# The Mapping Between Sign Language and Reading Ability: Evidence from Korean Deaf Children

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**Jhang, Se-Eun. 2004. The Mapping Between Sign Language and Reading Ability: Evidence from Korean Deaf Children.** *The Linguistic Association of Korea Journal, 12*(3), 225-238. From the perspective of a bilingual education program, an important topic of the current reading research in deaf education is to understand how deaf readers map their knowledge of sign language onto print. The purpose of this paper is twofold: first, to find an answer to the question of whether or not the general cognitive ability of deaf children is really different from that of hearing children in order for deaf educators to have a correct understanding of a bilingual approach and, second, to provide a piece of evidence to support bilingual approaches. Evidence comes from the fact that deaf children from deaf families seem to do better than those from hearing families on reading and writing and in overall academic achievement. This evidence is suggested from a small sample of Korean deaf children aged seven to ten in the second and third grades.

**Key Words**: sign language, reading, bilingual, Korean deaf children.

## 1. Introduction

The education of deaf children all over the world has been a history of barriers to language, learning, and communication since the use of signed language as their native language has been viewed as retarding the development of learning a spoken language. This statement has been applied to the education of Korean deaf children.

The current circumstances of deaf education in Korea are very similar to those of American Sign Language (ASL) in the 1970s, when the

study of ASL as a language in its own right was in its infancy. Many educators of deaf children in Korea still have the older view of deaf children emphasized as flawed and somehow incomplete children, who must be made to look and act like hearing children. Moreover, most hearing people have also viewed deaf children as a "handicap", as opposed to "normal hearing" children.

Fortunately, since the last decade, a movement of the Deaf culture[1] has been started for advocating a belief that deaf children should be thought of as a linguistic minority in Korea, whose linguistic and cultural rights should be respected. Nonetheless, most schools for deaf children still adhere to oralism,[2] and very few schools are moving from oralism to the use of signed Korean in the form of Total Communication Programs in which signing and speech are used simultaneously.[3] Signed Korean, invented Korean-based signing or Manually Coded Korean has been used to foster the development of speech and spoken Korean.

Therefore, many educators have paid little attention to the use of Korean Sign Language (KSL), the first and natural language of Korean deaf children, as an instructional tool to teach reading skills of spoken languages such as Korean or English because KSL has not been accepted as part of the philosophy of Total Communication. In other words, KSL has been considered an obstacle to the learning of Korean literacy, thus not deemed appropriate for classroom use. As a result, most deaf and hard-of-hearing students have great difficulty reading and writing Korean and their reading ability stands at that of the

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1) Following a convention proposed by Woodward (1972), the lowercase *deaf* is used when referring to the audiological condition of not hearing, and the uppercase *Deaf* is used when referring to a particular group of deaf people who share a language and a culture. That is, the word "deaf" is rooted in the pathological view of deafness, whereas the word "Deaf" is used from the standpoint of the linguistic-cultural view of deafness. (For more detailed discussion, see Padden & Humphries (1988))

2) The same state of affairs occurred in the U.S.A. before 1960; the only educational option available to young deaf children in the classroom was oral instruction without sign language.

3) Even signed Korean is used in the elementary school, not in the preschool or the kindergarten for deaf children.

second or third grade in the elementary school when they graduate from high schools, just as in the case of the U.S.A. in the 1970s.[4]

On the other hand, as indicated in Wilbur (2000: 82), deaf children born to deaf parents (less than 10% of all deaf children) who use sign language as their first language at home are an apparent exception to the generalizations stated above about deaf children's reading ability, because they have a fully established language base prior to learning to read.[5]

When most deaf and hard-of-hearing students have been experiencing greater difficulty in learning Korean and English, an attempt has been made to find some cognitive factors that account for how deaf children learn, or fail to learn, to read. It has been widely believed that deaf children do not develop the ability to apply their nonlinguistic cognitive skills to linguistic tasks. But here is a question: whether or not the general cognitive ability of deaf children is really different from that of hearing children.

