

THE SPEECH BEHAVIOUR OF INFANTS WITHOUT FAMILIES

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The research on infant speech has until recently been mainly concerned with technical problems of measurement and with the establishment of normative sequences of speech development for the young child. As a clinical instrument these norms look extremely promising; they offer standardizations obtained from a large number of cases on the basis of which one may measure deviations in a manner similar to that used in intelligence testing (1).

Interest in this research area has gradually been shifting, however, in another direction. While these norms undoubtedly will offer a basis on which one may objectively determine the speech status of any individual child with respect to the sampled population, they tell us little by themselves about the relevant variables which have contributed to the status. Nor do they, therefore, tell us anything about the possibility or desirability of changing a specific individual's status. If such variables could be isolated we might achieve theoretical knowledge, as well as a diagnostic measure, of language acquisition during the earliest stages of the life history and its relation to the later acquisition of more complex symbolic habits.

If we started with children who diverged markedly from the speech norms established by recent investigators, it is quite possible that common causal factors in their environment contributing to the deviations could be discovered. If such factors could be found, they might be varied in a reasonably controlled situation, so as to experimentally weight their differential influence. Such a program would be costly and tedious to realize, however, and probably would have to be done through amorphous clinical channels. If, on the other hand, we could find homogeneous populations which differed as a group with the norms established thus far, research would not be so technically encumbered. We have a technique that meets these requirements in what the anthropologists call "cross-cultural comparisons."

Now, one of the basic criteria used by the anthropologists to distinguish cultures is the structure of the family group, broadly conceived. It is predominantly within this institution, under the guidance of parents as cultural surrogates, that the individual learns a complex set of responses which carry over into interactions with more formally organized institutions. Any difference in the character of the family structure and/or its cultural

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surrogates would presumably affect the learning process itself, through both the administration and types of rewards and punishments used. This, in turn, would influence the character of the manifest cultural responses.

It is obvious that speech sounds function both as social responses and as social stimuli. The unpatterned speech of the infant is frequently a response to the behaviour of the members of the family, and in turn its speech sounds stimulate them to respond with culturally determined rewards and punishments. It is in these combined ways that infant speech acquires cultural meaning. When, as in this study, we compare orphanage infants with family infant groups, it is obvious that there are present wide differences with respect to family organization, cultural surrogates, and consequently the learning process itself. The presence of these conditions permits us to view our study on infant speech behaviour as a quasi-anthropological type of research.

Since this is the first systematic work, as far as we know, on the speech behaviour of orphanage infants at so early an age, its rather introductory nature should be emphasized. It is, of course, a general observation that children who grow up in the ordinary orphanage home are somewhat retarded in their speech development. Our study opens up the problem during the very earliest months of the orphanage child.

Procedure

The orphanage subjects of this study were 94 infants whose ages ranged from birth to six months of age. These subjects were residents of the Iowa Soldiers Home at Davenport, Iowa. They were divided into three age groups - from birth to two months, two to four months, and four to six months of age. There were 35 subjects in the first group, 33 in the second, and 26 in the third group. The subjects were classified as "dependent or neglected" children, the criterion of which is either 1) being destitute, homeless or abandoned or otherwise dependent on the public for support or 2) living in unfit surroundings, of either a physical or moral character or both. Feeble-minded children are not accepted at the Davenport orphanage and are transferred by the Iowa State Board of Control if so diagnosed.

The speech sound measurements of these orphanage children were then compared with measurements obtained from family infants living in Iowa City, grouped in the same way according to age, and containing 62, 80 and 75 babies in the successive age level periods.

A competent nurse of long experience in the institution was in charge of the babies and a physician is attached to the staff.

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The day-to-day work of caring for the infants is done by hired, non-professional, female workers who are drawn mainly from the lower socio-economic level of the community. There is a large turnover among these employees. In addition, these women are usually assisted by several older orphanage girls. Thus, the bulk of the personnel, with the exception of the nurse and physician, are of quite elementary education, trained to carry on the simpler techniques of caring for the babies and not at all motivated by strong personal interest or responsibility.

In regard to the handling of the infants, all of them are bottle-fed and all receive satisfactory care so far as their physical needs are concerned. Excellent medical attention is provided. There is, however, little personal attention in the way of being held, played with or spoken to, except incidentally and sporadically.

