A Universal CV Tendency?-- Another Look at the Syllable Structure in First Language Acquisition

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Theoretical background

Phonological theory on universals can be dated back to Jacobson a few decades ago. In his book *Child Language, Aphasia and Phonological Universals*, Jacobson (1968) claimed that children learn contrasts, not just individual sounds in acquiring the phonology of their native languages. He also attempted to predict the order in which sounds are acquired by saying that the first sounds that children acquire are those of maximal contrast. His hypothesis that there is a universal order of acquisition was made through surveying various diary data. With respect to syllable structure acquisition, he believed that children have a universal tendency of CV or CVCV syllables at the early stages of phonological acquisition.

Later a new theory developed out of generative phonology—Stampe's (1969) "Natural Phonology". In addition to supporting Jacobson's idea of universals, Stampe hypothesized that children are born with an adultlike knowledge of phonological processes common to all languages, and that their innate universal tendencies (including CV or CVCV syllable tendency) are gradually suppressed and eliminated in the course of their phonological development.

While Stampe's formulation began with phonological universals from languages of the world, Ingram (1976) used Stampe's idea of phonological processes in a more descriptive way to discuss the error patterns in phonological acquisition. These processes include substitution, assimilation and such other processes as cluster reduction, deletion of final consonants, deletion of unstressed syllables and reduplication. Ingram was among those who believed in the children's individual variations in their phonetic preferences and abilities, and their perceptual capacities (Ingram, 1976; Vihman et al., 1986; Studdert-Kennedy et al., 1986; Lund et al., 1983). He discussed his idea in the following way:

There is another striking way in which children construct a phonological system that results in marked differences between children. This is the result of individual phonological preferences from child to child. ... A phonological preference is used here to refer to a preference by a child
for a specific articulatory pattern. This preference may be for a particular class of sounds, such as fricatives or nasals, or for a particular kind of syllable structure. (Ingram, 1976:145)

The above brief review of theories provide us a clearer view of how linguists see differently such universals as a CV tendency. Since the concern of this paper is on the syllable structure in L1 acquisition, the following review of research will focus on this issue. More specifically, we will mainly look at the data on final consonant deletion, consonant cluster reduction and reduplication—the major processes to be applied for a simplified CV or CVCV tendency.

Review of Literature

Many studies have been published on the syllable structure of L1 acquisition. Some have demonstrated evidence of a CV/CVCV tendency, and others have demonstrated counter-evidence.

Smith et al. (1981) examined a male twin (H) who was 1;4 years at the outset of the initial three months of evaluation. Data was drawn from a 10-month study of this child. They claimed that the typical output of the child was of an open syllable format, with occasional reduplication occurring. In a study done by Ferguson et al. (1983), the data, which were drawn from the research of the Stanford Child Phonology Project during the period 1970-80, showed that at very early stages there is a CV syllable pattern in which the final consonant is deleted (e.g. [pɔ] for "boat") and later replaced by [ʔ]. Similarly, Branigan (1976) argued for the universal theory by analyzing the syllable structure and phonemic inventory of one child at the beginning of word production. His data indicated the following patterns: (1) open syllable, (2) all bisyllabic utterances were reduplicated—CVCV, (3) final syllable reduction, (4) unstressed syllable reduction. The data presented seem to warrant Branigan's claim that the CV syllable is the primary syllable unit.

The CV structure as opposed to a VC or a CVC structure provides the most favorable environment for the acquisition of consonantal distinctions because segments in initial position can be executed without interference from previous articulatory positions and segments in initial position in an open monosyllable will be unaffected by backword assimilation. The constraint to an early CV structure allows for the application of certain "exploration" strategies which help to master a set of consonants in initial position. Once established in the environment, these consonants then become available for productive use in other positions, allowing syllabic structure to expand. (Branigan 1976:131-32)
In order to test Stampe's Universal hypothesis, Prater et al. (1982) studied the phonological processes of 60 English-speaking children ranging in age from 21 to 48 months. The study used Brown's (1973) Mean Length of Utterance (MLU) and chronological age for classifying the subjects and the Phonological Process Analysis (Weiner, 1979) to obtain measures. The results indicated that the syllable structure processes--those processes for simplifying the child's production to a CV or CVCV unit--were the ones most frequently used by the children. Deletion of the final consonant was an important simplification process evidenced between MLU level 1 and MLU level 3. The same was true with cluster reduction and weak syllable deletion.