This paper tries to find an answer to this question, and to provide a piece of evidence to support a bilingual education program, called the native language approach,[6] as an alternative method to Total Communication Programs. The fundamental idea behind bilingual approaches is that there is a strong and positive relation between knowledge of sign language and reading ability. Evidence for this claim comes from the fact that deaf children from deaf families seem to do better than those from hearing families on reading and writing and in

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4) Trybus & Karchmer (1977) reported that the median reading level of deaf high school graduates was fourth grade. Fruchter, Wilbur, & Fraser (1984) also demonstrated that by age 18, most deaf students did not have the linguistic competence of ten-year-old hearing children in English reading.

5) As addressed in Newport & Meier (1985: 919), deaf children of deaf parents reach higher levels of formal education (Stevenson 1964), and show superior reading and writing of English (Stuckless & Birch 1966, 1968; Vernon & Koh 1970), larger English vocabularies (Quigley & Frisina 1961; Vernon & Koh 1970), and higher academic achievement scores (Vernon & Koh 1970).

6) As indicated in Bailes (2001: 147), the concept of bilingual education has long been in the Deaf consciousness. There were also several proposals for bilingual education presented by Woodward (1978) and many others in the 1970s.

overall academic achievement. This evidence is suggested from a small sample of Korean deaf children aged seven to ten in the second and third grades.

## 2. The Study

How do deaf children learn to read? This question can be put another way: why do most deaf children read poorly, while a very small minority of deaf children can learn to read fluently? Before going on to find a plausible answer to this question, we first need to think over another question regarding whether or not the general cognitive ability of deaf children is really different from that of hearing children. Many people have a misconception about the cognitive factors that account for how deaf children learn, or fail to learn, to read. A myth that both hearing and deaf people have is that deaf children do not develop the ability to apply their nonlinguistic cognitive skills to linguistic tasks. This myth is wrong because this study shows that there is no clear relationship between intelligence and language performance.

The aim of this study is to examine the relationship between nonverbal intelligence and Korean language performance in deaf and hard-of-hearing children as well as in normally hearing children, and to provide a piece of evidence for the mapping between sign language and reading ability. To support this evidence, we will show that deaf children from deaf parents seem to do better than those from hearing parents on reading and writing and in overall academic achievement.

As noted in Crystal (1987: 22), nonverbal intelligence tests do not contain any tasks that require a knowledge of language in order to solve them. A person is asked to carry out such activities as building an object, matching shapes, finding a way though a maze, detecting picture similarities and differences, or deciding which entities 'go together'. These nonverbal tests contrast with verbal tests, which rely on a prior awareness of language comprehension or production - for example, tests of general knowledge, memory for digits, arithmetic,

vocabulary comprehension, and similarities between words.

There is much confusion about the relationship between intelligence and language development, in particular, when the language is a signed language rather than a spoken language. Language is most often thought to relate to verbal intelligence rather than to nonverbal intelligence.

It is surprising that there is very little previous research on this topic, compared to the large amount of reading research on American deaf children.[7] For nonverbal IQ tests for American deaf children, Vernon & Brown (1964) provided evidence that deaf children would not be intellectually retarded. More recently, Watson et al (1982) looked at the nonverbal intelligence of a sample of deaf children and found that nonverbal intelligence was a predictor of English language ability. They noted that direct correlations between nonverbal IQ and language performance were obtained. Hence they suggested that differences in IQ may be a relatively important factor in the explanation of why some deaf children experience greater difficulty in acquiring English. They used intellectual measures such as Wechsler Intelligence Scale for Children-Revised (WISC-R) & Hiskey-Nebraska Test of Learning Aptitude (H-NTLA).

On the other hand, to my knowledge, there is only one work for nonverbal IQ tests for Korean deaf students: Kim & Kang (2000) tries to elaborate a standardization of the Raven Standard Progressive Matrices test for two hundred nineteen Korean deaf and hard-of-hearing high school students. This paper is designed to provide a validity of nonverbal IQ tests.

