Similarity of babbling in Spanish- and English-learning babies*

D. K. OLLER AND R. E. EILERS
University of Miami

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ABSTRACT

Infants from a variety of linguistic backgrounds have been reported to babble similarly. The present study considers this possibility in detail, offering a concrete characterization of how babbling of Spanish- and English-learning babies is similar. Babbling of a group of Spanish- and another of English-learning infants (12 months of age) was recorded and transcribed by two experimenters, one a primarily Spanish speaker and one a primarily English speaker. Results show that in spite of gross phonetic differences between the adult phonologies of Spanish and English, babies from both groups produce predominantly CV syllables with voiceless, unaspirated plosive consonants. Vowel production is also perceived as notably alike. In the light of such similarities, possible differences in babbling of the two groups may be hard for even sophisticated listeners to notice.

INTRODUCTION

It has been noted that babbling of infants from different language communities sounds remarkably alike. Nakazima (1962) examined vocalizations of Japanese- and American English-learning babies both transcriptionally and acoustically and concluded that in a number of ways they babbled similarly. Two studies have found adult listeners to be unable to distinguish babbling of infants from communities as different as American English and Chinese (Olney & Scholnick 1976, Atkinson, McWhinney & Stoel 1970). A recent study comparing late babbling of a French-learning child with reported babbling of English-learning children shows marked similarities (de Boysson-Bardies, Sagart & Bacri 1981, de Boysson-Bardies, Bacri, Sagart & Poizat 1981).

While there is no doubt that some similarities of infant babbling do occur cross-linguistically, it is worthwhile to pursue a further delineation of features

[*] Address for correspondence: D. K. Oller, Mailman Center for Child Development, University of Miami, P.O. Box 016820, D-820, Miami, FL 33101.

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which may be differentially influenced by phonological input. The purpose of this work is twofold: (1) to provide a broad-scale analysis of precursors to speech in babies from two sociologically well matched but phonologically quite different language communities, and (2) to further our understanding of phonetic relationships between babbling and early meaningful speech by viewing that relationship simultaneously in two linguistic communities. Previous work with English-learning babies (Oiler, Wieman, Doyle & Ross 1975) suggests a marked similarity of patterns of sound usage in babbling and early meaningful speech. By analysing frequency of occurrence of various sounds in babbling, and comparing them with frequencies of occurrence of sounds in early speech, the present work will provide a direct indication of the relationship of babbling and speech across two linguistic communities.

The greater Miami area is a bilingual community, with large groups of monolingual Spanish and English speakers. The area thus presents an ideal environment for cross-linguistic research, especially since both communities show similar socio-economic and child-rearing features. In addition, although English and Spanish share a lexical heritage, they represent divergent examples of the world’s languages in the phonological domain. Thus, comparison of English and Spanish phonological acquisition provides an opportunity to view effects of phonetic environment on phonological development.

Phonetic differences between the two languages are found in several important areas. For example, English has a very complex stress and vocalic system, wherein subtle degrees of stress affect vowel quality radically, yielding a unique and extensive vowel pattern (cf. Chomsky & Halle 1968). English is said to be ‘stress-timed’. Spanish on the other hand is said to be ‘syllable-timed’, with much more easily predicted stresses and a relatively simple and common five-vowel system which is largely unaffected by stress. In addition, English has an elaborate consonantal system with both voiced and voiceless obstruents occurring in initial AND final word positions, a rich fricative system (including at least eight phonemic types), a retroflex liquid /r/, and three nasals. Cuban Spanish has a more limited set of consonants. Voicing contrasts do not occur finally, the fricative set is limited to /s/ and /f/, and there are only two nasals. Spanish includes some contrasts not occurring in English: prevoiced initial stops vs. voiceless unaspirated ones (in English, initial stops have a contrast of aspirated vs. unaspirated) and a contrast of alveolar taps and trills. The consonants of English combine in clusters quite freely and can occur in final position either as singletons or as clusters. Spanish consonants, on the other hand, cluster in a far more limited fashion and are largely not accepted in final position. In the Cuban dialect, the tendency for restrictions against final consonants and clusters is especially strong, yielding widespread ‘deletion’ of underlying final and clustered consonants. In a broad view of phonologies of languages, English has a fairly elaborate segmental system and Cuban Spanish a fairly restricted one.
METHOD

Subjects
The present analysis focusses on 16 normal, healthy children seen over a 3-year period for a longitudinal study comparing the perceptual and productive acquisition of Spanish and English. Eight of these children are Spanish-learning and eight English-learning children from middle-class homes. Although a small amount of linguistic contamination inevitably occurs in a community like Miami, the parents all consider themselves to have monolingual homes and employ a single language with their children. Further, other family members (grandparents, siblings, etc.) speak only the parent language at home. To the extent that bilingualism outside the home is a part of the lives of these families, it clearly affects the Spanish group more than the English. A few of the Spanish-speaking parents are also competent English speakers, but none of the English-speaking parents is well versed in Spanish. All the children in both groups are quite monolingual.

