

EARLY SELECTION OF PHONETIC REPERTOIRE: CROSS-LINGUISTIC DIFFERENCES.

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ABSTRACT

Cross-linguistic studies of infant productions show that among the wide range of possible sounds that prelinguistic infants can produce a choice is made in relation to the phonetic characteristics of the inputs of the environment. Two studies demonstrated language-specific production patterns in vowels and consonants in the course of the first year.

We view early specific linguistic effects on infant vocal productions as the result of **selection** by infants from a range of possible sound-productions, and not as evidence of new sound **acquisition**.

1. VOWELS

The first study we present, was based on a statistical analysis of the relative distribution of sounds within the vowel space in the adult target language and in the vocalization patterns of infants, as defined by formant frequencies. Infant's vowels were extracted from 20 minutes of recording of twenty 10-month-old French, English, Algerian and Cantonese infants. The comparative

analyses were based on computation of statistical distances between infants' vowel sets. They show that infants differ more between linguistic communities than within any single linguistic community. The F2/F1 ratio, an index of vowel compactness, was used to give information on the relation between infant and adult vowel spaces. The adults' data were taken from the existing literature on each language (frequency of occurrence and F1, F2 mean values). The same trends were found in the compactness index for F2/F1 in the infants' and adults' data: English < French < Algerian < Cantonese.

Table 1. F1/F2 ratios for infants and adult vowels by language communities.

	Infants	Adults
English	3.00	3.68
French	2.80	3.28
Algerian	2.40	3.03
Cantonese	2.24	2.71

In the production of their vowels, infants have begun to approximate favored values in the adult language even before production of the first words.

2. CONSONANTS

In the second study (✱) we made an analysis of the consonantal

repertoire of five infants in each linguistic group: French, English, Swedish and Japanese. As for the vowel study the method to be used emphasizes the relative distribution of consonants found in infants' productions and its relation to adult language targets. However in this study (1) the analysis of consonantal production is based on a perceptual analysis of infant vocalizations. (2) We use a longitudinal analysis of vocalizations spanning the period from babbling only to early words with concurrent babbling (first 25 words) (3). Phonetic characterizations of infant productions were directly compared with statistical properties of the actual target words attempted by the children in each group. We took these words to offer the most representative adult-language sample available.

The consonants produced by infants were classified according to place and manner categories: labials, dentals and velars for place, and stops, fricatives, nasals and liquids for manner.

2.1 Overall productions show good deal of stability in mean frequency of distribution for place and manner categories throughout the period studied within each group. The infants' groups differ significantly in distribution according to the place of articulation. The interaction effect is mainly due to the difference in the distribution of labials. French infants produce significantly more labials than Swedish and Japanese. French infants' velar productions differ also from Swedish and Japanese.

There is also a main effect of the factor of manner. Swedish infants' productions differ significantly from French for stops and nasals.

2.2. Comparison between babbling productions and infants' words. No significant difference is found in any group for place categories, the distribution in infants' words is similar to the distribution in babbling (Fig.1).

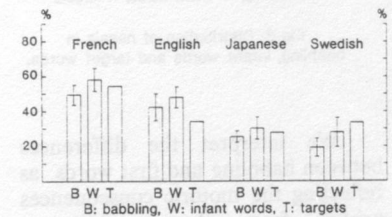


Fig 1: Distribution of labials in babbling, infant words and target words.

The distribution of manner categories for words is parallel to the babbling distribution for French, American and Swedish. There is a significant difference between babbling productions and words for stops in Japanese infant production (see Fig.2).

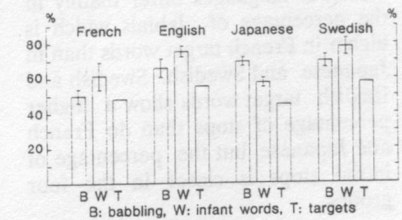


Fig 2: Distribution of stops in babbling, infant words and target words.

In words, there is a general tendency to produce more labials, more stops, fewer fricatives and the inter-group differences found in the percentage of nasals are small (see Fig.3).

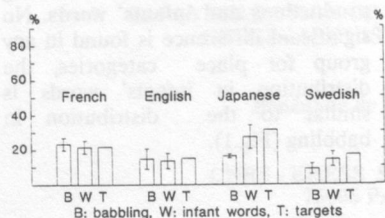


Fig 3: Distribution of nasals in babbling, infant words and target words.

We interpret the differences between babbling and first words as reflecting the motoric consequences arising from the obligatory sequentiality of segments and syllables for word production. A limited resource assumption (Kent 1991) may account for a tendency to return to more basic adjustments.

2.3. Adult reference sample. The distribution of consonants in the adult reference sample shows significant differences for place and manner categories among the four language groups (see Figs 1- 2-3). The four languages differ mainly in the percentage of labials which is higher in French target words than in Japanese and Swedish. Swedish and English target words show a higher percentage of stops than do French and Japanese, but the percentage of initial stops is closer in the four groups.

2.4. Comparison of infant productions with the adult reference sample (target words).

If there is an effect of linguistic environment, the distribution of labials, based on either the overall or the initial-position distribution in target words should yield the same

predicted ranking that is found between infants' groups. And indeed we found the predicted ranking French > English > Japanese = Swedish (see fig 1). For velars the expected ranking is Swedish > Japanese = American > French. We find that French infants produce, as expected, a lower percentage of velars, while the other three groups have a closely similar percentage of velars.

The patterns of manner distribution in infant productions agree with those of manner categories in target words. For stops, the distribution in target words predicts the ranking Swedish = American > Japanese = French. The percentage of stops is indeed higher in Swedish and English data than in Japanese and French (see fig 2). For nasals the expected ranking would be Japanese > French > American = Swedish; this ranking is indeed found in the infants' word production (see fig 3). The four groups do not differ significantly in fricative or liquid distribution and the percentages are too small to be informative for group comparisons.

The differences found in the distribution of consonants for place and manner categories in infant groups are predictable from the distribution of place and manner categories in target-words. Already we can see language specific tendencies in consonants as was demonstrated in vowels.

3. REFERENCES

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