It is also surprising that there is no standardized Korean language ability test for hearing elementary children. Most recently, Choi (2002) elaborates a test for Korean comprehensive standard vocabulary ability among nine hundred fifty hearing children between the ages of two and twelve and two hundred forty children with disabilities between the

7) Most research has been carried out in relation to the development of children's intellectual processes. Several theoretical positions exist: (i) imitation/reinforcement view (ii) innateness view (iii) cognitive development view.

ages of three and eight. But there are no data for deaf children. In this study intellectual measures included Raven Standard Progressive Matrices test for nonverbal IQ and self-made linguistic tasks for Korean language ability.

## 3. Method

### 3.1 Subjects

The subjects were composed of two samples between the ages of seven and ten in the second and third grades in elementary schools. One consisted of nine deaf children, five boys and four girls, attending a public special elementary school. Criteria for selection included a prelingual hearing loss of seventy dB or greater in the better ear and a child being in the second (six children) and third (three children) grades. They have been taught by means of a method of Total Communication including signed Korean at school, although their preferred communication is KSL at home. The other was a normal-hearing control group of nine children, four boys and five girls, attending a public elementary school. This sample was selected at random to correspond to the number of deaf children in each grade.

### 3.2 Procedure

Raven Standard Progressive Matrices (1938, SPM) as a nonverbal intelligence test was administered in this study. The SPM consisted of sixty questions each of which has six examples. Among the six examples, one example should be chosen to fill in the blank with the proper choice for a matrix composed of diagrams or patterns to match shapes. It was divided into five sub-tests each of which consisted of twelve questions: (1) continuous patterns, (2) analogies of figures, (3) progressive development of figures, (4) arrangement and combination of figures, and (5) resolving figures into their constituent parts. There was no time limit, but the test was usually finished within twenty-forty

minutes. For a Korean language ability test, self-made linguistic tasks were created including twenty eight vocabulary items of nouns (20) and verbs (8), three word order examples of sentences, twelve writing examples, and ten reading comprehension.

## 4. Result

The data were analyzed in terms of SAS 8.0 as a statistical tool. Due to a very small sample, the analysis method used in this study was nonparametric and thus Spearman correlation coefficients and Wilcoxon Two-sample Test were calculated for the correlation between nonverbal IQ and the Korean literacy performance in both deaf and hearing children. Because the quantity of data was comparatively small, normality was not usually satisfied. Therefore ranking was considered, instead.

### 4.1 Sex and grade effects in deaf children

No effects were shown on the nonverbal IQ test. On the other hand, sex and grade effects were shown on the reading comprehension part only in Korean language performance, but age effects were not, as shown in table 1.

TABLE 1. Means and standard deviations of the two subgroups in sex, grade, and age groups, and significant probability values between groups on Korean language performance (Wilcoxon Two-sample Test)

| | | | Word Order | | | Reading | | |
|---|---|---|---|---|---|---|---|---|
| | | n | M | SD | P | M | SD | P |
| sex | Male | 5 | 4.10 | 3.82 | 0.295 | 3.00 | 3.99 | 0.0175* |
| | Female | 4 | 6.13 | 3.82 | | 7.50 | 3.99 | |
| grade | 2nd | 6 | 4.67 | 3.62 | 0.679 | 3.50 | 3.79 | 0.0250* |
| | 3rd | 3 | 5.67 | 3.62 | | 8.00 | 3.79 | |
| age | 7 to 8.11 | 5 | 5.20 | 3.82 | 0.896 | 3.80 | 3.99 | 0.1688 |
| | 9 to 9.11 | 4 | 4.75 | 3.82 | | 6.50 | 3.99 | |