At the time of the recordings to be analysed here the children were between 0;11 and 1;2, with a mean age of 1;0.

Recording
Each high-fidelity tape recording of infant sounds was made in an IAC sound-insulated booth, decorated for infants and suitably equipped with silent toys and furniture. A parent and a bilingual experimenter were always present with the infant to encourage vocalization without interrupting the child’s vocalizations. The elicitations were, in general, those used by the parents at home plus a group of standard vocal models presented to both English and Spanish babies. In general, because it was a longitudinal study, the children were comfortable and vocalized spontaneously (not imitatively), especially while playing with toys or looking at various objects in the room. Recording sessions were normally 30 minutes in duration. Children in both groups proved to be quite vocal, and a sample of 50 or more utterances was typically collected in a single session.

Data analysis
In order to observe the relationship of babbling and early meaningful speech it is necessary to make certain assumptions. The first of these is that if a listener hears an infant sound sequence as speech-like, syllabic and non-reflexive (i.e. not a cry, cough, sneeze, etc.), it can be subjected to a transcription process much as meaningful speech can be. Syllable nuclei are interpretable as vowels (or vowel-like elements) and syllable margins as consonants (or consonant-like elements). A specific requirement for syllabicity has been adopted (after Oller 1976, 1980). The requirement stipulates that the timing relationship of ‘consonants’ and ‘vowels’ must be within the limits of consonant–vowel transitions seen in the adult speech acoustic
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literature (e.g. Liberman, Delattre, Gerstman & Cooper 1956). In the present
study all consonant-like elements considered in the analysis are from se-
quences interpreted by the transcribers as fully syllabic. Sequences meeting
these restrictions of syllabicity are called CANONICAL BABBLES. A transition that
is too slow (normally beyond 120 msec) invalidates the syllable, and
transcription of the sequence (called a MARGINAL BABBLE) necessitates special
procedures. Reflexive sounds and marginal babbles are not included in
the analyses. The vowel analyses do include some sequences for which no
‘well-timed’ consonant–vowel transition is involved, since, of course, vowel-
like elements often occur in isolation in infant vocalization.

Transcriptions

Each recorded speech sample was subjected to transcriptional analysis.
Utterances were reviewed by two phonetically trained listeners, one a primary
speaker of Spanish and one of English. It was assumed that because one
transcriber was of Spanish and one of English background, phonetic elements
of either Spanish or English occurring in the babbling samples would be
noticed by at least one of the transcribers. As in previous work (Oller et al.
1975), the two listeners were encouraged to confer after transcribing each
utterance independently. They then tried to resolve discrepancies, but were
not to change their transcriptions unless they felt persuaded they had been
mistaken in the original. The procedure documents the inherent phonetic
ambiguity of the acoustic babbling signal, while at the same time maximizing
the possibility that language-specific phonetic elements will be noticed. The
procedure emphasizes the transcriber as ‘informant’ rather than as
‘observer’ (terms attributable to Bakeman, personal communication). This
emphasis is in tune with Shotter (1978) and focusses on the fact that human
perceivers are of necessity influenced by their knowledge (including linguistic
knowledge). The principal question being investigated here concerning the
difficulty of listeners discriminating between the language backgrounds of
babbling infants suggests that subjective judgements should be considered as
the primary source of data, since it is upon these judgements that listeners
must rely in making such discriminations.

The system of symbols employed is an adaptation of the IPA with special
symbols for peculiarities of infant pronunciations. The two listeners were
trained and tested in the use of the symbology through a taped phonetics
course that has now been employed with over 30 research assistants in four
major projects at the University of Washington and the University of Miami
during the past eight years. Prior to data collection, both listeners were
required to pass all 14 phonetic subtests.
**Design**

**Comparisons of consonant usage.** There are two goals of our comparisons of the babbled consonants in Spanish- and English-learning babies. The foremost goal is to illustrate patterns of usage in enough detail to provide an assessment of possible similarities and differences between babbling in the two groups, as seen in the perceptions of two trained listeners. The secondary goal is to broaden our awareness of relationships of early babbling and speech by focussing cross-linguistically on patterns of consonant usage for which heretofore we have substantial information only about English.

