

Using the MacArthur CDIs to Assess Lexical Development in an English-Japanese Bilingual Toddler

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This case study combines the English and Japanese versions of the MacArthur Communicative Development Inventories (Fenson, Marchman, Thal, Dale, Reznick, & Bates, 2007; Watamaki & Ogura, 2004) as a potential assessment tool for English-Japanese bilingual toddlers. Combination measures were adapted from previous studies with other language pairs (Pearson, Fernández, & Oller, 1993; Marchman and Martínez-Sussman, 2002). The lexical development of a 32-month-old bilingual girl was evaluated by these measures. The child's test scores were compared with adjusted monolingual norms and tentative average norms of both versions. Results indicated that her lexical development in terms of conceptual vocabulary was within the normal range, although she scored lower than monolingual peers when measured in each language respectively. These findings were similar to those from previous studies (e.g., Pearson et al., 1993). Thus, bilingual first language acquisition was not detrimental in this case. Issues for further investigation are discussed.

本事例研究では、英語と日本語のマッカーサー言語発達質問紙（Fenson, Marchman, Thal, Dale, Reznick, & Bates, 2007; 綿巻・小椋, 2004）を結合し、バイリンガル幼児の評価法を試作する。他言語の先行研究（Pearson, Fernández, & Oller, 1993; Marchman and Martínez-Sussman, 2002）を改作した結合測定法を用い、32か月のバイリンガル女児の語彙発達を評価した。各言語の質問紙のモノリンガル児の標準を調節した値、及び両言語の標準を仮に平均した値と、その幼児の得点を比較した。その子供は各言語で測定されるとモノリンガル児より低得点だが、概念語彙においては正常な発達の範囲に入った。この結果は先行研究と類似する（Pearson, et al., 1993, 等）。それ故、同時二言語習得は本事例においては有害ではないと言える。さらなる研究課題を詳述する。

Introduction

Some young children acquire two languages simultaneously as first languages from birth. This type of language acquisition is called bilingual first language acquisition (see De Houwer, 2009). A typical example of this kind of bilingualism is one in which the child grows up in a family where his or her parents speak two different languages. Problematically, it is often believed by some early childhood professionals that bilingualism is detrimental to first language acquisition because bilingual children can seem to be confused while learning the grammars of their two languages. There is also a commonly held perception that bilingual children's knowledge of vocabulary is less developed than that of their monolingual peers because many young bilinguals initially possess a comparatively more limited vocabulary range in each of their two languages.

In order to address such concerns, there is a need to develop assessment tools that can provide reliable evidence pertaining to the linguistic development of bilingual children. The MacArthur Communicative Development Inventories (the CDIs) (Fenson, Dale, Reznick, Thal, Bates, Hartung, Pethick, & Reilly, 1993), were originally developed to assess the language development of monolingual children. Subsequently however, Pearson and her colleagues (Pearson, Fernández, & Oller, 1993) devised a methodology for combining the English and Spanish language versions of the CDIs. This combined CDI was used to assess the language acquisition of young bilingual infants and toddlers for this specific language pair. Their work also led to additional CDI combination research in other language pairs; two such studies were in Dutch and European French by De Houwer and her colleagues (De Houwer, Bornstein, & Putnick, 2006, as cited in De Houwer, 2009), and in Quebec French and English by Thordardottir and her colleagues (Thordardottir, Rothenburg, Rivard, & Naves, 2006). These combined CDI studies have suggested that bilingualism is not detrimental to the language development of children.

In an effort to extend CDI combination research, the purpose of the current study is to join the English and Japanese versions of the MacArthur Communicative Development Inventories in order to create an assessment tool for young simultaneous bilingual toddlers' lexical development for this specific language pair. To accomplish this, a method of matching expressive vocabulary items in the English CDI (CDI) and the Japanese CDI (JCDI) was devised. Furthermore, two combination measures were used to test a 32-month-old English-Japanese bilingual girl in this case study. Finally, the child's test scores were compared tentatively with monolingual norms after adjustment. These comparisons were made to examine whether results from previous studies in bilingual assessment using the CDIs in other languages were applicable to this English-Japanese bilingual case.

Literature Review

The MacArthur Communicative Development Inventories

The MacArthur Communicative Development Inventories (Fenson, et al., 1993; Fenson, Marchman, Thal, Dale, Reznick, & Bates, 2007b) were originally designed to assess English-speaking monolingual children's lexical and syntactic development and are also used as a screening tool for language learning problems. The CDIs are parent reports in which a child's parent checks the child's knowledge and use of the language. The CDIs facilitate the comparison of a particular child to other children at the same age by percentile scores as well as raw scores. The CDIs consist of three tests which have been developed for different age groups.