| | | | Noun | | | Verb | | |
|---|---|---|---|---|---|---|---|---|
| | | n | M | SD | P | M | SD | P |
| sex | Male | 5 | 4.60 | 3.42 | 0.661 | 5.80 | 3.87 | 0.367 |
| | Female | 4 | 5.50 | 3.42 | | 4.00 | 3.87 | |
| grade | 2nd | 6 | 4.25 | 3.24 | 0.217 | 5.58 | 3.67 | 0.414 |
| | 3rd | 3 | 6.58 | 3.24 | | 3.83 | 3.67 | |
| age | 7 to 8.11 | 5 | 3.80 | 3.42 | 0.107 | 5.80 | 4.00 | 0.366 |
| | 9 to 9.11 | 4 | 6.50 | 3.416 | | 3.87 | 3.87 | |

*p <0.05

The data were analyzed for differences between boys and girls for all linguistic tasks scores. The significant differences ($p<0.05$) occurred on the reading part where girls achieved a significantly higher mean score. The similar effect takes place in grade in the same area. Interestingly,

however, there was no age effect in this area as well as in other areas. In light of sex and grade effects, it is suggested that quality of information obtained from the context should depend on sex and grade rather than age.

### 4.2 Nonverbal IQ and language performance

There was no significant difference between the two groups on the nonverbal IQ test and Korean language performance, as shown in table 2. The correlations between language performance and nonverbal IQ were not significant. Null hypothesis ($H_0$) was not rejected since the significant probability value of a deaf group and a hearing group was 0.1107 and 0.2369 respectively. Please note that the two variables were significant when the p-value was less than significant level 5%. Therefore, the two variables were mutually independent.

TABLE 2. Spearman correlation coefficient in deaf vs. hearing children

| Variable | Korean Language Performance | | Nonverbal IQ | |
|---|---|---|---|---|
| | Deaf | Hearing | Deaf | Hearing |
| Korean Language Performance | 1.00000 | | 0.56782 **(0.1107)** | 0.43921 **(0.2369)** |
| Nonverbal IQ | 0.56782 **(0.1107)** | 0.43921 **(0.2369)** | 1.00000 | |

## 5. Discussion

It has been emphasized that reading is the central core of the entire educational system of both hearing and deaf children. In particular, reading ability deserves to be the most effective means of obtaining information even for the deaf. What is the best way to teach deaf children how to read? As a preliminary research to answer this question, this study focused both on the general cognitive ability of deaf and hearing children aged seven to ten in the second and third grades related to reading ability, and on the mapping between sign language and reading ability. For the purpose of the first part of this study, we scrutinized the correlation between nonverbal IQ scores and a self-made measure of Korean language ability in a sample of deaf and hearing children. Comparisons of the two groups (deaf children and hearing children) on nonverbal IQ scores and Korean literacy scores did not reveal a significant difference, as graphically shown in figure 1 and figure 2. This result could be inferred from the crossing of two lines in figure 1 because some children of n1, n3, and n7 had high rankings in nonverbal IQ but low rankings in language ability, and vice versa (n4, n5, and n9). In the same way, we could infer the result from the crossing of two lines in figure 2.

FIGURE 1. Correlations between nonverbal IQ ranking and language performance ranking in deaf children

