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Further Studies in Infant Speech

ORVIS C. IRWIN

From time to time reports on the progress of a long time research on the development of speech in infants have been given to this group. Today I should like to discuss three recent findings of this work. The first is concerned with the effect of family occupational status upon the mastery of speech sounds by the infant. The second indicates the effect of the presence in the family of older siblings. And finally, an effort has been made to approach the problem of the diagnosis of speech sound status in the infant with the view of spotting during the period of infancy any indications of retardation.

First something should be said about the criteria of early speech development. A great part of the vocalization of babies is comprised of meaningless sounds and sound combinations. Words ordinarily do not appear until the second year of life and even at a year and a half the vocabulary includes on the average only about twenty words. The sentence does not appear as a rule until the child is about fifteen months old and then it usually is what is called the one-word sentence. Consequently the word and the sentence cannot be used as the criteria of early speech development, and we have to look elsewhere for suitable criteria.

There are two useful criteria, however, which are available. These are the phoneme type and phoneme frequency. The elemental speech sounds, that is, vowels and consonants, are what is meant by the term type. It refers to the sounds included in the International Phonetic Alphabet. There are about forty sounds included in this alphabet. An easy way to remember this is that there are about two dozen consonants and a dozen or more vowels. In the infant's babbling there are of course many repetitions of the same sounds and this suggests the criterion of frequency. This report then attempts to elucidate the three problems listed above in terms of the two criteria, phoneme type and phoneme frequency.

I would like to approach these problems first by a discussion of the curves of development based on each of these criteria. The curve for phoneme type is a parabolic arc. The period which has been studied covers the first thirty months of life. If we consolidate the data into two month intervals or age levels, we will have fifteen age levels or fifteen points with which to work. If we average the number of types present for each of the fifteen age levels, we will find that the means will show increments from age level to age

level. The equation derived by the method of least squares from the data will be

$$N = 7.5^{0.47}$$

where N = number of types
and A = age

The curve of this equation affords a picture of the nature of speech development during infancy. It shows that infants during the first two months of life on the average use about seven and a half of the elemental speech sounds. At the end of the two and a half years, he uses about twenty-seven of the three dozen (or more) sounds in the International Phonetic Alphabet, and even at two and a half years of age he has still a long way to go to master these sounds.

Furthermore, progress in the mastery of these elemental sound types proceeds in a decelerating manner. There are differences between the sexes which appear at about a year and a half. Previous to that time the curves show no difference, but thereafter the girls show greater progress on the basis of the phoneme type criterion. However, on the basis of the phoneme frequency criterion, boys tend to be superior to girls after about a year and a half. While the curves show that these tendencies are present, the differences are not decisive enough to be statistically significant.

It will be noted that the curves for frequency are exponentials. Whereas the type curves are decelerating, those for frequency are accelerating curves.

Now in regard to the first of our three problems, namely the effect of occupational status of the father, the phoneme type curves show an interesting difference. If the data of the babies whose fathers are professional persons and business executives are separated from infants of families of workers and the means for each group are calculated, it will be seen that for the first year and a half there is little difference, but that thereafter the infants in professional and business homes show a tendency to outstrip the other group. This is apparent in the curves of phoneme type. The difference is statistically significant.

A similar situation, but even more pronounced, is indicated in the frequency curves for occupational status. Here again the differences after a year and a half are significant. It is apparent then that family occupational status exercises a profound influence on the rate of speech development of infants, although this influence is not effective until the latter part of the second year of life.

The second problem concerns the effect of the presence of siblings

in the family. The curves for both type and frequency reveal no significant differences between the rate of mastery of only infants in the family and of sibling infants.

The third problem is the problem of diagnosis. Can a diagnosis of the speech sound status of the baby under two and a half years be undertaken? That is, can speech retardation be spotted during infancy? Can we, on the other hand, identify the advanced infant?

Suppose a parent asks us to tell whether her sixteen month old child is progressing normally in its speech development. The procedure would be to secure several samples of the child's speech sounds and determine the average number of phonemes found in the samples. Suppose this number were twenty. We enter the percentile curves at the eighth age level on the x axis, read up on twenty on the y axis and find that the child's speech status falls on the median curve. This means the child is progressing normally. If it falls anywhere between the 25th and 75th percentile curves, its speech status may be considered average. If it falls above the 90th percentile, the child may be considered well advanced. If, however, the sample yielded a value of, say, twelve, and if further samples gave a similar value, it would fall below the tenth percentile and the infant is probably retarded. In this manner a diagnosis of the speech sound status of the infant may be made on the basis of the phoneme type criterion. A comparable analysis may be made by using the percentile curves of phoneme frequency.

SUMMARY

1. Speech sound development during infancy in terms of the phoneme type criterion is a decelerating phenomenon.
2. Speech sound development in terms of the frequency criterion is accelerating in nature.
3. There are statistically significant differences on the basis of both criteria in the speech development of babies in homes of different occupational status.
4. The presence of older siblings does not appear to affect speech development during infancy.
5. An approach to the problem of diagnosis of the speech sound status of infants is indicated.

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