Oller et al. (1975) showed that English-learning infants produced consonant patterns that were similar to patterns of early speech as documented in an extensive literature (e.g. Ingram 1976, Leopold 1947, Menn 1971, Moskowitz 1970, Jakobson 1968). In particular they illustrated that both English-learning (babbling) infants and young English-speaking children produced

1. more singleton consonants than consonant clusters,
2. more initial than final consonants,
3. more initial stops than fricatives and affricates,
4. a greater proportion of fricatives and affricates relative to stops in final position than in initial position,
5. more unaspirated than aspirated initial stops,
6. more voiceless than voiced final obstruents,
7. more prevocalic glides than liquids, and
8. more apical than dorsal obstruents.

Each of these eight results constitutes an illustration of similarities of English learners’ babbling and early speech. The results also provide the organization for a comparison of Spanish and English babbling. Each of the eight results will be considered as a question of the following form: do Spanish and English babies show the same pattern of vocalizations with regard to phonological patterns produced in early meaningful speech?

**Comparisons of vowel production.** Two approaches have traditionally been used to study vowel production in infant and child speech: acoustic analysis and transcription. In general, the results of studies employing acoustic analysis (e.g. Lieberman 1980), have seemed more definitive, since transcriptional approaches have often yielded low inter-transcriber reliability on vowel-like elements. However, since it is the goal of the present study to explain auditorily perceived similarity in the babbling of infants from different linguistic backgrounds, the appropriate data result from the perceptual judgements of informants who might report these similarities. It is particularly important not to exclude vowel interpretations in the present work, because Spanish and English differ radically in the domain of vowels, and possible differences in vocalizations of babies in the two communities might be expected to be particularly salient with regard to vowels.

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In the present study vowel production will be compared across the two groups to determine the proportion of perceived occurrence of each of 17 vowel and diphthong types in each child and to look for differences or similarities in the relative proportions for each vowel across the language experience groups.

RESULTS

Comparisons of Spanish and English learners' babbling:

(1) Consonants. The eight English- and eight Spanish-learning infants displayed patterns of consonant production that are very similar as perceived by the two informants. Table 1 displays the data.

(a) Singleton consonants vs. consonant clusters. Column 1 illustrates that both groups produced predominantly singleton consonants rather than consonant clusters. Spanish-learning infants had 93.6% singleton consonants and English-learning infants 89.4%. This small difference suggests substantial similarity in the pattern of usage of consonant clusters. Since mature English incorporates more clusters than Spanish does, the difference, though small, is in the direction one would predict if there were linguistic environmental influence on the proportion of consonant cluster usage. The difference is not significant, however \( t = 2.25 \), in an analysis using the Bonferroni \( t \) statistic, which adjusts for the fact that multiple \( t \) tests are being used on a single data corpus. The reliability factor reported in column 1 indicates that in 78% of instances where one of the two transcribers noted one or more consonants, the other transcriber noted the same number of consonants in that position. The 22% of cases where this was not so were largely attributable to differences in judgements on the presence or absence of glide (‘y’ or ‘w’) elements. For the primary analysis here and below all observations are taken into account, though data points on which there is disagreement are given only half weight in the results. For the benefit of readers who are more interested in the transcriber-as-observer, a separate analysis was performed considering only elements agreed on by the two transcribers. In this analysis the proportions of singleton consonants vs. consonant clusters change little (Spanish = 96.9% and English = 94.1%) and still yield a non-significant difference \( t = 1.07 \).

(b) Initial and final consonants. As seen in Column 2 of Table 1, both Spanish and English-learning infants produce ‘word’ initial consonants far more often than ‘word’ final ones. (A consonant here is called ‘final’ if it precedes a pause of at least 1 sec.) Again, the small difference between the groups is non-significant whether we consider the primary analysis \( t = 0.38 \) or one in which only agreed data are taken into account (Spanish = 72.4%, English = 72.6%, \( t = 0.037 \)). The small difference between groups does not in this case agree with the prediction that English babies should produce a
Table 1: Consonant-like productions of Spanish- and English-learning infants (primary data analysis)

