Cross Linguistic Evidence for the Early Acquisition of Accent

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Abstract: An investigation of word accent in infant vocalizations was undertaken on the basis of data from five English- and five French-learning participants at two developmental points, the onset of word use (10-13 months) and late in the single word period (14-19 months). The 555 disyllabic utterances (words and babble) were digitized from naturalistic recordings and quantified acoustically by indices of duration, amplitude and fundamental frequency (F0). Perceptual judgments showed a developmental trend toward the adult prosodic system. In addition, acoustic comparisons of French and American infants at both developmental points revealed differences in the accentual use of F0 traceable to the respective adult languages. Finally, in lieu of the often posited trochaic bias in infants’ early word productions our data display an iambic bias arguably rooted in a biological predisposition to final syllable lengthening.

INTRODUCTION

Prosody plays a major role in early language acquisition. In perception it guides the child to meaning in vocal form (1), and it has been said to later serve as a “bootstrap” to grammar (2). It is the source of the earliest evidence in child vocalizations of a link between perception and production (3), while for early word production we have argued that alongside an individual phonological template each infant also develops favored prosodic patterns (4).

Cross-linguistic studies provide a way to identify language-specific developmental paths against a background of universal constraints. This developmental study examined the emerging prosodic system of infants acquiring French and English by analyzing accentual patterns in isolated disyllabic utterances. French has phrase-final accent; disyllables are iambic when accented but are evenly stressed in non-final position. English stress on disyllables may be either iambic (verbs, noun phrases) or trochaic (nouns). A “trochaic bias” has been proposed for both perception and production in English (5; 6), although infant-directed speech includes iambic patterns under nuclear accent roughly half the time (4).

As a working model of the acquisition of accent we assume that features of the ambient language that coincide with biological predispositions will be acquired early, while those that do not will be acquired later. As final syllable lengthening coincides with the phrase final accent in French, for example, it is expected to facilitate the early acquisition of the iambic accent.

METHOD

For this study we used data from five French and five American English learning infants from the “4-word point” (10-13 months) and “25-word point” (14-19 months), defined as the first half-hour recording session in which the requisite number of identifiable word types was used spontaneously. Disyllables (both words and babble) were included if they minimally contained two open (vocalic) phases separated by a closed (consonantal) phase. Utterances judged as belonging to the intonation group of bounded words were excluded, as were any that showed excessive shifts from modal register, excessive vocal effort, whisper, or creaky voice. Syllabic nuclei of utterances were analyzed for indices of F0 average, RMS voltage, and duration. A disyllable was categorized as iambic, trochaic, or even if two out of three independent listeners agreed on that judgment.

RESULTS AND DISCUSSION

Figure 1 shows a predominance of iambic patterns in both English- and French-learning infants at the 4-word point. The two groups of children diverge at the 25-word point, exhibiting patterns more consistent with the respective ambient language. The early production of iambs in both languages suggests that the tendency to produce longer phrase-final syllables facilitates the production of iambs but not trochees.
Figure 2 illustrates the proportional change in stressed syllables (the 25-word point subtracted from the 4-word point) in individual children. Four of the five English-learning infants produce more trochees at the 25-word point, while only one French infant shows even a slight increase. Three French infants produce considerably more iambs at the later point while the remaining two produce more even-stressed disyllables, consistent with the input speech for non-phrase final syllables.

An ANOVA on the ratio of second syllable to first for F0, duration, and amplitude, with language, stress and developmental point as independent variables, showed stress to be significant for all three variables, validating the categories established by the perception test. The only other main effect was language for F0. F0 also showed significant interactions for language with both stress and developmental point. Investigation of the differences between syllables in Table 1 reveal that the French infants consistently use higher F0 on stressed syllables than do English-learning infants. This is consistent with adult French (7) and shows that already at the 4-word point there are phonetic differences between the two groups.

**Table 1. Comparison of F0 for French and English disyllables in semitone differences.**

<table>
<thead>
<tr>
<th></th>
<th>French 4 wrd</th>
<th>English 4 wrd</th>
<th>French 25 wrd</th>
<th>English 25 wrd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iambic</td>
<td>2.3</td>
<td>-1.45</td>
<td>3.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Trochaic</td>
<td>-2.86</td>
<td>-1.45</td>
<td>-2.8</td>
<td>-1.9</td>
</tr>
</tbody>
</table>

**References**