The CDIs have also been adapted into other languages; however, the non-English versions of the CDIs are not direct translations of the English original version because, in the process of adapting the CDIs into other languages, various linguistic and cultural differences in communication need to be accounted for (Dale, Fenson, & Thal, 1993).

The Japanese MacArthur Communicative Development Inventories (JCDIs) (Watanaki & Ogura, 2004b) were adapted from the English CDIs by taking characteristics of the Japanese language into consideration. The JCDIs consist of two tests which have been developed for different age groups. In the JCDIs, children's levels of language development are indicated by gender at developmental ages in months by percentile ranks. The concept of developmental ages (*battatsu nenrei*) and index thereof are used in the JCDIs, but not in the English CDIs. A developmental age is used to assess children who are suspected of showing signs of language

delay. Developmental ages are based on the raw scores of children in the 25th percentile rank at a given age in months (Watanaki & Ogura, 2004b).

As far as possible, in making the JCDI, the aims and characteristics of the original English CDI were maintained so that the JCDI could be used for research in bilingual children's language development and cross-linguistic language development. However, test items were changed in accordance with Japanese culture and language and Japanese children's development in communication and language (e.g., the use of mimetics and the acquisition of particles) (Watanaki & Ogura, 2004b).

Previous Research

The current study utilized knowledge gained from CDI combination studies on young bilingual children. Pearson, et al. (1993) compared lexical development of 25 English-Spanish simultaneous bilingual children and 35 English monolingual children at the ages of 8 to 30 months, all of whom were living in the U.S. The CDI (1989) was used to assess their receptive and productive vocabulary in English and Spanish. The degree of overlap between the bilingual children's lexical knowledge in the two languages was also evaluated by double-language measures called total vocabulary and total conceptual vocabulary. Results indicated bilingual children were not slower than monolinguals in early vocabulary development. A wide range of vocabulary sizes was observed among bilingual children, just as it was with monolinguals. The pattern of the bilinguals' growth in two languages together corresponded closely to that of monolinguals in one language. Therefore, Pearson et al. suggested that bilingual norms for lexical development should be made with reference to the children's performance in the two languages together.

Marchman and Martínez-Sussmann (2002) provided evidence for the validity of the English CDI (Fenson et al., 1993) and the Spanish CDI (IDHC) (Jackson-Maldonado, Bates, & Thal, 1992) in a sample of 26 US-based English-Spanish bilingual children at the ages of 23 to 34 months. Scores were significantly correlated with analogous laboratory measures in both languages. In their study, total vocabulary size on the vocabulary checklists of both the CDI and IDHC was computed as the total number of words that the bilingual child said. Moreover, items on both CDIs were matched for the same concepts in order to compute a composite vocabulary score (Marchman, 2004). Following this, total conceptual vocabulary was calculated as the sum of the number of concepts reported in English only, Spanish only, and both languages. A child received credit for only one concept when equivalent words were reported in both languages.

Case Study

Participant

The participant in the present study was a 32-month-old girl acquiring English and Japanese simultaneously as her first languages in the U.S. Taking a flexible approach to the 'one parent, one language' discourse strategy, the child's mother spoke to her in Japanese, and the child's father spoke to her in English. The child was exposed to English for approximately 28 hours per week and Japanese 56 hours per week.

Methodology

The Rationale for English-Japanese Combination Measures

The lexical knowledge of bilinguals often differs from that of monolinguals in a number of ways. A language has its own set of words to express meanings or concepts, i.e., its vocabulary. When dealing with monolingual data, the concepts are coded or lexicalized by words from one language; therefore a monolingual's words and concepts are basically the same in number. On the other hand, bilinguals have to acquire two sets of words, each from a different language. At the same time, there is an overlap between a bilingual's lexical knowledge in one language and that in the other language. A bilingual person may express a concept with a word from one or the other language or by using words from both languages that have the same meaning. Therefore, a bilingual's concepts are lexicalized by words in either one language or both languages. However, the sum of words available to a bilingual in both languages is greater than the total number of concepts expressed in the two languages due to the overlap in the bilingual's lexical knowledge (Pearson et al., 1993).

Based on this rationale, two measures were used to combine the English and Japanese CDIs following the method by Pearson et al. (1993). The first combination measure was *total vocabulary* (TV). TV is the sum of words that a bilingual child produces in one language (i.e., English) and words that he or she produces in the other (i.e., Japanese). If the bilingual child can say both 'dog' in English and 'inu' in Japanese, then he or she can produce two words, thereby scoring two for these words on the CDIs. If the child says either 'dog' or 'inu', it is considered that he or she has produced one word, scoring one. If he or she says neither, then no word has been produced and the child scores zero.

