

# Infant Speech: The Effect of Family Occupational Status and of Age on Use of Sound Types

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IN PREVIOUS REPORTS (5, 2) analyses of the speech sound status of infants have been made in terms of age norms. The problem of sex differences also was reported (5, 2). A further study was done on the differences between the speech of young infants living in an orphanage and those living in their own homes (1), and another which treated the speech sound status of low grade feeble-minded children (3). Another report compared the speech sound status of only infants and infants with siblings (4). The purpose of the present article is to consider two other variables, parental occupational status and age, on the speech sound development of infants under two and one-half years of age.

The present report will be concerned with an analysis of the effect of these variables upon the infant's mastery of phoneme types. A subsequent article will deal with their effect upon the infant's frequency of utterance. The term *type* refers to an elemental speech sound while the term *frequency* refers to the number of times each of the various sound types occur. The comparison will be made between two groups of infants. One of these groups was reared in families the fathers of which were laboring men, either skilled or unskilled. The other group of babies was from business, clerical, and professional homes.

The data for phoneme types are

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presented in Table 1 which includes the number of age levels, the number of infants, and the means for each group. It should be read: for the first bimonthly period there are 47 infants from non-laboring groups with a mean of 7.2 sound types, and 15 infants from laboring groups with a mean of 7.1. It may be noted in the table that the differences of the pairs of means from the 8th age level (15-16 months) to the last age level consistently favor the non-laboring group.

Equations have been derived from the data of Table 1. The equation for the means of the groups of infants from non-laboring homes is  $P_T = 7.8 A^{0.467}$ , while that of the children of working people is  $P_T = 8.3 A^{0.410}$ . Theoretical values were calculated from each equation, and the curves determined by them have been plotted in Figure 1. Age is laid off on the *x*-axis and the number of speech sound types on the

TABLE 1. Means for type, two groups.

Bimonthly Period	Non-Laboring		Laboring	
	N	Mean	N	Mean
1-2	47	7.2	15	7.1
3-4	62	11.1	18	11.4
5-6	59	12.1	16	12.9
7-8	49	14.9	15	15.7
9-10	47	16.6	15	14.1
11-12	48	19.3	14	16.4
13-14	46	18.8	11	19.1
15-16	43	20.6	12	19.8
17-18	39	21.3	11	20.2
19-20	30	23.3	11	20.4
21-22	29	23.4	8	21.6
23-24	23	24.9	8	23.0
25-26	24	26.5	8	23.9
27-28	17	26.4	7	25.4
29-30	13	28.1	6	25.2

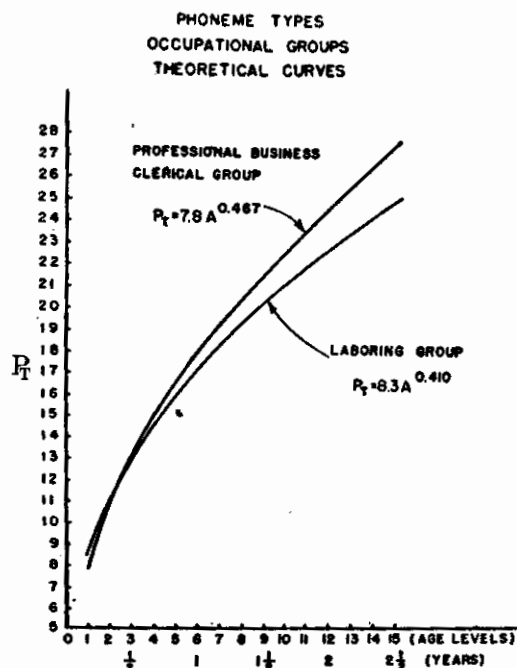


FIGURE 1. Theoretical curves derived from means of phoneme type production of groups of infants from laboring and non-laboring homes.

y-axis. The curves are parabolic arcs and illustrate a tendency toward a slower rate of development for infants in the homes of workers, especially during the last year of infancy.