The actual recording of sounds followed a definite procedure. While the infants lay asleep in their bassinets the observer recorded the name, sex, birth date, and recording date on a card, which was then left in the crib. When an infant awoke and began to vocalize, the observer stood beside the crib and took records until vocalization ceased. This was done in turn with each child in the nursery. Sometimes more than one infant would vocalize simultaneously. In this situation, a sample of breaths of one infant was completed before a sample of the other was taken. Thus, no conflict of observation arose, which might distort the results.

The unit of measurement was a behaviour rather than a time unit. The type and number of sounds were recorded for twenty or more discrete breaths for each subject and were taken only on the exhalation phase of breathing. The sounds were recorded in terms of the International Phonetic Alphabet as described by Fairbanks (2). The breath as a unit of measurement is advantageous because its length is easily within the attention span of the observer, thus permitting higher reliabilities between research workers. The International Phonetic Alphabet permits standardization of the qualitative aspects (the content) of the sounds.

No direct measure of observer reliability could be calculated since the data were collected by a single observer. This reliability has been reported elsewhere (5). In each of these studies the reliabilities reported have been of such a consistently satisfactory nature as to permit us to assume an equally satisfactory reliability for the purposes of the present study.

The reliability of the data was determined by the split-half method. Odd and even sounds as they came constituted the two halves of the data. The formula used has been described else-

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where (6). The mean percent of agreement for each differential condition is 90. The range is 66 to 100 for crying sounds. The range for non-crying sounds is 71 to 100.

The distribution of percentages of agreement is presented in the following tabulation.

	CRYING	NON-CRYING
91-100	33	26
81- 90	9	8
71- 80	8	8
61- 70	2	0

Half of the reliabilities for the non-crying data, and over half of the reliabilities for the crying data, fall in the upper interval, 91-100. It is therefore quite evident that there exists a very satisfactory degree of internal consistency in the data.

The Results¹

The data were analyzed both with regard to frequency, the number of sounds a given child made on all recorded breaths without discounting for any reduplication of sound content, and with regard to type, the number of sounds a given child made on all recorded breaths with any repetition of a given sound discarded. The frequency measure merely indicates the degree or amount of vocalization, whereas the type measure indicates the breadth and richness of vocalized sounds.

Type and frequency measures were calculated for both orphanage and family groups at each successive age level period according to the following conditions:

1. An over-all analysis, combining both crying and non-crying data and consonant and vowel data.
2. An analysis of non-crying data separately, combining both consonant and vowel sounds.

The non-crying data were then broken down into:

1. A comparison of mean vowel and consonant types for both experimental and control groups at the three different age levels.
2. A comparison of mean vowel and consonant frequencies for both groups at the three different age levels.

The results of these analyses are shown in Figures 1 and 2.

¹For the detailed statistical treatment of these data see the original thesis in the library of the State University of Iowa: Brodbeck, Arthur J. *The phonetic status of orphanage infants: The first half year.* Unpublished Master's thesis, State University of Iowa, 1946.

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MEAN COMPARISONS OF ORPHANAGE AND FAMILY SUBJECTS FOR
TYPES AND FREQUENCIES