The second combination measure was *total conceptual vocabulary* (TCV). TCV is the total number of concepts or meanings a bilingual child expresses in either one language or both languages. An English-Japanese bilingual child's vocabulary consists of concepts lexicalized in English, concepts lexicalized in Japanese, and concepts lexicalized in both languages. Words that have the same meanings in the two languages are called *translation equivalents* (TEs) (see Pearson, et al., 1993). For example, 'dog' and 'inu' have the same meaning and are therefore a pair of TEs. Therefore, TCV is the total number of words a bilingual child produces only in English, words he or she produces only in Japanese, and the number of pairs of translation equivalents he or she produces in both languages. For example, even if a bilingual child can say both 'dog' and 'inu', then he or she is expressing only one concept, thereby scoring only one for this concept on the CDIs. If the child says either 'dog' or 'inu', he or she is still expressing one concept, and therefore still scores one for this TE pair. If he or she says neither, then no concept has been expressed and the child scores zero.

Materials

This study used the JCDI: Words and Grammar (ages 16-36 months) (Watamaki & Ogura, 2004b) and its technical manual (Watamaki & Ogura, 2004a) as well as the CDI: Words and Sentences (ages 16-30 months) (Fenson et al., 2007b) and its technical manual (Fenson, Marchman, Thal, Dale, Reznick, & Bates, 2007a). Each version of the CDI consists of two parts, Part I Words and Part II Sentences and Grammar. Only the vocabulary parts (Part I) of both versions were used in this lexical study. The grammar parts (Part II) were excluded as they were considered beyond the scope of this study. For the purpose of translation between English and Japanese, various dictionaries including a Japanese picture dictionary for children (Sanseido, 1996) were referred to. Native speakers of each of the two languages also served as sources of information pertaining to their respective native languages.

Combining the CDI and JCDI

Several processes were involved in combining the two tests. First, the common categories in the vocabulary parts of the CDI and JCDI were matched, although some categories were excluded. Words within each category were then matched between the two versions. Some items were only found in the CDI and others existed in the JCDI only; still other items were found in both versions. Those words which had translation equivalents in both languages were paired, and each pair of TEs was listed as one concept. Next, original monolingual norms of the CDI and JCDI were tentatively modified to create adjusted monolingual norms and tentative average norms. Following this, the bilingual participant was tested using both language versions of the CDIs separately and the combination measures (i.e., TV and TCV) of the two versions. Finally, her scores were compared with adjusted monolingual norms of the two versions separately and then with tentative average norms of both versions combined.

Combining Categories

Originally, the vocabulary list in the CDI had 680 items spanning 22 categories, whereas the vocabulary list in the JCDI had 711 items spanning 24 categories. Most categories in both versions are either the same or very similar. However, some of the categories in the two versions are organized differently or have no counterparts. For example, while the CDI has a category containing auxiliary verbs in the vocabulary section (Part I: Words), the JCDI contains auxiliary verbs in the grammar section (Part II: Sentences and Grammar). The auxiliary verbs in the two versions were thus excluded from this study.

Therefore, for the purpose of combining the CDI and JCDI, only those categories common to both versions were used. There were 21 common categories in both versions, and excluding the unmatched categories, each version had a total of 659 items. Examples of the matched categories included food and drink, verbs, adjectives, pronouns, and question words.

There were differences between the two versions even in some of the matched categories. For example, a category in English contained items related to games and routines, whereas a category in Japanese contained items related to routines and greetings. Although some English categories contained prepositions and articles, their matched Japanese categories did not.

The Rules for Concept Matches

In this study, the rules for matching concepts: (1) allowed only one-to-one correspondences; (2) disallowed repetitions of the same item; (3) prohibited within-language synonyms; and (4) prohibited inter-category transfers. These rules were modified from those found in Marchman's concept matches (2004).

Adhering to the first rule, if one item in English had two Japanese translation equivalents, only one of the Japanese items was matched to the English item; the other Japanese item was listed separately as a concept lexicalized in Japanese only. As a result, three such items were counted as two concepts (e.g., 'bear' = '*kuma*'; 'teddy bear' = NA (not applicable or no match)). Exceptions to this rule were the following closed class words: 'I' = '*watashi*' or '*boku*'; 'my' = '*watashi no*' or '*boku no*'. In this study, only pronouns referring to the participant's gender were matched with English equivalents. However, if the test-taker had been a boy, '*boku*' and '*boku no*' could have been matched with English equivalents.