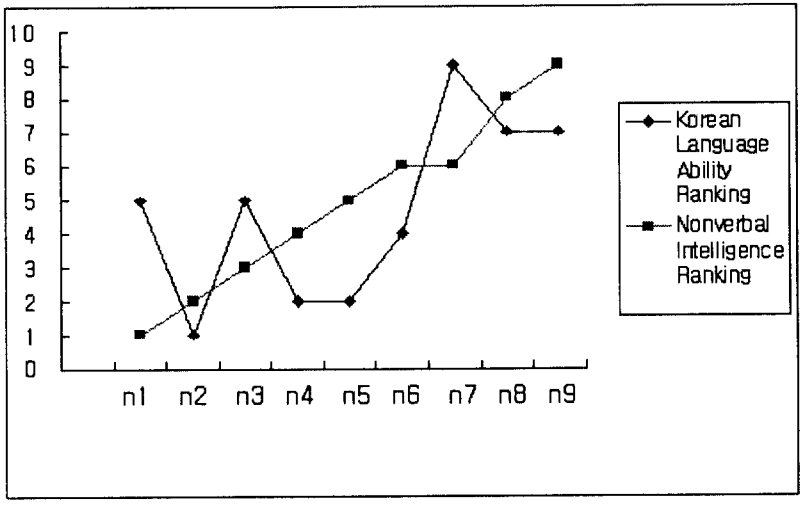
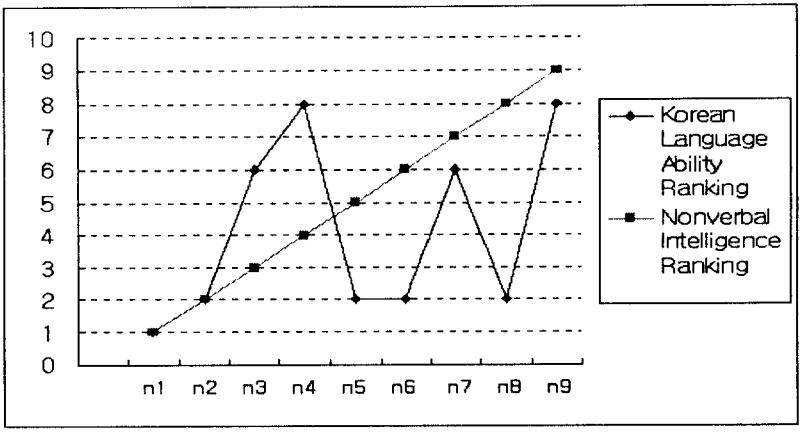



FIGURE 2. Correlations between nonverbal IQ ranking and language performance ranking in hearing children



For the purpose of the second part of this study, we tried to provide a piece of evidence of a positive relation between the use of KSL and Korean literacy. To support this, this study found that deaf children from deaf parents seemed to do better than those from hearing parents on reading and writing and in overall academic achievement. It is worth noting that deaf children of n2 and n4 in Figure 1 had deaf parents. The other children had hearing parents. Those who had high academic achievement were four out of nine deaf children, those who had middle academic achievement were four, and the rest had low academic achievement. Interestingly, the two deaf children of deaf parents had high academic achievement and also displayed the highest and second ranking of Korean language ability respectively, even though they did not show the same ranking in nonverbal IQ as in language ability. In this respect, we expect that there may be a significant positive correlation between sign language and reading ability, as reported in the large amount of the recent research (Hoffmeister at al, 1997, Chamberlain & Mayberry, 2000, Strong & Prinz 2000), albeit with a smaller sample.

From the perspective of bilingual approaches for deaf learners, the basic issue is that the relation between sign language (ASL or KSL) proficiency and spoken language (English or Korean) literacy can be considered analogous to the proposed underlying relation between first and second spoken language skills. It is then proposed in Paul & Quigley (1990) that ASL-using deaf students be educated in a bilingual minority-language immersion program, just as bilingual education has been applied to hearing minority-language students. In this program, the emphasis is on developing and maintaining communicative competence in the native, or first, language. Although ASL and KSL do not have a written form, the use and study of ASL or KSL in a bilingual education setting will offer insights regarding the acquisition of spoken languages whose forms and grammars are different from those of signed languages. Specifically, the use of ASL or KSL will help facilitate the development of English or Korean and literacy, as argued in the latest research of Bailes (2001) and Wilbur (2000).

In conclusion, main findings produced by this study are summarized as follows:

(i) There was no clear relationship between intelligence and language performance, contrary to Watson et al (1982).
(ii) KSL was the key to explaining academic differences between deaf children from deaf and hearing families, as reported in research on ASL.
(iii) A biased view was that use of sign language could interfere with development of reading ability.

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