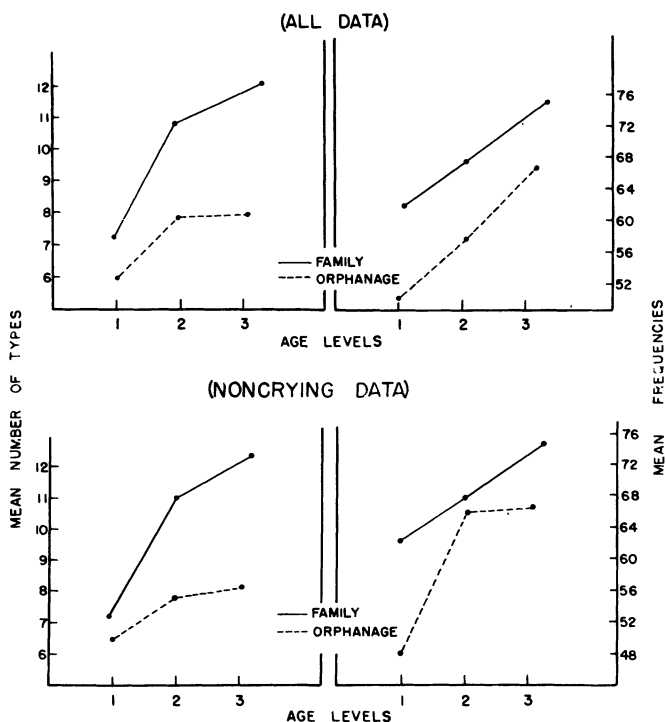


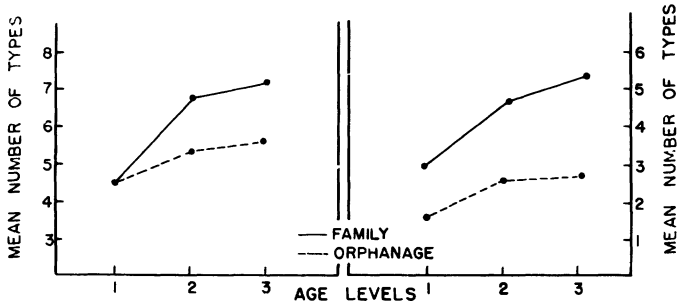
FIGURE 1

An examination of the graphs reveals some similarities. All of the graphs show that the means for orphanage infants fall below the means for family infants at all age levels and for both all type and all frequency measures. Regardless of the reliabilities of the differences, there is little doubt as to the consistency of this finding.

Moreover, the shape of the curves for the two groups is dissimilar. Wherever the speech sound growth curve for orphanage babies reaches a plateau between the second and third age levels, the curve for family infants shows some increment. The former curves flatten out in almost two-thirds of the comparisons, and especially for all analyses of type differences, both with consonant and vowel sounds combined and analyzed separately. There appears, then, to be a differential growth pattern for the two populations.

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MEAN COMPARISONS OF ORPHANAGE AND FAMILY SUBJECTS
FOR VOWEL AND CONSONANT TYPES



MEAN COMPARISONS OF ORPHANAGE AND FAMILY INFANTS
FOR VOWEL AND CONSONANT FREQUENCIES

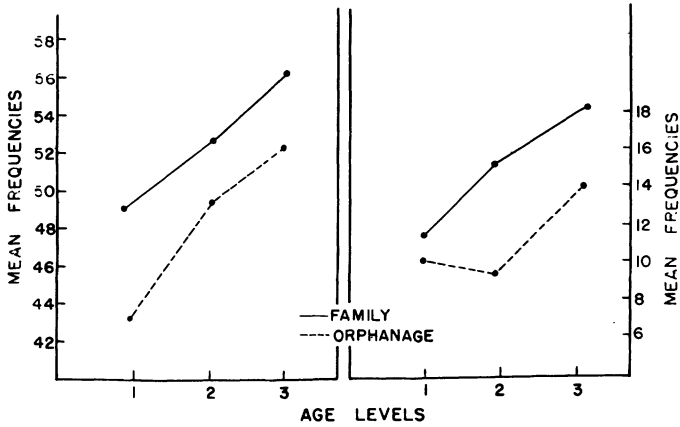


FIGURE 2

TABLE 1

FREQUENCY AND PERCENTAGE DISTRIBUTION
OF CRITICAL RATIOS

C.R.	Level of Confidence	Frequency		Type	
		No.	Percent	No.	Percent
2.58+	(1%)	1	8	7	58
2.33+	(2%)	0	0	0	0
1.96+	(5%)	0	0	3	25
1.64+	(10%)	2	17	0	0
below 10%		9	75	2	17

Table 1 shows the frequency and percentage distribution of critical ratios for the mean differences between the two groups for both the type and frequency measures shown in Figures 1 and 2. If we take the 1 percent level of confidence as acceptable (which is equivalent to a critical ratio of 2.58), then more than half (58 percent) of the type differences prove to be significant, while only one (8 percent) of the frequency measures falls above this value.² Consonant type differences between the two groups were reliable at all three age levels, and type differences for the crying data, with consonant and vowel sounds combined, became progressively more reliable with increase of infant's age, with a critical ratio of 3.72 obtained at the third age level period.