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Language</th>
<th>Singleton vs. consonant cluster (%)</th>
<th>Initial consonant vs. final consonant (%)</th>
<th>Initial plosive vs. fricative or affricate (%)</th>
<th>Final plosive or affricate vs. final plosive (%)</th>
<th>Unaspirated initial plosive vs. aspirated initial plosive (%)</th>
<th>Voiceless initial plosive vs. voiced initial plosive (%)</th>
<th>Prevocalic glide vs. liquid (%)</th>
<th>Apical vs. dorsal obstruent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spanish</td>
<td>93.6</td>
<td>66.75</td>
<td>89.6</td>
<td>47.4*</td>
<td>89</td>
<td>91.4*</td>
<td>92.6</td>
<td>59.1</td>
</tr>
<tr>
<td></td>
<td>English</td>
<td>89.4</td>
<td>69.25</td>
<td>88.75</td>
<td>39.4*</td>
<td>93.9</td>
<td>96.8*</td>
<td>97.4</td>
<td>77.5</td>
</tr>
<tr>
<td></td>
<td>Spanish</td>
<td>11.22</td>
<td>11.4</td>
<td>18.1</td>
<td>16.2</td>
<td>77</td>
<td>11.8</td>
<td>69</td>
<td>21.3</td>
</tr>
<tr>
<td></td>
<td>English</td>
<td>4.8</td>
<td>12.7</td>
<td>9.4</td>
<td>9.5</td>
<td>6.9</td>
<td>5.5</td>
<td>5.1</td>
<td>17.4</td>
</tr>
<tr>
<td></td>
<td>Spanish</td>
<td>463</td>
<td>312</td>
<td>125</td>
<td>35</td>
<td>115</td>
<td>35</td>
<td>168</td>
<td>261</td>
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<tr>
<td></td>
<td>English</td>
<td>353</td>
<td>291</td>
<td>113</td>
<td>49</td>
<td>100</td>
<td>46</td>
<td>153</td>
<td>244</td>
</tr>
<tr>
<td>Agreement (%)</td>
<td></td>
<td>78</td>
<td>86</td>
<td>86</td>
<td>74</td>
<td>78</td>
<td>74</td>
<td>57</td>
<td>78</td>
</tr>
</tbody>
</table>

* Data represent 5 subjects per group in these cells.
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Greater proportion of final consonants than Spanish babies, since adult English has more final consonants than Spanish does.

(c) Initial plosives vs. fricatives or affricates. Column 3, Table 1 shows that for both language groups the vast majority of initial obstruents are perceived as being plosives, and that only about 10% are heard as fricatives or affricates. Again, the differences between groups are extremely small and non-significant whether we use the primary analysis \( t = 0.11 \) or the one in which only data agreed on by the two transcribers are employed (Spanish = 91%, English = 92.9%, \( t = -0.218 \)).

(d) Final fricatives or affricates vs. final plosives. In Column 4, Table 1, the data on ‘word’ final obstruent manner of articulation are given. Again, no significant group differences are evident \( t = 0.85 \). In this case the number of subjects involved in the primary analysis is five per group rather than eight. Three subjects in each group were deleted here because each produced less than three final obstruents of any kind (a number too small for meaningful calculations of a proportion).

(e) Unaspirated vs. aspirated initial consonants. Column 5, Table 1 shows results on the production of initial unaspirated vs aspirated consonants. Both groups prefer unaspirated consonants strongly and do not differ significantly in this tendency in either analysis (primary analysis \( t = 1.24 \), agreed-only analysis, Spanish = 94.5, English = 98.4, \( t = -1.48 \)). The small difference that does occur would not be predicted by the fact that English has aspirated initial stops and Spanish does not.

(f) Final voiceless vs. voiced obstruents. Column 6, Table 1 shows again that final obstruents are uncommon in infant vocalizations, for both groups, yielding low Ns and the necessity for eliminating several subjects for lack of data. With five subjects per group, both groups show a favouritism for voiceless finals and the small difference is non-significant \( t = -0.829 \). The small tendency for Spanish babies to produce more voiced final obstruents cannot be predicted by patterns of the languages, since Spanish has no final voiced obstruents while English has many.

(g) Prevocalic glides vs. prevocalic liquids. The results in Column 7, Table 1 show that the vast majority of prevocalic semivowels were perceived as glides rather than liquids for both the Spanish and English groups. (In this analysis a liberal definition of ‘liquid’ is employed, including retroflex [r]s, taps, trills and lateral [l]s.) The small differences between groups were again non-significant \( t = -1.47 \).