In choosing which one of the multiple items in each language should be matched to one item in the other language, consideration was given to the following conditions: (a) which item was a more general translation; (b) which item was acquired by toddlers earlier than the other item(s) by age 30 months according to previous studies (Dale & Fenson, 1996; Ogura,

Yamashita, & Murase, 1998; Okubo, 1967); and (c) which item, in the researcher's view, was more likely to be used by young children.

The second rule was made possible by changing multiple-to-multiple correspondences into one-to-one correspondences for concept matches. Examples included: 'clock' = *'tokei'*; 'watch' = NA; NA = *'mezamashi'*.

Regarding the third rule, Pearson et al. (1993) also did not allow within-language synonyms because monolinguals were also tested on such synonyms as separate words (e.g., 'hi' and 'hello' as two words). Examples included 'mommy' = *'mama'*; NA = *'okaasan'*.

The fourth rule prohibited inter-category transfers. For example, *'denki'* remained in the category of furniture and rooms instead of being transferred to match *'light'* in the category of small household items. Consequently, the number of words in each category stayed the same as the original CDIs.

The Extent of Total Vocabulary and Total Conceptual Vocabulary

The extent of the child's TV and TCV as determined by the English-Japanese combination measures were as follows. The number of total vocabulary (TV) was 1318. The number of concepts lexicalized in English only was 236 out of 659 words (35.8%), and the number of concepts lexicalized in Japanese only was also 236 out of 659 words (35.8%). In addition, 423 out of 659 words (64.2%) in each language had translation equivalents; that is, the number of concepts lexicalized in both languages or the number of TE pairs was 423. The number of total conceptual vocabulary (TCV) items was 895.

Creating Adjusted Monolingual Norms and Tentative Average Norms

Since the 32-month-old bilingual girl in this study was over the age limit of the CDI, percentile scores of monolingual English-speaking girls at age 30 months were used for this assessment. For Japanese, percentile scores of monolingual girls at age 32 and 30 months were used.

In order to compare the bilingual child's scores with monolingual norms, original monolingual norms for Word Produced in the CDI technical manual (Fenson, et al., 2007a) and those for Expressive Vocabulary in the JCDI manual (Watamaki & Ogura, 2004a) were tentatively adjusted for this study. This adjustment, discussed earlier, was necessary due to the exclusion of certain categories from both versions. This was done by reducing the total numbers of words from 680 to 659 in English and from 711 to 659 in Japanese. Raw scores for monolingual norms of each language were then reduced by the same rates as the total numbers of words. However, these adjusted scores were merely estimates.

After adjusting monolingual norms tentatively, monolingual girls' minimum raw scores at the 50th percentile in the respective languages were as follows: 564 at age 30 months in English; 498 at age 32 months and 464 at age 30 months in Japanese. Moreover, the averages of English and Japanese raw scores were calculated to create tentative average norms. This was attempted because the English raw scores were much higher than the Japanese raw scores even within the same percentile ranks in the original monolingual norms. The average of the English and Japanese minimum raw scores at the 50th percentile for 30-month-old girls was 514.

Results

The Bilingual Child's Scores in Comparison with Tentative Norms

Using the combination measures in this study, the test results of the English-Japanese bilingual girl at age 32 months were as follows: her English raw score was 409 out of 659; her Japanese raw score was 399 out of 659; her total vocabulary (TV) was 808 out of 1318; her total conceptual vocabulary (TCV) was 559 out of 895.

Table 1 presents the participant's raw scores and percentile scores in comparison with adjusted monolingual norms and tentative average norms for monolingual girls. Comparing the bilingual child's scores with adjusted monolingual norms in each language, her percentile score in English at age 30 months was at the 20th percentile. If her English raw score was tentatively matched to its developmental age by placing the score in the 25th percentile rank as in the JCDI (Watamaki & Ogura, 2004b), her developmental age was 29 months according to English norms. The child's Japanese percentile score at age 32 months was at the 25th percentile, meaning her developmental age was also 32 months. She was at the 35th percentile for age 30 months in Japanese norms.

However, her TV was 157.2% higher than the average of the minimum raw scores at the 50th percentile at age 30 months in both languages. Comparing her TCV with Japanese monolingual norms, her TCV was at the 65th percentile at age 32 months and at the 75th percentile at age 30 months. In English norms, her TCV was at the 45th percentile at 30 months old. Moreover, her TCV was at the 65th percentile at age 30 months in tentative average norms.