Having made these analyses, it was still possible that the differences found between the two groups with regard to speech behaviour might be due to a selective socio-economic factor, operative in the placement of infants in the orphanage. We know, in general, that the lower socio-economic groups tend to be somewhat retarded in language development when compared

²*It is somewhat difficult to interpret the fact that, while both all type and all frequency mean differences favored the family group, only the type differences proved to be consistently reliable. However, it is to be remembered that the unit of measurement was a behaviour unit, so set up as to arbitrarily exclude extremes of vocalization frequency. That is, records were taken only on breaths during which the infant was making some sound and excluded breaths on which no sound was made. On the other hand, the average breath of an infant may not be long enough to permit reliable discrimination between two individuals or groups. Thus, it is conceivable that one infant may vocalize 400 times a day, while another might vocalize only 200 times a day and, yet, both individuals might vocalize to the maximum on a single breath. The breath unit might in this manner set an arbitrary high and low ceiling above which no reliable discrimination is possible.*

These speculations lead us to believe that a time unit of measurement, under approximately similar stimulating conditions, might increase the range of variability so as to lead to reliable differences between the two populations with respect to frequency of vocalization. A possible unit might be the time elapsing a half hour before feeding to the moment of the actual presentation of the breast or bottle.

Some confirmation for our hypothesis is the fact that, with the exception of consonant frequencies, the most reliable frequency differences were at the earliest age level where we would expect the range of variability to be smallest, and the least reliable were at the later age levels where we would expect the range of variability to be greatest.

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with higher-status groups. The family infant data were, therefore, broken down into a professional and unskilled group and the same measures were calculated for each of these subsidiary groups as they had been for the family infant group as a whole previously. The mean results are shown in Table 2.

TABLE 2
COMPARISON OF ORPHANAGE DATA WITH FAMILY
DATA OF DIFFERENT SOCIO-ECONOMIC LEVELS

(Non-crying Data)

Periods	1	2	3
<u>Types</u>			
Professional	7.4	10.7	12.7
Unskilled	7.6	10.9	13.3
Orphanage	6.4	7.7	8.0
<u>Frequencies</u>			
Professional	60.1	62.2	71.2
Unskilled	60.3	70.6	62.2
Orphanage	48.1	66.1	66.8

An inspection of these means makes it quite evident that there are no very large differences between the two socio-economic groups, and that these small differences tend to favor the lower socio-economic group, especially for those type measures which proved most reliable in the original orphanage and family group comparisons. Furthermore, for all measures of type, the orphanage means deviated from the means of both family groups several times more than did either of the two occupational groups deviate from each other. The deviation of the orphanage means also becomes appreciably greater with age, but the socio-economic deviations do not. The means of the frequency measures did not show any similar consistent trend. It would, therefore, seem to follow that the reliable differences which have been found between orphanage and family infants cannot be solely attributed, if at all, to a selection of orphanage babies from the lower socio-economic strata of the community. Yet the fact that at later ages speech sounds do actually reflect the differences between socio-economic groups, found by other

widely-used tests of language development, is more or less manifested in the results of an unpublished study made by one of the authors, which shows that the curves for the higher socio-economic groups begin to exceed that of the lower group at about one year of life.

Discussion

In her recent book, Infants Without Families, Anna Freud (3) puts forward the observation, based upon clinical work at the Hampstead Nursery, that children under one year of age separated from their parents use speech sounds "as extensively and not less than other children." This result, which of course was not based on any systematic unit of measurement comparable to our frequency and type measures, is explained by the children's drive to gain oral-erotic pleasure during the first year of life and is said to be all the more active, the more the child is left to itself. Dr. Freud does find differences between infants with and without families during the second year of life with regard to the use of patterned speech (words). Such differences disadvantageous for orphanage infants are explained as due to an absence of some form of imitation resulting from the lack of identification or relationship with a mother. In other words, the identification mechanism is not assumed to have differential effects on speech behaviour during the first year of life, and becomes crucial only during the second year when the child begins to use patterned speech.

There is no reason to doubt the precision of Dr. Freud's observations. On the basis of our own results and those of several other investigators, however, there does appear to be some reason to doubt the generality of her theoretical explanations. A recent study by William Goldfarb (4) showed that this deficiency with regard to speech sounds, as well as to other uses of language, continues right up to the third year of life among institutional children, and even after a period of foster home replacement. If the use of speech sounds per se was a function solely of a universal oral drive as Freud hypothesizes, why should these differences continue until the preschool ages, as Goldfarb demonstrated, when the child has already passed through the oral stage of development? Here, again, Dr. Freud underestimates the permanent and primary effects which the early mother-infant relationship exerts, and indeed predicts that the speech differences due to absence of the mother in the second year will be cancelled at the preschool ages, a prediction in flat contradiction to Goldfarb's findings.