The problem to be considered is whether the tendency apparent in the curves is statistically significant. The procedure which was followed was to test first for the homogeneity of variance about 15 pairs of means, then to make an analysis of variance of the means over all 15 age levels.

The results of the Bartlett test for homogeneity of variance (6, 99) are shown in Table 2 which gives the corrected Chi-square and P-values for the 15 pairs of type distributions. The table indicates that none of the Chi-square values are significant at the 5% level of confidence and thus that the pairs of distributions may be assumed to be homogeneous.

It remains to test whether the null hypothesis holds for the differences

between the means of the two groups. A multiple criterion design for the variance analysis was used, namely occupational status and age. In this analysis, the numbers in the subclasses are corrected for disproportionality.

The result of this analysis is shown in Table 3. The analysis of variance with correction for disproportionality yields F-ratios which indicate that interaction is negligible, that occupation is significant at the 5% level and just short of the 1% level, and that age is significant at the 1% level of confidence. It can therefore be assumed that the null hypothesis may be rejected. Furthermore, when an F-test was run on the last six age levels where all values for the laboring group are smaller than those for the other group, occupation was found to be significant well beyond the 1% level of confidence, and age was found to be significant just short of the 1% level. The F-test on the first nine age levels, however, shows that the occupational factor is not significant at the 5% level.

There is also the question as to whether the differences between the means of the laboring and non-laboring homes may not be due to differences among the subgroups. Are there significant differences among the type means among the business, clerical and professional groups on the

TABLE 2. Test of homogeneity of variance for 15 pairs of type distributions.

Bimonthly Periods	Corrected Chi-Squares	P
1	1.597	.20
2	0.472	.50
3	0.947	.40
4	0.155	.70
5	0.395	.85
6	0.617	.40
7	1.169	.25
8	1.067	.30
9	1.009	.90
10	0.672	.40
11	1.528	.20
12	1.057	.30
13	0.324	.55
14	2.481	.10
15	0.868	.45

TABLE 3. Analysis of variance for types in two groups—15 age levels\*.

Source	df	SS	V
Age	14	23,332.51	1,666.07
Occupation	1	113.96	113.96
Interaction	14	197.32	14.09
Within Subclasses.	722	12,491.90	17.30
Total	751		
Interaction: $F = \frac{14.09}{17.3} = 0.81$ , $df = \frac{14}{722}$ , not significant			
Occupation: $F = \frac{113.96}{17.3} = 6.59$ , $df = \frac{1}{722}$ , 5%			
Age: $F = \frac{1,666.07}{17.3} = 96.3$ , $df = \frac{14}{722}$ , 1%			

\*Corrected for disproportionality of numbers in subclasses.

one hand; and on the other, between the means of infants from skilled and unskilled laborers' homes? In neither case was the F-ratio found to be high enough to reject the null hypothesis at the 5% level of confidence. The differences characterize the two major groups and do not occur among the subgroups within them.

In view of the foregoing analyses it seems proper to assume that the null hypothesis for differences in occupational status, that is, between babies of laboring and of non-laboring parents, may be reasonably rejected. It would seem, then, that the curves in Figure 1 illustrate a tendency toward differences due to occupational status of the families in which these infants are born and reared. The occupational component, however, is not effective until the last year of the infant period. Age differences within the two groups are likewise significant.

#### SUMMARY

Speech sound data collected on two groups of infants, one including children from homes of laboring families, the other from homes of business, clerical, and professional people, were analysed in terms of phoneme type. The mastery of speech sounds for the

two groups was found to proceed at different rates. The equation for phoneme type development of the babies in working class homes is  $P_T = 8.3 A^{0.410}$ , while that for the other group is  $P_T = 7.8 A^{0.467}$ . Analyses of variance yield F-ratios indicating significant differences between the two groups, especially for occupational status during the last year of infancy. Age differences within each group are likewise significant.

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