In support of the universal theory, Moskowitz et al. (1980) reviewed several case studies in which CV/CVCV syllables were dominant in the children's early speech. For example, Hildegard's (Leopold, 1939-49) and Braine's (1971) sons produced words with final consonant deletion, consonant cluster deletion and reduplication. Moskowitz thus concluded that a typical syllable pattern is "for the child to produce syllables which have the internal phonetic pattern CV, and to produce words which consist of one syllable or of two identical syllables (75)."

There was an interesting study done by Stockman et al. (1982) on the speech of vernacular-Black-English-speaking children, which included a phonological analysis on the acquisition of final consonants. Samples of spoken English were collected longitudinally from 12 Black children. The data showed that the children favored the final CV/CVCV pattern.

Lahey et al. (1985) investigated the process of reduplication in children with specific language impairment (SLI) and found that in the single-word utterance period, there were few differences between the phonological simplification processes used by SLI children and nonlanguage-impaired children. The SLI children had an open syllable preference.

In their study, Leonard et al. (1978) examined the aspects of child phonology in imitative and spontaneous speech. Eight children, ranging in age from 1;3 to 2;0 were chosen to be the subjects. The experimenters first obtained the phonological characteristics from the children's spontaneous speech in the same situations and tasks designed for each of the eight children. Out of the spontaneous speech the phonological characteristics were drawn which focused on consonant and syllabic shape features. There was a CV and CVCV tendency in the syllabic shape. In order to test whether the children's imitative speech would reflect the phonological system demonstrated in spontaneous utterances, the experimenters constructed 24 nonsense words so that half of the words had their syllabic shapes representing the shapes that were evidenced in the child's phonological system and half of the words which were not. Then the experimenters designed tasks for each individual
child to imitate the nonsense words. The results indicate that the children's imitative production of syllabic shape agreed with that of their spontaneous speech and both demonstrated a universal CV/CVCV preference.

There have been several studies on the syllable structure of bilinguals of English and other languages as well as the children whose native languages were other than English. Nettelbladt's (1982) research in normal and language disordered Swedish children indicated that both groups at the earliest speech stage demonstrated open syllable dominance. Likewise, Machen's (1977) subject Si, whose speech was basically Spanish, produced the syllable pattern of CV/CVCV. Similar results can be found in Khan's (1984) study on the phonological development of Urdu speaking children. "Children simplify syllable structure of adult speech. The direction is towards simple CV syllable against CCV or CVC syllables. Consonant cluster reduction is the most common process employed by children" (Khan, 282). Berman (1977) analyzed the syllable structure and phonological processes of a Hebrew-English bilingual girl, Shelli, at the one-word stage. The data yielded a preferred CV or CVCV syllable structure both for English and Hebrew words. The phonological processes included reduplication of syllables, reduction of consonant clusters, deletion of syllable-final consonant and weak syllable-deletion.

Besides the research on early speech production, the syllabic feature of babbling has also been studied. For instance, Oller et al. (1982), believing that babbled utterances is consistent with patterns of early meaningful speech, looked at the babbling of a group of children (aged 0;11 to 1;2) who were exposed bilingually to Spanish and English. He found that all the children used primarily CV syllables.

Donahue's (1984) diary recorded the phonetic shapes of a child's (Sean) early words at the one-word stage, and noted that they were characterized by the presence of only one consonant and took the syllabic patterns of CV, VCV or reduplicated syllables such as "mama" or "baby". Here are some examples: bird [bæ]; light [lai], dog [dɔ], ball [bau], etc.

The above case studies which have been presented are all manifestations of a universal CV/CVCV tendency. The following few paragraphs will be devoted to the counter- and partial counter-evidence which have appeared in literature.

Fee et al. (1982) studied samples from 36 children ranging in age from 1;1 to 2;8. They found that children who frequently reduplicated were poorer at final consonant production or closed syllable than children who reduplicated less. The nonreduplicators had a dominant use of monosyllables. The children showed different final consonant production: Some had dominant open syllables and some used closed syllables. The data showed a wide range of preference among the children to open
syllables and closed syllables. The paper did not discuss consonant cluster reduction.

Kiparsky and Menn (1977) disagreed with Jacobson's universal theory. They suggested that there are individual differences of syllable preference among children. They seemed to agree with the idea that there are "open syllable" children as well as "closed syllable" children. Stoel-Gammon et al. (1984) expressed the same idea by demonstrating the results of their study on the phonological development of three children from late babbling to 50-word stage. They found there were extensive variations on syllable forms of word productions between subjects. For the three subjects, the predominant patterns were: "...velar stops and closed syllables for Daniel, open syllables and phonetic accuracy for Sarah, and reduplicated syllables for Will" (270). Thus in their view the claim that "the CV syllable in the "primary syllable unit" in the production of early words (Branigan, 1976) must be modified. They suggested that researchers must "exercise caution in making statement about what ALL children do or do not do as they acquire the phonology of their native language" (269).