Goldfarb, as well as others, has suggested that, through transient and impersonal attendance and in the absence of a

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fixed, loving adult, the infant even before the first year cannot readily identify with any of the cultural surrogates around him, and is not motivated to do so, thus remaining retarded in all those functions which depend on social forms of imitation and communication. Presumably, the activity of babbling is at least in part one of these functions, as Lewis (7) and Miller and Dollard (8) have tried to demonstrate. If this hypothesis should be true, then on the basis of our data, the "identification" mechanism may be crucial even during the first six months of life. Dr. Goldfarb specifically states:

"As early as six months and possibly even somewhat before, one observes the beginnings of sentiments, particularized attitudes, and attachments to a particular person or limited number of people within the primary family circle. Placement observation of babies separated from the parent person at this age indicates that the children experience psychological shock which sometimes may even be prolonged in nature. Nor is the shock ameliorated, for instance, by the simple satisfaction of hunger. A psychological relation between child and specific adult must be reconstituted before the baby's habitual expression of complacency is again observed. Close attachment to specific adults considerably before the end of the first year thus appears to be a fact." (p. 18)

It may very well be that the Hampstead Nurseries are not truly representative of the conditions that regularly exist in most orphanage institutions in the United States. And, as a matter of fact, some of our orphanage babies were well above the means for family infants. We believe that such individual cases (which were exceedingly rare) may be explained by the fact that a worker occasionally develops a fondness for a particular child and would, as a consequence, be more inclined to speak to it and encourage it to answer, as well as to give it more frequent all around stimulation. There is evidence that the social environment of the Hampstead Nursery was more uniformly of such a character. At least this seems a more reasonable hypothesis than Dr. Freud's toward explaining both the results obtained by Goldfarb and ourselves. It is in line, too, with the general clinical results reported by Margaret Ribble (9, 10) although she uses the same psychoanalytic principle of oral-eroticism to explain directly contradictory results to those found by Dr. Freud. Ribble seems to imply that, given a strong oral drive (measured in other than vocalization units) plus the absence of a fixed, affectionate adult, non-crying vocal-

ization (babbling) will be proportionately diminished. It may be, of course, that the two explanations (oral-eroticism vs. communication and imitation) are not incompatible and that only a multiple set of hypotheses can adequately explain the empirical findings regarding early speech behaviour. Until the oral-erotic principle is applied less ambiguously however, it is difficult to assign its relative weight at any stage of development.

Apparently what is needed now by way of rigorous investigation is some kind of clinical survey of the life histories of individual orphanage children who scored extremely low and extremely high when compared with the means of infants living in their own homes. By this method we may be able to isolate the more concrete cultural factors within the orphanage that have made for the manifest differences in speech behaviour. Secondly, there is the possibility of taking a more direct experimental approach through subjecting these children to types of treatment differing from that which they would ordinarily receive under orphanage conditions and measuring the resulting speech behaviour at the conclusion of the experimental treatment. This last procedure would be the more difficult of the two, in so far as it is rather trying to quantify all the factors that might go into such experimental treatments, but it would be more gratifying from the point of view of assessing the relative quantitative importance of a set of independent and manipulatable variables. At any rate, until some work like this is done, all our theoretical explanations remain somewhat academic.

SUMMARY

A group of orphanage infants ranging from one day to six months of age was compared with family infants of the same age range, with respect to various measures of speech behaviour. It was found that:

1. A graphical comparison showed that the orphanage means fell below those of the family means at all age levels and for both type and frequency measures.

2. More than half (58 percent) of the type differences proved to be reliable, but only one (8 percent) of the frequency measures was satisfactory.

3. Consonant type differences were reliable at all age levels, and type differences for the crying data, with vowel and consonant sounds combined, became progressively reliable with increase of age.

4. When the family infant data were broken down into professional and unskilled family groups and again compared with orphanage infants, the orphanage means were found to deviate

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from the means of both family groups several times more than did either of the two socio-economic groups deviate from each other, especially for those measures which showed reliable differences between the orphanage and family groups as a whole previously. This finding more or less ruled out the possibility of attributing the previous results solely to a selection of the orphanage infants from lower social status groups.

5. Some exception was taken to the use of the identification mechanism and of the oral-erotic principle by Anna Freud in explaining age differences in infant speech behaviour.

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