Table 1: The participant's raw scores and percentile scores compared with adjusted monolingual norms and tentative average norms (girls)

Languages	Raw Scores	Percentile Scores
English	409 out of 659	English norms: 25th percentile at age 29 months; 20th percentile at age 30 months
Japanese	399 out of 659	Japanese norms: 35th percentile at age 30 months; 25th percentile at age 32 months
TV	808 out of 1318	Average norms: 157.2% higher than the 50th percentile score at age 30 months
TCV	559 out of 895	English norms: 45th percentile at age 30 months Japanese norms: 75th percentile at age 30 months; 65th percentile at age 32 months Average norms: 65th percentile at age 30 months

Figure 1 compares the participant's raw scores, TV and TCV with adjusted monolingual norms and tentative average norms for girls. Her English and Japanese raw scores were compared with the minimum raw scores at the 50th percentile in English at age 30 months and in Japanese at age 32 months in adjusted monolingual norms respectively. Her TV was compared with the average of the minimum raw scores at the 50th percentile at age 30 months in both monolingual norms. Her TCV was compared with the average of the minimum raw scores at the 50th percentile at age 30 months in both monolingual norms.

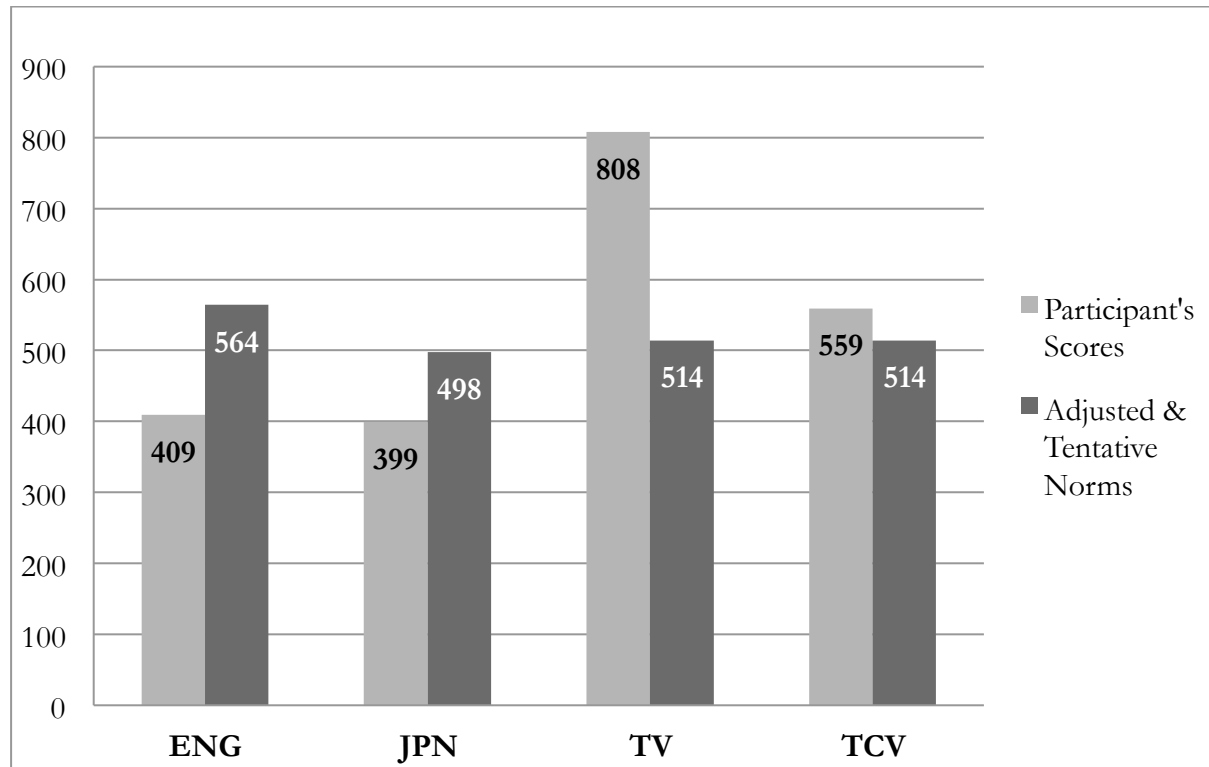


Figure 1: The participant's scores compared with adjusted monolingual norms and tentative average norms (girls)

Discussion

In this study, the English CDI was used even though the 32-month-old participant exceeded its designed upper age limit by two months. This approach was consistent with other combination studies (Marchman & Martínez-Sussmann, 2002; Thordardottir et al., 2006) since bilingual children were not expected to be near ceiling levels in either language.

