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HEMISPHERIC SPECIALIZATION FOR SPEECH PERCEPTION IN FOUR-YEAR-OLD CHILDREN FROM LOW AND MIDDLE SOCIO-ECONOMIC CLASSES

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Several studies have indicated that children from low socio-economic class (SEC) backgrounds may develop cerebral lateralization for speech perception at a slower rate than middle SEC children (Kimura, 1967; Geffner and Hochberg, 1971). However, Dorman and Geffner (1974) found that when six-year-old black and white children from low and middle SEC backgrounds were tested with a simplified dichotic task (one monosyllable pair on each trial) all groups evidenced a significant right-ear advantage.

It is possible that rearing conditions may exert an influence on cerebral lateralization of function but that such effects are detectable only in children younger than age six. To assess this, in the present study, four-year-old children from low and middle SEC backgrounds were presented a dichotic syllable task.

MATERIALS AND METHODS

Subjects

The subjects were 44 four-year-old children; 21 low SEC (9 males and 12 females); and 23 middle SEC (11 males and 12 females). Socio-economic class was determined by Hollingshead's Two Factor Index of Social Position (Hollingshead, 1965). All subjects were right-handed, and had normal hearing with no known perceptual, neurological, speech or language deficit.

For details of the Apparatus, Preparation of Stimuli and the Procedure see Dorman and Geffner (1974).

RESULTS

A subject's results were excluded from the data analyses if he (or she) did not complete the 120 trials or if he (or she) gave perseverative responses. On these criteria, the test results of 48 percent of the low SEC subjects were excluded from the data analyses. None of the data from the middle SEC subjects were excluded.

Each subject's performance was scored in terms of the metric $\frac{R - L}{R + L} \times 100$ where R is the total number of syllables correctly recalled from the right ear and L is the total number of syllables correctly recalled from the left ear. The mean

ear advantage for the male low SEC group was 12.53; for the male middle SEC group 12.00; for the female low SEC group 0.60; and for the female middle SEC group — 0.83.

The magnitude of the right-ear advantage did not differ significantly between the low and middle SEC groups ($Z = 1.02$, $p > .05$). However, an overall sex effect was observed ($Z = 2.07$, $p < .02$) with males evidencing a significantly larger right-ear advantage than females. Both low and middle SEC male subjects evidenced a significant right-ear advantage. Neither the low nor middle SEC female subjects evidenced a significant right-ear advantage. Sixty-six percent of the female subjects, collapsed over SEC, evidenced a right-ear advantage (mean = 11.22) and 33 percent a left-ear advantage (mean = 23.51). Of the male subjects, 65 percent evidenced a right-ear advantage (mean = 22.04) and 35 percent a left-ear advantage (mean = 6.41). Thus, the male subjects evidenced both larger right-ear advantages and smaller left-ear advantages than the female subjects.

DISCUSSION

The presence of a similar right-ear advantage in both low and middle SEC children replicates the outcome of an earlier study with six-year-olds (Dorman and Geffner, 1974). Thus variation in rearing conditions, at least for the range subsumed under the categories low and middle SEC, does not appear to affect the rate of cerebral lateralization for speech perception. This conclusion, however, must be tempered due to the number of low SEC children who could not be tested with the dichotic syllable task.

The absence of a significant right-ear advantage in both female populations was unexpected. However, a number of other investigators, in spite of using different dichotic listening tasks, have independently reported a similar outcome with four-year-old females (Ingram, 1975; Nagafuchi, 1970; Yeni-Komshian, 1973). While one such sex-effect may reasonably be attributed to sampling error, the similarity in outcome of the present study and those cited above suggests that females, as a population at age four, do indeed perform differently than males on dichotic listening tasks.

The absence of a right-ear advantage for females resulted from a majority of children evidencing moderate right-ear advantages while the remaining children evidenced large left-ear advantages. Thus, the absence of a right-ear advantage for the female population does not imply that females as individuals are not lateralized (cf. Ingram, 1975). Indeed, the absolute ear-advantage (ignoring direction) for the males and females was essentially identical (females = 15.54; males = 16.67).

Ingram (1975) has pointed out that the absence of an overall right-ear advantage in four-year-old females is somewhat puzzling given that three and five-year-old females as a population appear to have a right-ear advantage. Further cross-sectional developmental studies, because of inherent problems of sampling error, are clearly inadequate to examine these issues. A longitudinal *cohort* study (cfr. Schaie and Strother, 1968) appears necessary to resolve these issues.

SUMMARY

Four-year-old male and female children from low and middle socio-economic class (SEC) were presented a dichotic syllable task. Both low and middle SEC

males evidenced significant right-ear advantages. Neither the low nor middle SEC females evidenced a significant right-ear advantage. The similar ear advantage in the low and middle SEC populations replicates a previous study with six-year-olds and suggests that the variations in rearing conditions which occur in low and middle SEC classes does not affect hemispheric lateralization for speech perception.

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