Lund et al. (1983) explained their agreement with the idea of individualization: the first words stage "is different for different children. Children vary in their sound and syllable structure preferences; they vary in the degree to which they impose these preferences on adult forms; and they vary in whether they organize their phonological system by rules which work across words, or by memorizing individual lexical items" (94).

Vihman et al. (1986) also argued strongly for the individual differences in phonological development across children. Their argument was based on a study of 10 children (5 boys and 5 girls) acquiring English as their first language over a 7-month period. This study started from the period of no word to the 50 words stage. "Individual differences were found to prevail from the start in phonetic tendencies, consonant use in babbling and early words, and phonological word-selection pattern. (3)" Their data of early words indicated that there is a large amount of diversity in the production of final consonant, consonant clusters and reduplicated consonant sequences (C.CV.C.V) in disyllable strings.

The study of Elbers et al. (1985) is somewhat different from the others. As they believed that babbling may "predispose the talking system towards selecting words of a certain form (i.e. towards developing 'phonological preferences')" (363), they examined the syllabic feature of the "word babbles" of a Dutch boy (from 1;3.18 to 1;4.29) who had entered the first words stage. The babbling consisted of both meaningful and meaningless forms. The child produced the following types of syllable patterns: VC(V), (V)CVC(V). There is no predominant CV preference in the data. However, the babbles have no consonant cluster, which reveals the characteristics of the syllabic shape at the first words period.

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Ingram has done some influential research to prove the hypothesis of individual variation in phonological development (1976; 1981). He examined (1976) the speech of a language-disordered child at the 50-word stage and found that she first demonstrated a basic inventory of sounds and primary CV words in her speech. The phonological processes she used included deletion of final consonants and unstressed syllables, reduction of consonant clusters, and reduplication. However, in another study, Ingram (1981) reported variation in the use of syllabic patterns by 15 subjects. The measurement showed that children had a tremendous range in the proportion of closed syllables they used--from no closed syllable to virtually all closed syllables.

An even more interesting study by Ingram (1981) was on the issue of whether bilinguals have one phonological system or two in the early 50-word stage of phonological development. He analyzed the speech of an Italian-English bilingual L aged 2;0, and found that L's segmental inventories were similar for both languages, but that the syllabic patterns were not. In Italian L used mainly multisyllabic open syllables, but her English was mostly monosyllabic with closed syllables. The results indicate that she was using separate systems in her phonological acquisition. (As we know, English is highly monosyllabic with many final consonants. In comparison with English, Italian tends to be more multisyllabic with open syllables.) At this point Ingram further addressed the issue of the role of individual strategies. He stated:

Recent studies have focused on individual variation, and either implicitly or explicitly assign such strategies to inherent preferences in the child. The data from L, however, raised questions about how independent these tendencies are from the input language. ...The results indicate that a preference a child shows may vary greatly depending on the language being learned. It appears that the phonological shape of the input language plays a greater role in early phonological development than has been proposed, and that one needs to be cautious about concluding inherent preferences or strategies of acquisition. (1981:14)

This bilingual research appears to be particularly significant for the present paper because this writer's study exactly matches Ingram's in that the subject used is a Chinese-English bilingual who also had separate phonological systems.

Up to now we have had a brief review of the studies done on the "universal" controversies. While the majority of the cases support the universal CV/CVCV tendency, there have been a notable number of exceptions cited and researched which challenged the "universal" claim. However, none of these cases demonstrated consonant cluster production at the early stage of phonological acquisition. The purpose of this research project is to examine
the syllabic patterns of one particular English-Chinese bilingual child's speech at the early stage of phonological development.

Method

Subject

A child from a New England upper class family was observed from the age of 1;1.2 to 1;5.3. The little girl, Denille, had had English exposure from her sister, who was three years older than her, and several different American caretakers before me. There was not very much exposure from her parents since the child spent most of her time with the caretaker. Soon after she was with me, she picked up Chinese. Although she understood and produced more Chinese than English, she had a certain amount of exposure of English from me, her older sister and her sister’s friends. Thus the child can be labeled as English-Chinese bilingual. The child was at her early one-word stage of phonological development. The production was all in mono- or double-syllable forms. On the first day when I was with her, she could only produce two words: "Hi" and "daddy". According to her parents, she had no other production prior to these two words.

