Language Development, Interpersonal Communication, and Academic Achievement Among Japanese Children as Assessed by the ALADJIN

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Objectives: Japanese-speaking children in a standard sample were subjected to a test battery (ALADJIN: Assessment Package for Language Development in Japanese Hearing-Impaired Children) to evaluate the effect of language development on both interpersonal communication skills and academic achievement.

Methods: A total of 414 preschool and school-age children without hearing impairment were included in this study. The following tests make up the ALADJIN: the Test of Question-Answer Interaction Development (TQAID), the Japanese Language by Criterion Referenced Test-II (CRT-II) for measuring academic achievement, the Picture Vocabulary Test-Revised (PVT-R), the Standardized Comprehension Test of Abstract Words (SCTAW), both parts of the Syntactic Processing Test for Aphasia (STA), and the Word Fluency Test (WFT). Means and standard deviations at each academic grade level were calculated, and a multiple regression analysis was performed.

Results: A ceiling effect was observed for the TQAID and the STA in children in grade 3 of elementary school, and the scores for the PVT-R, SCTAW, and WFT increased incrementally according to grade level. Multiple regression analysis revealed that the PVT-R, WFT, and STA (production) have predictive power for the results of the TQAID ($R = 0.59; R^2 = 0.58; p < 0.0001$), whereas the SCTAW and STA (comprehension) have predictive power for the results of the CRT-II.

Conclusions: Both vocabulary and syntax are important in communication development among children. The results of our multiple regression analysis suggest that different language domains may play different roles in the development of interpersonal communication skills and in academic achievement. The development of interpersonal communication skills is largely based on productive vocabulary and syntax abilities, whereas academic achievement is largely based on comprehensive vocabulary and syntax abilities. Children who have difficulties in either area should be evaluated with detailed language assessment tools such as the ALADJIN in an effort to aid in the selection of appropriate intervention.

Key Words: academic achievement, interpersonal communication skills, language development.

INTRODUCTION

Knowing the processes of language development is an important step in understanding the degree of children’s development.1 The importance of language development increases during the school-age years, because language is crucial not only to interpersonal communication but also to academic achievement.2 Language problems in this age group may lead to secondary learning problems that may ultimately limit occupational choice and social interaction.3 Thus, monitoring language development in school-age children assists in identifying those who are at risk of language delay, including children with hearing impairment, autistic disorders, or intellectual problems.

Language development tests for at-risk children can aid in diagnosis, determination of the degree of delay, and intervention planning. The tests must be objective and easy to administer. The test results must be easily interpretable; ie, it should be clear how the results of a given language domain test may reflect academic achievement or interpersonal communication skills. Some information is difficult to obtain by inquiries of caregivers. Total

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language development can be difficult to assess, because the concept of language includes a wide range of aspects. Hence, to address these difficulties, test batteries have been created that comprise many language tests, covering major language domains and providing a structured review for evaluating both conversation and academic achievement.

In Japan, however, very few language tests are available, especially for school-age children, although some tests have been directly translated from English into Japanese, and others have been developed under the influence of English-language tests. However, because the structure of Japanese syntax is very different from that of English, use of English tests with Japanese speakers presents problems. In addition, each language test was created separately. Therefore, the relationships among the tests and their correlations with other developmental factors, including communication and learning ability, have not been established. To address these shortcomings, we organized previously established language tests representing different language domains to form a set of tests called the Assessment Package for Language Development in Japanese Hearing-Impaired Children (ALADJIN). In this report, Japanese children in a standard sample were evaluated with the tests in this package, and the correlations between the test results, interpersonal communication skills, and academic achievement were examined.

### SUBJECTS AND METHODS

**Subjects.** The study subjects included 113 preschool children and 316 school-age students without hearing impairment. Fifteen children were excluded from the sample because of low scores on Raven's Coloured Progressive Matrices (RCPM) or the Screening Test of Reading and Writing for Japanese Primary School Children (STRAW; less than -2 SD). In total, 414 children were included in this study (Table 1). The study was approved by the Institutional Review Board of Okayama University.

**Methods.** Verbal communication function was measured with the Test of Question-Answer Interaction Development (TQAID), and academic achievement was measured with the Japanese Language by Criterion Referenced Test–II (CRT-II). The results of these two tests were used as objective variables. For vocabulary, the Picture Vocabulary Test–Revised (PVT-R), the Standardized Comprehension Test of Abstract Words (SCTAW), and the Word Fluency Test (WFT) were performed. For syntax, the Syntactic Processing Test of Aphasia (STA) was also performed. The results of the vocabulary and syntax tests were used as explanatory variables.