Some categories in the CDI and JCDI were excluded from concept matches. Although an earlier study of a different language pair (Thordardottir et al., 2006) included sections that were difficult to match (e.g., closed class items with too many translation equivalents) as words having no translation equivalents, the current study preferred to exclude those categories that could raise any doubt. It was also noted that there were even some differences between the CDI and JCDI in some matched categories. This may reflect cultural or linguistic differences between the two versions.

The rules for matching concepts were modified from those of Marchman (2004). These rules may potentially have the following advantages for comparative analyses and further application: First, since no word is repeatedly used in concept matches, it is reasonable and easy to compare the vocabulary sizes of bilinguals with those of monolinguals. It is also reasonable to use monolingual norms for bilinguals tentatively. Second, by using one-to-one correspondences only, a new bilingual vocabulary test may be created based on its concept matches. Third, by prohibiting inter-category transfers, the number of words in each category remains the same as that of the original CDI or JCDI. This is also useful for: (a) the comparison of a bilingual child's English and Japanese vocabularies in corresponding categories; (b) the comparison between

bilinguals and monolinguals in each language in order to examine possible characteristics in lexical development in different categories; and (c) the comparison of the CDI and JCDI when analyzing linguistic and cultural differences between the two versions.

Original monolingual norms were tentatively adjusted and averaged. The adjustment was attempted solely for the purpose of comparing the participant with the two monolingual groups' raw scores in relation to TV and TCV.

This study also evaluated the bilingual child's developmental ages in expressive vocabulary. When the child's English score was tentatively matched to its corresponding developmental age, which is used in the JCDI when language delay is suspected (Watanaki & Ogura, 2004b), her developmental age was 29 months based on English monolingual norms. This indicated that she was below the normal range of development in English, even though the CDI defines language delay differently from the JCDI (Fenson, et al., 2007b). On the other hand, the child's developmental age in Japanese was 32 months; that is, her Japanese was within the normal range of language development. The difference in the child's developmental ages in the two languages indicated that at the time of the test her Japanese was stronger than her English in terms of vocabulary.

These differing levels of development in the two languages reflected the fact that the child had been exposed to more Japanese than English (i.e., approximately 66.7% Japanese to 33.3% English). This finding supports previous studies identifying a correlation between language exposure estimates and vocabulary learning in two languages for bilingual children (e.g. Pearson, Fernández, Lewedeg, & Oller, 1997).

In this study, the bilingual child's total vocabulary was much greater than monolinguals' raw scores. This suggested that the bilingual child produced many more words in the two languages together than monolinguals of either language. Furthermore, the bilingual child's total conceptual vocabulary was within the normal range of development for monolinguals in both languages. However, depending on which monolingual norms are compared, there was a difference in the percentile scores of the bilingual child's TCV, with English being lower than Japanese. These findings were similar to those from previous studies in different CDI language combinations (see, for example, Pearson et al., 1993; De Houwer et al., 2006; Thordardottir et al., 2006).

When the original norms of the CDI and JCDI were compared, it was noticed that English monolinguals knew more words than Japanese monolingual peers of the same age. This may reflect cross-linguistic and cross-cultural differences in patterns and rates of language acquisition. Pearson (1998) cited studies (Bornstein, Tal, & Tamis-LaMonda, 1991; Boysson-Bardies, & Vihman, 1991) indicating that Japanese infants acquired vocabulary more slowly than infants acquiring some other languages.

There are several issues that require further investigation in order to improve the combined version of the CDI and JCDI for the assessment of bilingual language development. First, since the JCDI is not a direct translation of the CDI, it is crucial to devise the best possible method for matching concepts or translation equivalents by interpretation or approximation. Pearson et al. (1993) mentioned that some translation equivalent pairs that had apparently the same meanings for adults might not be semantically equivalent for children. It would be interesting to investigate this point in the Japanese-English combination.

Second, since the CDIs in English and other languages including their normative studies were originally developed to assess monolinguals, creating bilingual norms will be a major challenge. Because there are many variables in bilingual children's linguistic environments and situations such as the amount of language exposure, a wide range of normative data is needed. De Houwer (2009) suggests that it is problematic to compare CDI data from bilingual children

with percentile scores for monolingual children and recommends that researchers use raw CDI scores. Pearson et al. (1993), on the other hand, suggest that current norms should be adequate for bilinguals if their performance in the two languages was taken into account. Keeping these recommendations in mind, the bilingual child's scores were tentatively compared with monolingual norms in this case study.

Third, since the combination method of the CDI and JCDI was used to test only one bilingual child in this study, more English-Japanese bilingual children need to be tested in order to obtain more quantitative data and better quality findings. In addition, since the current study lacks information on concurrent validity, such studies must also be conducted. Further research is required to verify whether the findings of this study are applicable to other cases of English-Japanese bilingual first language acquisition.