Sample collection

The speech of the child was collected in a diary form on a biweekly basis. International Phonetic Alphabet was used to record the sounds. The collection started from an almost-zero word production to 50-word production stage, all of which were mono- or double-syllable words.

Results and Discussion

Before we come to the data analysis, let us take a brief look at the syllabic shapes of Mandarin Chinese and English. The syllabic shape of English can be described as (C)(C)(C)V(C)(C), e.g., "a", "too", "eat", "spy", "book", "first", "spread", etc. The syllabic shape of Chinese is much less complicated than that of English. According to Cheng (1973) and Chao (1968) Chinese syllable pattern includes:

1. V, e.g., "a";
2. CV—the dominant shape, e.g., "bu", "keyi";
3. CV[n] or CV[ŋ], e.g., "Xiang Gang".

Both consonant cluster and final consonant appear in English syllable structure, whereas Chinese does not have consonant cluster and final consonant except [ŋ] and [ŋ]. Chinese is a predominantly open-syllable language.
In this study the subject's production of Chinese words is dominantly CV or V syllable shape, in accordance with the syllable feature of Chinese. For the words that end in [n] such as "xin"([cin]), she would say [ci] without the [n] sound because she was not able to produce the [n] sound at the very early stage. However, soon after she acquired [n] in the initial position as in "nai"([nai]), she used it in the final position. Her [ ] was never produced throughout the four months of my observation. The reasons for that, I believe, are that [ ] is comparatively a hard consonant to acquire, and that there is no syllable initial [ ] in Chinese, which would otherwise be a help for the child to acquire the sound earlier. We may predict that once the sound is acquired by the child, it would be produced syllable-finally as [n] was. It is, therefore, inadequate to simply say that she had a final consonant deletion tendency. This can be seen more clearly in her English final consonant production.

Table 1 shows the percentage of final consonant production in Denille's English words.

<table>
<thead>
<tr>
<th>Total No. of English words</th>
<th>Total No. of final consonant words</th>
<th>Total No. of words with final consonant production failure</th>
<th>Percentage of final consonant production</th>
</tr>
</thead>
<tbody>
<tr>
<td>87</td>
<td>51</td>
<td>5</td>
<td>90.2%</td>
</tr>
</tbody>
</table>

Among the 87 English words of her production there were 51 words with final consonant. Out of the 51 final consonant words only 5 words had no final consonant production, and the final consonants of the remaining 46 words were pronounced. The final consonants of the 5 words which were not produced are [k], [n], [l], and [ŋ]. What is interesting is that Denille's failure in producing [k] and [n] happened only before the two sounds were acquired syllable-initially. Soon after the two sounds were acquired, she showed no deletion of them syllable-finally, which was the same case with her Chinese [n] production. The final [l] and [ŋ] indicated the same phenomenon with her Chinese [ŋ]. Her English [ŋ] was not acquired during my observation, which might be because of the nonoccurrence of the sound in syllable initial position in English as well as the complexity of the sound—the same case with Chinese. [l] was acquired syllable-initially by the end of the observation and thus predictably would appear.
syllable—finally, although I did not wait for its occurrence. This means that we cannot simply say that the child has a final consonant deletion preference.

As there is no consonant cluster in Chinese, the feature needs to concentrate on English. Table 2 describes the percentage of consonant cluster deletions in Denille's English words.

Table 2. Denille's consonant cluster production in English

<table>
<thead>
<tr>
<th>Total No. of English words</th>
<th>Total No. of words with consonant clusters</th>
<th>Total No. of words produced with consonant cluster deletion</th>
<th>Percentage of consonant cluster production</th>
</tr>
</thead>
<tbody>
<tr>
<td>87</td>
<td>22</td>
<td>22</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 2 indicates that the 22 consonant cluster words out of Denille's 87 English words were all produced with consonant cluster deletion. Her production of consonant clusters was 0%. It is apparent that consonant cluster deletion process is dominant in Denille's early phonological acquisition, which agrees with all the research in the literature.

The child used dominant CVCV production in Chinese but only in open syllable word in English. It appeared that the CVCV shape only happened to open syllable words. As Chinese is a predominantly open-syllable language, the child's production of CVCV was used much more in Chinese than in English.