The relatively adequate N in Column 7, Table 1, is not accompanied by a high agreement factor. This fact is due to common discrepancies between the two transcribers on whether they perceived ‘glides’ as present or not. Very little of this disagreement tendency was associated with events in which one observer heard a glide while the other heard a liquid (note that liquids of any kind were perceived as exceedingly infrequent by both transcribers).
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If only agreed-on data are analysed, the results remain largely unchanged (Span = 97.1 %, Eng = 100 %).

(h) Apical vs. dorsal obstruents. The largest absolute differences between the two groups are displayed in Column 8, Table 1 and show that English-learning infants produced proportionately more apical consonants than Spanish-learning infants. However, this difference too was statistically non-significant whether we use the primary data analysis ($t = -1.76$) or the agreed-only analysis (Span = 61.5 %, Eng = 83.1 %, $t = -1.89$), due to high variability of these patterns between subjects.

<table>
<thead>
<tr>
<th>Vowel type</th>
<th>$\bar{X}$ Proportion occurrence (%)</th>
<th>Rank order</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spanish</td>
<td>English</td>
</tr>
<tr>
<td>e</td>
<td>15.0</td>
<td>13.5</td>
</tr>
<tr>
<td>æ</td>
<td>14.9</td>
<td>22.4</td>
</tr>
<tr>
<td>e</td>
<td>11.8</td>
<td>7.9</td>
</tr>
<tr>
<td>i</td>
<td>11.2</td>
<td>9.1</td>
</tr>
<tr>
<td>a</td>
<td>10.4</td>
<td>8.0</td>
</tr>
<tr>
<td>a, æ</td>
<td>8.5</td>
<td>7.8</td>
</tr>
<tr>
<td>u</td>
<td>6.0</td>
<td>6.8</td>
</tr>
<tr>
<td>u</td>
<td>6.0</td>
<td>5.8</td>
</tr>
<tr>
<td>i</td>
<td>4.3</td>
<td>5.5</td>
</tr>
<tr>
<td>o</td>
<td>4.3</td>
<td>3.4</td>
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<tr>
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<td>aj</td>
<td>2.1</td>
<td>2.6</td>
</tr>
<tr>
<td>o</td>
<td>1.3</td>
<td>2.4</td>
</tr>
<tr>
<td>aw</td>
<td>0.25</td>
<td>0.13</td>
</tr>
<tr>
<td>œ</td>
<td>0.13</td>
<td>1.13</td>
</tr>
<tr>
<td>oj</td>
<td>0.13</td>
<td>0.25</td>
</tr>
<tr>
<td>ow</td>
<td>0.13</td>
<td>0.25</td>
</tr>
</tbody>
</table>

(2) Vowels. Seventeen vowel and diphthong types were considered; infrequently occurring other types (e.g. front-rounded vowels) were ignored. As can be seen in Table 2, there was a tendency for the same vowels to be perceived most frequently in the babbling of both groups of infants. A Pearson product moment correlation was computed for the 17 elements ($r = 0.91$, $P < 0.001$, d.f. = 15) and indicated a striking similarity in the proportions of various vowel types that were perceived across the two groups. The comparative rank orderings, as listed in Table 2, provide further characterization of the similarity.

Since vowel quality seemed a particularly likely realm in which to observe differences between infants due to language environment, we looked at this area more closely for possible differences. The vowel system of Spanish
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includes more frequent usage of the vowels [a], [e], [i], [o] and [u] than does English. Thus we might expect that Spanish infants would use more of these elements than English infants; and in fact, in all five cases the proportions of these vowels in Spanish-learning infants are higher. Spanish does not often (if at all) employ the vowels [ae], [i], [e], [u], [a], [a], [A], [a], nor the diphthongs [eI], [ow], or [oj]. Of these 10 types, the English babies produced 7 more frequently than the Spanish. Thus of 15 vowel and diphthong types for which the languages differ clearly, 12 show more frequent occurrence among infants who hear those sounds more often. Although most of the differences are in the expected direction, it must be remembered that these differences are quite small—so small in fact that they may be of little consequence to listeners attempting to differentiate babies as to language background based on samples of babbling. These findings would take on greater significance if similar trends were discovered in other babbling samples. The primary interest of the result would be as an indication that infant production of speech-like sounds is influenced, however minimally, by specific language environment.

