Perceptual Effects of Deafness

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1. Introduction

Deafness imposes a naturally occurring condition of unimodal sensory deprivation, in which information conveyed to the perceptual system is blocked at the sensory level or disrupted in transmission to the brain. Since spoken language is a prominent form of auditory information in the human environment, a primary effect of deafness in humans is that it interferes with communication through speech. Many of the psychological, social, and educational consequences of deafness can be attributed largely to the individual’s lack of exposure to verbal information, and resultant deficiency in comprehension and expression of spoken and written language (Moores, 1970; Reynolds, 1977). These effects are most serious when deafness is profound and prelingual—occurring before the acquisition of language, at about the age of 3 years.

Numerous studies of heteromodal sensory deprivation have revealed that an absolute reduction of sensory input, or a reduced patterning of stimulation, can produce serious perceptual deficiencies and distortions (Kubzansky and Leiderman, 1961). If deafness is considered a form of deprivation limited to one sensory channel, some perceptual deficiencies in other modalities might be expected. This proposition is sometimes termed the “generalized deficiency hypothesis” (DiFrancesca, 1969). It is based on the argument that auditory deprivation might interfere with functioning in other perceptual systems through disruption of normal intersensory relationships, and/or neurological impairment affecting the other sensory systems.

In opposition to this hypothesis, it might be expected that impairment in one sensory modality would result in the development of compensatory abilities
in other perceptual systems. This "compensation hypothesis" predicts that deaf persons should develop superior capabilities in certain visual, tactual, and other sensory functions, by comparison with people of normal hearing ability. These alternative hypotheses provide a framework for the research results described in this chapter.

2. Visual Perception and Deafness

2.1. Ocular Defects

Since deaf persons must rely heavily on vision for perception of their environment, it is important to know something about the ophthalmological characteristics of this population. Consistent with the deficiency hypothesis, Pollard and Neumaier (1974) have cited a number of studies generally indicating that 40–60% of deaf school-age children have ocular defects, compared with an incidence of 20–30% among hearing students. Their own research showed that refractive errors were more prevalent among deaf students than hearing students. For example, farsightedness was found in 8% of the deaf sample compared with 3% of a hearing sample. Other ocular defects which occurred more frequently in deaf than in hearing subjects were nearsightedness (13.3% vs. about 6.6%), astigmatism (7.3% vs. 1.4%), and anisometropia (5.9% vs. 1.4%). However, the incidence of eye coordination problems (e.g., strabismus, amblyopia) and ocular pathology was about the same for both groups. It is not clear why there should be a higher incidence of refractive ocular defects among deaf children, although a contributing factor may be the visual stress imposed by greater dependence of deaf individuals on their visual system. The higher probability of visual impairment in the deaf population suggests the need for visual screening of hearing-impaired subjects participating in research involving vision, to avoid confounding of results. In addition, considering the extent to which deaf persons must depend on vision, it is obvious that early ophthalmological examination of hearing-impaired children is of great practical importance.

2.2. Visual Test Performance and the Deficiency Hypothesis

A study by Myklebust and Bruten (1953) was among the first of numerous experiments comparing the performance of deaf and hearing children on tests of visual perceptual functioning and visuomotor performance. Their underlying theoretical orientation was consistent with a deficiency hypothesis in stating that deafness should modify visual perception (probably adversely) because of the dynamic interrelationship of all the sensory modalities. Their ex-