Conclusion

This paper has discussed the issue of CV/CVCV universal tendencies in first language phonological acquisition. The review of the literature demonstrated a majority of cases of CV/CVCV universal tendencies, there was also a notable number of cases revealing individual variations among children in L1 phonological acquisition. Consonant cluster deletion seems to be overall a universal tendency. My research on the Chinese-English bilingual child presented data which indicate a dominant consonant cluster deletion process, a universal tendency. However, there does not seem to be an open syllable preference in her closed syllable production in English. As Chinese is dominantly an open syllable language, the child's Chinese words
show a dominant CV features. This agrees with the results of Ingram's (1981) study which stated that bilingual children use two phonological systems from the early stage of first language acquisition. The findings of this research support the idea of universals in that there is consonant cluster deletion, but provide evidence for the claim of individual variations in L1 phonological acquisition. These results might have implications on the research of second language phonological acquisition.

References


Appendix A

Denille's English Word List from 1;1.2 to 1;5.3
(Recorded on biweekly basis)

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>1;1.2</td>
<td>Hi[ai]; daddy[dɔːdi]</td>
</tr>
<tr>
<td>From 1;1.2 to 1;1.16</td>
<td>up[ap']; bird[bad]; this[diʃ]; that[dat']; book[bu]</td>
</tr>
<tr>
<td>From 1;1.16 to 1;2.0</td>
<td>dirty[dədi]; mummy[mami]; cheese[tsi:ɡ]; bib[bib]; home[om]; apple[æpu]; Birt[bat']; brush[brɑɡ]</td>
</tr>
<tr>
<td>From 1;2.0 to 1;2.15</td>
<td>hot[hɑt']; shoe[ɡu:]; toe[do]; fish[ɡɪɡ]; Alda[adə]; mouth[maʊ]; bubble[babu]; ball[bo]; cookie[gigi]; book[buk']</td>
</tr>
<tr>
<td>From 1;2.15 to 1;3.1</td>
<td>papa[baba]; go[ɡo]; Estee[edi]; baby[bebi]; bye[bi]; juice[tɡiʃ]; duck[dak']; please[pi:ɡ]; hair[he]; movie[uɡi]; spoon[bu:]</td>
</tr>
<tr>
<td>From 1;3.1 to 1;3.16</td>
<td>cracker[gaga]; bed[bed]; dog[dog]; push[puɡ]; coat[ɡoʊt']; Mindy[miːdi]; top[ɡoʊp']; arm[ɑm]; happy[ɑbi]; down[du]</td>
</tr>
<tr>
<td>From 1;3.16 to 1;4.0</td>
<td>Oscar[ɔɡa]; hat[hæt']; good girl[ɡɑɡ]; no[nɔ] see[siː]; star[tɑ]; nana[nana]; Ernie[əni]; bunny[ˈbæni]; kiss[ɡiʃ]</td>
</tr>
<tr>
<td>From 1;4.0 to 1;4.14</td>
<td>yes[ieɡ]; monkey[ˈmʌɡi]; down[don]; cat[ɡæt']; eye[ai]; nose[ˈnɔsi]; turkey[ˈtʌki]; car[ɡɑr]; two[duː]; three[diː]</td>
</tr>
<tr>
<td>From 1;4.14 to 1;4.29</td>
<td>head[hed]; milk[ˈmɪk]; cup[kʌp]; big[biɡ]; me[miː]; sister[ˈsɪtə]; turtle[ˈtɜːl]; hand[hand]; heart[haːt]; school[ɡuː]; moo[muː]; green[ɡin]</td>
</tr>
<tr>
<td>From 1;4.29 to 1;5.10</td>
<td>walk[wɔk]; bread[bed]; comb[ɡɑm]; sing[ɡiː]; frog[ɡɒɡ]; friend[ˈfrend]; hello[ˈeləʊ]; light[laɪt]; leg[lɛɡ]; my[mi]; tummy[ˈdʌmi]</td>
</tr>
</tbody>
</table>

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Appendix B

Denille's Chinese Word List*
(Only the closed syllable words)

From 1;1.2 to 1;4.0
bing (pie) [bi]; yan (eye) [je];
tang (candy) [da]; dandan (egg) [dede];
daxiang (elephant) [daGa]; men (door) [mɛ];
pinggo (apple) [pigo]; gaoxing (happy) [gaçi];
qingwa (frog) [tçiwa]; yang (sheep) [ya];
shan (mountain) [ga]; binggan (cookie) [biga];
qin (kiss) [tçi:]

From 1;4.0 to 1;5.10
yan (eye) [jên]; fan (food) [fәn];
binggan (cookie) [bigәn]; dandan (egg)[dadәn];
daxiang (elephant) [daGa]; qiang (wall) [tca];
qinqin (kiss) [tçiçin]

* Except for the few closed-syllable words listed here, Denille's Chinese words are all open-syllable.