Finally, in order for this bilingual assessment to be used as a screening tool for language delay, specific screening guidelines for English-Japanese bilinguals should be established. Unfortunately, the technical manuals of the CDI and the JCDI (Fenson et al., 2007a; Watamaki & Ogura, 2004a) specify the criteria for language delay in monolinguals only, and the previous CDI studies in other language pairs mentioned earlier focused only on healthily developing bilingual toddlers. However, studies using the CDIs and other vocabulary checklists (e.g., the Language Development Survey by Rescorla, 1989) show that bilingual children's expressive language development is comparable to that of monolinguals when both languages are combined (Pearson et al., 1993; Junker & Stockman, 2002) and that the age of onset of word combinations is similar for both bilinguals and monolinguals (Patterson, 1998; Marchman & Martínez-Sussmann, 2002). Because of these studies, Dale and Patterson (2009) recommend that bilingual two-year-olds who are not combining words and/or who have small total expressive vocabularies (less than 40 words) should be monitored and/or referred for further evaluation, just as monolingual children are. According to Thordardottir (2006), bilingualism itself does not impair language; bilingualism is an attainable goal even for children with language impairments and developmental deficits. While these additional studies provide potential guidelines for screening overall bilingual language delay, their application to specific language pairs, including English and Japanese, will require further research and testing.

Conclusion

The main purpose of this case study was to combine the English CDI (Fenson et al., 2007b) and the Japanese CDI (Watamaki & Ogura, 2004b) in order to assess bilingual toddlers' lexical development. Based on Pearson et al. (1993), two combination measures of total vocabulary (TV) and total conceptual vocabulary (TCV) were used to test a 32-month-old bilingual girl. TV was the sum of words that the child produced in English and words that she produced in Japanese. Since a bilingual child's vocabulary consists of concepts lexicalized in either one or both languages (Pearson et al., 1993), TCV was the total number of words the bilingual child produced only in English, words she produced only in Japanese, and the number of pairs of translation equivalents (TEs) produced in both languages.

In this method of combining the CDI and JCDI, the common categories in the vocabulary section of both versions were matched and then words within each category were paired. Some categories were excluded due to structural differences or the lack of corresponding categories between the two versions. To create tentative norms, the original monolingual norms of the CDI (Fenson et al., 2007a) and JCDI (Watamaki & Ogura, 2004a) were adjusted. The bilingual participant was tested by using the respective versions and the combination measures.

The participant's scores were tentatively compared with the adjusted monolingual norms of the two versions separately and with the tentative average norms of both versions combined. Although the participant scored lower than most monolingual peers when measured in one language only, the results indicated that her overall lexical development in terms of conceptual vocabulary was within the normal range of development.

Thus, a combination method of the English and Japanese versions of the MacArthur Communicative Development Inventories was successfully devised to create an assessment tool for a simultaneous bilingual child's lexical development. It was also possible to compare the child's scores with adjusted monolingual norms and tentative average norms. The findings of this study were similar to those from previous studies with other language combinations (e.g., Pearson et al., 1993). Therefore, this case study indicates that bilingual first language acquisition is not detrimental to the English-Japanese bilingual toddler.

Combined versions of the CDI and its adaptations into other languages have practical relevance and application to the study of bilingualism and multilingualism. These testing instruments are needed for data collection purposes to support further research such as longitudinal studies of bilingual/multilingual first language acquisition or comparative studies of lexical or syntactic development in bilingual/multilingual children vs. monolingual children. Therefore, the unprecedented development of this bilingual testing instrument specifically using the CDI and JCDI can be justified for its potential versatility in bilingual/multilingual studies and contribution towards extending CDI combination research.

