>72.41</td>
<td>203</td>
<td>73.55</td>
<td>251</td>
<td>68.96</td>
</tr>
<tr>
<td>Oral Reading*</td>
<td>128</td>
<td>61.54</td>
<td>82</td>
<td>61.65</td>
<td>93</td>
<td>63.70</td>
<td>114</td>
<td>70.81</td>
</tr>
<tr>
<td>Imitation</td>
<td>33</td>
<td>78.57</td>
<td>20</td>
<td>64.52</td>
<td>58</td>
<td>79.45</td>
<td>40</td>
<td>72.73</td>
</tr>
</tbody>
</table>

*In Sample 4, task is text recitation

Table 6
Time 1: Task variation in word-final cluster production

<table>
<thead>
<tr>
<th></th>
<th>Conversation</th>
<th></th>
<th>Reading</th>
<th></th>
<th>Imitation</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>Target</td>
<td>3</td>
<td>5.88</td>
<td>8</td>
<td>17.78</td>
<td>4</td>
<td>12.50</td>
<td>15</td>
<td>11.72</td>
</tr>
<tr>
<td>Non-Target</td>
<td>48</td>
<td>94.12</td>
<td>37</td>
<td>82.22</td>
<td>28</td>
<td>87.50</td>
<td>113</td>
<td>88.28</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100.00</td>
<td>45</td>
<td>100.00</td>
<td>32</td>
<td>100.00</td>
<td>128</td>
<td>100.00</td>
</tr>
</tbody>
</table>

(Conv. x Rdg. x Imit., $X^2 = 3.30$, df=2, p > .05, n.s.)
Table 7
Time 2: Task variation in word-final cluster production

<table>
<thead>
<tr>
<th></th>
<th>Conversation</th>
<th></th>
<th>Reading</th>
<th></th>
<th>Imitation</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>Target</td>
<td>4</td>
<td>5.41</td>
<td>13</td>
<td>28.89</td>
<td>7</td>
<td>26.92</td>
<td>24</td>
<td>16.55</td>
</tr>
<tr>
<td>Non-Target</td>
<td>70</td>
<td>94.59</td>
<td>32</td>
<td>71.11</td>
<td>19</td>
<td>73.08</td>
<td>121</td>
<td>83.45</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>100.00</td>
<td>45</td>
<td>100.00</td>
<td>26</td>
<td>100.00</td>
<td>145</td>
<td>100.00</td>
</tr>
</tbody>
</table>

(Conv. x Rdg. x Imit., $X^2 = 13.64$, df=2, $p < .005$)
(Conv. x Rdg., $X^2 = 10.76$, df=1, $p < .005$)
(Conv. x Imit., $X^2 = 7.03$, df=1, $p < .01$)

Table 8
Time 3: Task variation in word-final cluster production

<table>
<thead>
<tr>
<th></th>
<th>Conversation</th>
<th></th>
<th>Reading</th>
<th></th>
<th>Imitation</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>Target</td>
<td>18</td>
<td>21.69</td>
<td>31</td>
<td>30.69</td>
<td>25</td>
<td>47.17</td>
<td>74</td>
<td>31.22</td>
</tr>
<tr>
<td>Non-Target</td>
<td>65</td>
<td>78.31</td>
<td>70</td>
<td>69.31</td>
<td>28</td>
<td>52.83</td>
<td>163</td>
<td>68.78</td>
</tr>
<tr>
<td>Total</td>
<td>83</td>
<td>100.00</td>
<td>101</td>
<td>100.00</td>
<td>53</td>
<td>100.00</td>
<td>237</td>
<td>100.00</td>
</tr>
</tbody>
</table>

(Conv. x Rdg. x Imit., $X^2 = 9.81$, df=2, $p < .01$)
(Conv. x Imit., $X^2 = 8.57$, df=1, $p < .005$)
### Table 9

**Time 4: Task variation in word-final cluster production**

<table>
<thead>
<tr>
<th>Target</th>
<th>Conversation</th>
<th>Recitation</th>
<th>Imitation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td># &amp; %</td>
<td># &amp; %</td>
<td># &amp; %</td>
<td># &amp; %</td>
<td># &amp; %</td>
</tr>
<tr>
<td>Target</td>
<td>6 14.63</td>
<td>4 6.15</td>
<td>7 31.82</td>
<td>17 13.28</td>
</tr>
<tr>
<td>Non-Target</td>
<td>35 85.37</td>
<td>61 93.85</td>
<td>15 68.18</td>
<td>111 86.72</td>
</tr>
<tr>
<td>Total</td>
<td>41 100.00</td>
<td>65 100.00</td>
<td>22 100.00</td>
<td>128 100.00</td>
</tr>
</tbody>
</table>

(\text{Conv.} \times \text{Recit.} \times \text{Imit.}, X^2 = 9.50, df=2, \ p < .01)

(\text{Conv.} \times \text{Recit.}, X^2 = 9.94, df=1, \ p < .005)

(\text{Recit.} \times \text{Imit.}, X^2 = 7.62, df=1, \ p < .01)

### Table 10

**Target-like production of word-final clusters by task**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Task</th>
<th>1</th>
<th>%</th>
<th>2</th>
<th>%</th>
<th>3</th>
<th>%</th>
<th>4</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conversation</td>
<td>3</td>
<td>5.88</td>
<td>4</td>
<td>5.41</td>
<td>18</td>
<td>21.69</td>
<td>6</td>
<td>14.63</td>
</tr>
<tr>
<td></td>
<td>Oral Reading*</td>
<td>8</td>
<td>17.78</td>
<td>13</td>
<td>28.89</td>
<td>31</td>
<td>30.69</td>
<td>4</td>
<td>6.15</td>
</tr>
<tr>
<td></td>
<td>Imitation</td>
<td>4</td>
<td>12.50</td>
<td>7</td>
<td>26.92</td>
<td>25</td>
<td>47.17</td>
<td>7</td>
<td>31.82</td>
</tr>
</tbody>
</table>

*In Sample 4, task is text recitation*
Table 11
Word-final consonant production over time

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>Target</td>
<td>265</td>
<td>58.89</td>
<td>228</td>
<td>67.46</td>
</tr>
<tr>
<td>Non-Target</td>
<td>185</td>
<td>41.11</td>
<td>110</td>
<td>32.54</td>
</tr>
<tr>
<td>Total</td>
<td>450</td>
<td>100.00</td>
<td>338</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 12
Word-final cluster production over time

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>Target</td>
<td>15</td>
<td>11.72</td>
<td>24</td>
<td>16.55</td>
</tr>
<tr>
<td>Non-Target</td>
<td>113</td>
<td>88.28</td>
<td>121</td>
<td>83.45</td>
</tr>
<tr>
<td>Total</td>
<td>128</td>
<td>100.00</td>
<td>145</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Figure 1
Target-like production of final consonants and final clusters over time

- Consonants
- Clusters
Figure 2

Target-like consonant production by task over time

Free Conversation
Oral Reading
Text Recitation
Elicited Imitation
Figure 3
Target-like cluster production by task over time

Free conversation
Oral Reading
Text Recitation
Elicited Imitation
Although one of the cells yields an expected frequency of less than 5, the Chi-square test is considered appropriate for these data, following Siegel (1956, p. 110): "When K (number of categories) is larger than 2 (and thus df is greater than 1), the $X^2$ test may be used if fewer than 20 percent of the cells have an expected frequency of less than 5 and if no cell has an expected frequency of less than 1."
REFERENCES


