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The Chen Index Applied to the Speech Sounds of the Fifth Half Year of Life

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RELIABILITY OF SPEECH SOUND DATA OF INFANTS

ORVIS C. IRWIN

The reliability of data may be determined either by correlating odd-even frequencies of speech sounds or by the method of the percent of agreement of the items. In the following both methods will be applied to a sample of the speech sounds of infants. The sample upon which the analyses are based are sixty records of infant speech sounds from a total of over a thousand records from the first to the thirtieth month of life. Two records per month were selected randomly by means of a table of random numbers. In this sample 13 vowel and 26 consonant sounds were found.

RANK ORDER CORRELATIONS

The tabulation gives the rank order correlations of odd and even speech sound elements for the thirty month period for vowels and for consonants and also separately for the periods of the first year and the second year and a half.

Months	Vowels	Consonants
1-30	.98	.97
1-12	.97	.96
13-30	.98	.96

The entire period of thirty months yields a correlation value for odd-even vowel items of .98, and for consonant items of .97. For the first year the respective values are .97 and .90, and for the 13 to 30 month period they are .98 and .96.

PERCENT AGREEMENT

A more detailed analysis of the reliability of these data is afforded by the method of percent of agreement of the odd-even items among the separate speech sounds. A formula commonly used for this purpose is

$$2a \frac{o + e}{o + e + 2}$$

in which a = agreements
 2 = a correction
 o = number of odd items
 e = number of even items

The next tabulation summarizes the average percentages of vowel and consonantal data.

Months	Vowel Percentages	Consonant Percentages
1-30	87	76
1-12	86	66
13-30	85	76

For the total period the percent of agreement between odd and even vowels is 87, for consonants it is 76. For the first year the values are 86 and 66 and for the remaining period they are 85 and 76. Thus the method of percent of agreement of the odd-even items yield quite satisfactory results although those for consonants are not as high as those for vowels.

Another check on the reliability of these data is afforded by the

X² test of homogeneity. When this test is applied to the odd-even items for the 30 month period, P is found to be 70 for both the vowels and for the consonants thus indicating that no difference exists between these categories.

It appears then that the data in this sample of speech sounds of infants is quite reliable.

IOWA CHILD WELFARE RESEARCH STATION

THE CHEN INDEX APPLIED TO THE SPEECH SOUNDS OF THE FIFTH HALF YEAR OF LIFE

ORVIS C. IRWIN

The problem under investigation was to study the development of speech sounds of infants during the period from the twenty-fifth to the thirtieth month of life. For this purpose the Chen number differential index was employed. This index is derived by subtracting the number of phonemes at any given infant age level from the adult standard. The English speaking adult uses thirty-five of the speech sounds listed in the International Phonetic Alphabet. Data was collected on a group of infants in this age range and for purposes of analysis divided into three two-month units. There was available data on 32 infants for the 29-30 month period. The mean number differential scores are given in the tabulation.

25-26 months	9.5 ± .67
27-28 months	9.3 ± .93
29-30 months	7.9 ± .54

The tabulation is interpreted as follows. Infants 25-26 months of age show a deviation of 9.5 from the adult standard in the use of speech sounds. For the next two-month period the difference amounts to 9.3. For the 29-30 month period the difference is 7.9, only slightly less than the two preceding values.

If the question is asked, "What improvement in terms of the adult standard has been made during the six-month period under consideration?" it should be indicated that the difference between the first and last values in the tabulation amounts to only 1.6. The value for P for this difference is 60% and thus is hardly significant. On the basis of the number difference index it would therefore seem that during this period infants are only slowly making gains in the mastery of speech sounds.

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