Because mental retardation and reading and writing difficulties (dyslexia or dysgraphia) can be confounding factors in language development, children were screened with the RCPM and the STRAW. All test results are summarized in Table 2. All tests except for the CRT-II were administered in a face-to-face setting by trained doctors or speech therapists. The CRT-II was administered in a group setting.

**Statistical Analysis.** All test results are presented as means and standard deviations. Elemental factors that can affect the results of the TQAID and CRT-II were evaluated by multiple linear regression analy-
The scores on the vocabulary tests in this study were analyzed for children who were in grades lower than grade 4 (9 to 10 years of age), because an apparent ceiling effect was observed among children of this age and older. The results of the PVT-R, WFT, STA (comprehension), and STA (production) were used as explanatory variables. The results (Table 4) indicated that the WFT, PVT-R, and STA (production) had predictive value for the TQAID (R = 0.59; R² = 0.58; p < 0.0001). The standard regression variables (standardized partial regression coefficients) were significant: 6.97 for STA (production; p < 0.0001), 5.47 for the WFT (p < 0.0001), and 4.37 for the PVT-R (p < 0.0001). A CRT-II analysis was performed separately for each grade because of differences in content according to grade level. The results of the SCTAW, WFT, STA (comprehension), and STA (production) were used as explanatory variables. Among these variables, those of the SCTAW and STA (comprehension) had high predictive value for the scores on the CRT-II (Table 5).

**DISCUSSION**

In this study, the ALADIJIN was used to evaluate the effect of language development on interpersonal communication skills and academic achievement in a normative sample of Japanese-speaking children. The impact of vocabulary, syntax, and reading and writing abilities in these two areas was examined.

The results of the TQAID demonstrated that children 5 to 6 years of age have fairly well-developed interpersonal communication skills. A ceiling effect was observed on this test at grade 3 (8 to 9 years of age). Thus, in standard samples, the TQAID may not be appropriate for children more than 9 years of age. Alternatively, this test could be used for screening of children more than 9 years of age to detect crucial delays in interpersonal communication skills.

The scores on the vocabulary tests in this study (PVT-R, SCTAW, and WFT) increased incrementally by grade level. The results also indicated that
vocabulary building may play an important role in development of more complicated language skills in older children. A ceiling effect was also observed on the test for syntax (STA) in grade 3. School-age children acquire the basic structures of syntax relatively early.

The results of the multiple regression analysis suggested that different language domains may play different roles in interpersonal communication skills, as indicated by the results on the TQAID, and in academic achievement, as indicated by the results on the CRT-II. The results on the WFT and STA (production) tests were strongly correlated with those on the TQAID, and the results on the CRT-II were highly correlated with those on the SCTAW and STA (comprehension). Interpersonal communication skills as measured by the TQAID may include the ability to select or use appropriate words or sentences in response to given situations or questions. In other words, the results on the TQAID may reflect the development of productive language (both vocabulary and syntax). By contrast, the results on the CRT-II were well correlated with those of the SCTAW and STA (comprehension), suggesting the importance of both vocabulary and syntax in comprehension.

This study was conducted with a standard sample of preschool and school-age children attending a mainstream school without specialist support. However, some children in each grade demonstrated very poor language development (more than -2 SD). Further inquiries demonstrated that the teachers and caregivers were already aware of these children's difficulties, but were unaware of the causes of these difficulties or how to offer appropriate support. The present data demonstrate the possibility that domain-based language development assessment can predict the results of academic achievement. The ALADJIN may therefore play an important role in identifying children who need language support and in indicating in what areas the support is most needed.

CONCLUSIONS

Using the ALADJIN, we evaluated language ability in different language domains in Japanese-speaking children. Development in the productive language domains (productive vocabulary and syntax) had an effect on interpersonal communication skills, and development in the receptive language domains (receptive vocabulary and syntax) had an effect on academic achievement, together with reading and writing ability. The aim of the ALADJIN is to provide assistance or guidance for diagnosis and intervention. The ALADJIN allows important insights into language delay in children and provides a guide to intervention by indicating weak points that must be overcome.

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