References

- Bornstein, M.H., Tal, J., & Tamis-LaMonda, C.S. (1991). Parenting in cross-cultural perspective: The United States, France, and Japan. In M. H. Bornstein (ed.), *Cultural approaches to parenting* (pp. 69-90). Hillsdale, NJ: Erlbaum.
- Dale, P.S., & Fenson, L. (1996). Lexical development norms for young children. *Behavior Research Methods, Instruments, & Computers*, 28, 125-127.
- Dale, P.S., Fenson, L., & Thal, D. (1993). Suggestions for the adaptation of the CDIs. Retrieved March 6, 2012, from http://www.sci.sdsu.edu/cdi/suggestions_adaptations.htm
- Dale, P.S., & Patterson, J.L. (2009). Early identification of language delay. Retrieved July 19, 2013, from <http://www.child-encyclopedia.com/documents/dale-pattersonangxp-language.pdf>
- de Boysson-Bardies, B., & Vihman, M.M. (1991). Adaptation to language: Evidence from babbling and first words in four languages. *Language*, 67, 297-319.
- De Houwer, A., Bornstein, M.H., & Putnick, D.L. (2006). Bilingual infants know more words: A monolingual-bilingual comparison of lexical development at 13 months using the CDI. Poster presentation at the Language Acquisition and Bilingualism Conference, Toronto, Canada, May 4-7.
- De Houwer, A. (2009). *Bilingual first language acquisition*. Bristol, UK: Multilingual Matters.
- Fenson, L., Dale, P.S., Reznick, S., Thal, D., Bates, E., Hartung, J., Pethick, S., & Reilly, J. (1993). *MacArthur Communicative Development Inventories*. San Diego, CA: Singular Publishing Group, Inc.
- Fenson, L., Marchman, V.A., Thal, D.J., Dale, P.S., Reznick, J.S., & Bates, E. (2007a). *MacArthur-Bates Communicative Development Inventories: User's guide and technical manual* (2nd edition). Baltimore, MD: Brookes Publishing.

- Fenson, L., Marchman, V.A., Thal, D.J., Dale, P.S., Reznick, J.S., & Bates, E. (2007b). *MacArthur-Bates Communicative Development Inventories: Words and Sentences (2nd edition)*. Baltimore: Brookes Publishing.
- Jackson-Maldonado, D., Bates, E., & Thal, D. (1992). *Fundación MacArthur: Inventario del Desarrollo de Habilidades Comunicativas*. San Diego, CA: San Diego State University.
- Junker, D.A., & Stockman, I.J. (2002). Expressive vocabulary of German-English Bilingual toddlers. *American Journal of Speech-Language Pathology*, 11(4), 381-394.
- MacArthur Communicative Development Inventory*. (1989). San Diego: University of California, Center for Research in Language.
- Marchman, V.A. (2004). Concept Matches for CDI: Words & Sentences and IDHC: Palabras y Enunciados. Retrieved March 7, 2012, from http://www.sci.sdsu.edu/cdi/scoringdb_p.htm
- Marchman, V.A. & Martínez-Sussmann, C. (2002). Concurrent validity of caregiver/parent report measures of language for children who are learning both English and Spanish. *Journal of Speech, Language & Hearing Research*, 45(5), 983-998.
- Ogura, T., Yamashita, Y., & Murase T. (1998). The validity and the analysis of vocabulary checklist in the first version of the Japanese Early Communicative Development Inventory. *Kobe Daigaku Hattatsu Kagakubu Kenkyu Kijo* [Bulletin of the Faculty of Human Development, Kobe University], 5(2), 261-276.
- Okubo, A. (1967). *Yooji gengo no hattatsu*. Tokyo: Tokyodo Shuppan.
- Patterson, J.L. (1998). Expressive vocabulary development and word combinations of Spanish-English bilingual toddlers. *American Journal of Speech-Language Pathology*, 7(4), 46-56.
- Pearson, B.Z. (1998). Assessing lexical development in bilingual babies and toddlers. *International Journal of Bilingualism*, 2(3), 347-372.
- Pearson, B.Z., Fernández, S., Lewedeg, V., & Oller, D.K. (1997). The relation of input factors to lexical learning by bilingual infants. *Applied Psycholinguistics*, 18, 41-58.
- Pearson, B.Z., Fernández, S., & Oller, D.K. (1993). Lexical development in bilingual infants and toddlers: comparison to monolingual norms. *Language Learning*, 43, 93-120.
- Rescorla, L. (1989). The language Development Survey: A screening tool for delayed language in toddlers. *Journal of Speech and Hearing Disorders*, 54, 587-599.
- Sanseido (1996). *Sanseido kodomo kotoba ejiten* [Sanseido children's picture dictionary]. Tokyo: Sanseido.
- Thordardottir, E. (2006) Language intervention from a bilingual mindset. *The ASHA Leader*, 11(10), 6-7, 20-21.
- Thordardottir, E., Rothenburg, A., Rivard, M.-E., & Naves, R. (2006). Bilingual assessment: Can overall proficiency be estimated from separate measurement of two languages? *Journal of Multilingual Communication Disorders*, 4(1), 1-21.
- Watamaki, T. & Ogura, T. (2004a). *Technical manual of the Japanese MacArthur Communicative Development Inventory: Words and Grammar*. Kyoto: Kyoto International Social Welfare Exchange Center.
- Watamaki, T. & Ogura, T. (2004b). *The Japanese MacArthur Communicative Development Inventory: Words and Grammar*. Kyoto: Kyoto International Social Welfare Exchange Center.