Cross-linguistic comparison of babbling and meaningful speech

The pattern of results obtained with both groups of infants agrees with the available literature on relationships of early child speech and infant vocalizations. For instance, the pattern of results on singleton consonants is quite close to that obtained in a previous study of English-learning infants (Oiler et al. 1975), in spite of notable procedural differences (e.g. all transcribers in the previous studies were native English speakers). In both studies, all infants, Spanish and English, show a strong preference for singleton consonants, a pattern consistent with usage in later meaningful child speech (e.g. Greenlee 1974). The results also appear to concur with tendencies of babbling seen in the work of Cruttenden (1970) for British English, Nakazima (1962) for Japanese and American English, and Vanvik (1971) for Norwegian, and indicate that babies from a variety of language communities produce babbled utterances in a way that is consistent with patterns of early meaningful speech.

Preference for babbled initial consonants comparable to that found in the present study has also been seen in Nakazima (1962) and Cruttenden (1970), as well as Oller et al. (1975), who showed that more than \( \frac{3}{4} \) of all consonants in initial or final position were initial. These results indicate further cross-linguistic similarity of babbling with early speech where final but not initial consonants are often deleted (Tracy 1909, Oller & Warren 1976, Albright & Albright 1956).

The preference seen in the present work for initial stops as opposed to fricatives is also quite similar to babbling data of Oller et al. (1975), Menyuk (1968) and Nakazima (1962). Ingram, Christensen & Veach (1980) have provided data indicating that early meaningful speech includes a preference for stop over fricative consonants.
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Perhaps because of the small number of subjects and the small number of observed final obstruents, or because of some procedural difference, the data on final obstruents from the present study only partly resemble those of Oller et al. (1975). In both studies the number of final obstruents was small, but the previous study showed a predominance of final fricatives and affricates (they constituted over $\frac{2}{3}$ of all final obstruents) whereas the present study found less than $\frac{1}{3}$ of final obstruents to be fricatives and affricates. The two babbling studies do, however, agree that fricatives and affricates are in higher proportion finally than initially and in this regard they are in agreement with the literature on early meaningful speech (Menn 1971, Oller 1976).

The present data concerning de-aspiration of initial stop consonants also concur with instrumental acoustic work on English and Arabic babies by Preston & Yeni-Komshian (1967), who found that babies in both groups tended to produce primarily unaspirated stop elements. These results all strongly support the view that infant babbling shows a preference for unaspirated initial stops in a manner similar to the preference seen in early meaningful speech (cf. Menn 1971, Oller 1976).

Similarly, the results are consistent with those of previous works showing that babies (Oller et al. 1975) and older meaningfully speaking children (Leopold 1947) produce more final voiceless than voiced obstruents. The data also agree with the literature on liquid acquisition of infants (Oller et al. 1975) and young meaningfully speaking children (e.g. Edwards 1971, Smith 1973, Oller 1976) who show a tendency to avoid liquid consonants.

Finally, the present study agrees with previous results on preference of infants for apical vs. dorsal consonants (Irwin 1947, Smith & Oiler 1981, Oller et al. 1975). Similar preferences for apical consonants have been reported for meaningfully speaking children (Jakobson 1968).

The data of the present study, then, provide a strong indication that phonetic patterns of early meaningful speech bear a striking resemblance to phonetic babbling patterns for both Spanish- and English-learning infants.

CONCLUSION

This study has two major findings. The first is that English- and Spanish-learning babies produce speech-like vocalizations that are perceived as very similar. They use primarily CV syllables with unaspirated apical or labial plosives. Very few linguistically rare or non-universal ('marked') consonant-like elements occur. The proportion of various vowel types used also appears similar across the two groups. This result does not indicate that there are NO differences in babbling of Spanish- and English-learning infants, but it does suggest that differences may be hard to find in the light of overwhelming similarities and rare production of non-universal phonetic elements. The data presented in the tables offer a concrete and quantitative characterization of the sense in which babbling in the two groups is alike.
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The second major finding of the study is that Spanish-learning babies, like English-learning babies, show patterns of consonant production in babbling that closely resemble those of early meaningful speech. Thus it is seen cross-linguistically that babbling and early speech are phonetically related, in contradiction to the claims of Jakobson (1968).

In future work we intend to search further for possible differences both between Spanish-learning and English-learning babies' vocalizations and between babbling and speech. A particular focus of this work will be in the realm of voice onset time measured instrumentally. It is possible that by plotting VOT results across time, subtle differences may emerge, differences that would be too small to be noticed by the informant whose task it is to listen to infant babbling and transcribe it. It appears that only with a multi-faceted approach using various converging studies, some instrumental and some transcriptional, can we reach an understanding of babbling as a precursor to speech.

REFERENCES


