Brief Report:

Differential Ability Structure in Deaf and Hearing Children

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The Hiskey-Nebraska Test of Learning Ability (H-NTLA) is the only individually administered intelligence test designed for use with deaf subjects that has been standardized separately on deaf and hearing samples (Hiskey, 1966). In addition to its popularity among psychological examiners of the deaf (Levine, 1974), the H-NTLA has been favorably evaluated when used with mentally retarded and bilingual children (Lewis, 1969; Shutt & Hannon, 1974). Thus, it is surprising that no factor analytic studies of the H-NTLA have been reported.

In contrast to the numerous comparative investigations of the cognitive functioning of deaf and hearing subjects (for reviews see Furth, 1964, 1966, 1971; Vernon, 1968), only three studies have directly addressed the issue of differential ability structure. Farrant (1964) administered a comprehensive battery of ability tests to 120 hearing-impaired children and 120 normal-hearing children. Parallel factor analyses suggested that the intellectual abilities of the hearing-impaired children were "less integrated" and "distorted" relative to those of the normal-hearing children (p. 324). Holmberg (1966) analyzed a battery of tests from selected categories of Guilford's structure of intellect model for 154 deaf adolescents and found that the factor structure was unlike that of hearing adolescents. The most sophisticated of the reported investigations was conducted in Finland by Juurmaa (1963). Extensive comparisons of the separate factor analyses of a carefully selected battery of tests for 94 hearing-impaired adolescents and 100 hearing subjects matched for age produced the general conclusion that "the ability structure of the deaf is less differentiated than that of the hearing (p. 103)."

Method

The H-NTLA is comprised of twelve performance tests: eight are administered to subjects aged 3 through 10 years of age and seven are administered to subjects aged 11 through 17. (Three subtests are used with both age groups.) The H-NTLA manual (Hiskey, 1966) provides a detailed description of the test materials and administration procedures.

In conjunction with the standardization of the H-NTLA, 1,079 deaf and 1,074 hearing children and adolescents were tested. The majority of deaf subjects came from schools for the deaf in 10 states. Hearing subjects from the 10 states were also sampled, on the basis of the occupational level of their parents. The subtest intercorrelation matrices for deaf and hearing subjects at two age levels constituted the raw data for the present investigation (Hiskey, 1966, pp. 11–12).

The factor analytic procedures were as follows: Maximum likelihood estimation of the loadings for factors with associated eigenvalues greater than 1.0, followed by Oblimin rotation to oblique simple structure.

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Results and Discussion

Because there was just one factor with an eigenvalue greater than 1.0 for each of the older samples, they were not considered further. Both younger samples, however, had two factors that met the 1.0 criterion.

Table 1
H-NTLA Factor Patterns for Deaf and Hearing Subjects Aged 3 Through 10[a]

	Deaf (N=550) Factors		Hearing (N=614) Factors	
Test	I	II	I	II
Bead Patterns		86		86
Memory for Color		68	67	
Picture Identification	91		84	
Picture Association	82		61	
Paper Folding	60		99	
Visual Attention Span	77		51	30
Block Patterns	89			74
Completion of Drawings		74		79

[a]Coefficients less than .25 and decimals are omitted. The factor correlations for both samples were .60.

The oblique factor patterns for the younger samples, which are presented in Table 1, suggest that the organization of subtest abilities is different for deaf and hearing children aged 3 through 10 years. More specifically, the findings indicate that two of the H-NTLA subtests, Memory for Color and Block Patterns, assess different cognitive abilities in younger deaf and hearing examinees. These results, which are in accord with the three studies reviewed above, do not support Furth's (1971, p. 70) conclusion "that the thinking processes of deaf children are similar to those of hearing children and therefore must be explained without recourse to verbal processes." However, the evidence is consistent with Mykelbust's (1964) organismic shift hypothesis which maintains that sensory deprivation alters the equilibrium and integration of perceptual and conceptual abilities.

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