Culture and Cognition: Lexical and Morphological Processing in Different Languages (ICCS2006 Symposium)

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Our symposium focuses on some of the "universals" or "specifics" of lexical development and morphological processing across various languages. In particular, studies on diverse languages such as English, Korean, Chinese, Japanese and Spanish have provided evidence on how culture and language interact, as well as the extent to which language interacts with cognition. In this workshop, three speakers are invited: Ping Li outlines similarities and differences in the quality and the quantity of parental speech and child vocabulary during early lexical development in different cultures. Kichun Nam presents unique features of lexical processing, and also a computational model in a rarely studied language: Korean. Jeung-Ryeul Cho presents a cross-language transfer from Korean morphological awareness skill to reading in second language (L2) - English and Chinese Hanja - among Korean elementary school children. The three papers are as follows:

Early Lexical Development: Parental Speech in Different Cultures

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Abstract

Do adults from different cultures use words differently when speaking to their young children? Previous research in early lexical development has provided a positive answer to this question. In particular, work by Choi (2000) and Tardif and colleagues (Tardif, 1996, 2006; Tardif, Shatz, & Naigles, 1997) suggests that the proportion of nouns and verbs in the input to young children differs across cultures. In English, parents use many more nouns than verbs in their speech, whereas in Chinese and Korean, the reverse is true. These authors have found that in the early speech of young Chinese and Korean children, verbs occur more frequently than nouns, reflecting the important role that input plays in early lexical development.

In this study, we examined the types of nouns and verbs used by parents and primary caregivers in English, Chinese, Japanese, and Spanish when they talk to children. Our data were based on child-directed speech from the CHILDES database (MacWhinney, 2000). We analyzed the 500 most frequent nouns and verbs that occur in the database for each language, and then compared the frequency of the most frequent words and word categories used by the caregivers.

Results indicate both similarities and differences in the type and frequency of words and word categories due to culture. For example, among all cultures, words that refer to food and drink, family members, and animals are among the most frequent ones that parents use in speaking to children. Not incidentally, these are also the words that young children acquire and produce at the earliest stages of vocabulary development. On the other hand, our data also indicate clear differences between cultures. For example, in English, parents talk a lot about rooms, furniture, clothing, weather, and time, whereas these words are not among the most frequent words in Chinese, Japanese, and Spanish cultures, reflecting cultural biases in discussing the world around the child.

To further examine the role of input, we focused specifically on comparing parental speech and child speech in the Chinese language. Our analyses revealed that among the 200 most frequent nouns and verbs (types), the ratio of verb to noun is 1:0.77, confirming a slight "verb bias" in Chinese adult input. When we considered the word token frequencies, the verb bias is even stronger. Verbs occurred on the average twice as more frequently as nouns, resulting in a 1:0.48 verb-to-noun ratio. Children's speech reflects these biases, especially with respect to the frequency of word tokens. These analyses are highly consistent with results from Tardif and colleagues. Table 1 shows the detailed results.

Table 1 Types, tokens, and average frequencies of 200 most frequent nouns and verbs in adult and child speech in Chinese.

	Adult Speech			Child Speech		
	Types	Tokens	Average Freq.	Types	Tokens	Average Freq.
Nouns	87	23771	273.2	102	7970	78.1
Verbs	113	63781	564.4	98	10262	104.7
N-V ratio	0.77:1	0.37:1	0.48:1	1.04:1	0.78:1	0.75:1

In conclusion, our study adds to the accumulating evidence that early lexical development in young children is dependent on the quality and quantity of parental input, and that significant differences exist across cultures in the way the vocabulary is delivered to and acquired by children during early lexical development.

Choi, S. (2000). Caregiver input in English and Korean: Use of nouns and verbs in book reading and toy-play contexts. *Journal of Child Language, 27,* 69-96.

Tardif, T. (1996). Nouns are not always learned before verbs. Evidence from Mandarin speaker's early vocabularies. *Developmental Psychology, 32*, 492-504.

Tardif, T. (2006). The importance of verbs in Chinese. In P. Li, L.H. Tan, E. Bates, & O.J.L. Tzeng (Eds.), *Handbook of East Asian Psycholinguistics* (Vol. 1: *Chinese*). Cambridge, UK: Cambridge University Press.

Tardif, T., Shatz, M., & Naigles, L. (1997). Caregiver speech and children's use of nouns versus verbs: A comparison of English, Italian, and Mandarin. *Journal of Child Language, 24*, 535-565.

Korean Word Recognition and Lexical Representation

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Abstract

Korean sentences are composed of Eojeols, and Eojeols are the composites of morphemes or words. For Korean sentence comprehension, it is necessary to decompose the Eojeols and to retrieve linguistic knowledge associated with the morpheme. In order to examine the mental representation of Korean Eojeols, several semantic priming studies are performed. The results showed that Korean verb Eojeols are stored in the form of "root +pre-final-ending suffix" and "final ending suffix". Thus, Korean Eojeol comprehension is processed through the memory retrieval for the "root + pre-final-ending suffix" and the decomposion for the "final-ending suffix". In addition, Korean Eojeols are represented in the phonological syllable unit. Based on the above results, one computational model was proposed, and this model simulated human data successfully. We will explain this model and related experimental results.

Korean sentences are composed of Eojeols which are the connections of morphemes or words. For example, "나는 점심을 김교수와 먹었다“, which means "I ate lunch with professor Kim", consists of four Eojeols. And "나는” Eojeol is the composite of "나“(which means "I") and "는”(which represents the role of the previous pronoun in the sentence). In this case, the above Eojeol consists of two words. But "먹었다“ Eojeol consists of three morphemes (e.g. "먹” + “었” + “다”) rather than three words.

In this symposium, the representation architecture and the unit of Eojeols will be presented. In the first part of the presentation, the issue of whether Eojeols are represented in the full list form or in the decomposed form will be reported. In the second part of the presentation, what the unit of the Eojeol representation is will be discussed. And lastly one computational model of Korean word recognition will be discussed.

In order to see the architecture of the Eojeol representation in mind, the primed lexical decision task was used. The semantic relationship between the prime Eojeol and the target words was manipulated. The Eojeol, "쥐어“, might be represented in the full form or in the decomposed form. If "쥐어” is stored in the decomposed form (e.g. "쥐“ +“어” and in this case "쥐“ has two meanings; (1) "mouse" and (2) "hold"), the semantically related words, "고양이”(in English words, which means "cat") and "손“(which means "hand") are facilitated in recognition. Whereas if If "쥐어” is stored in the full form (in this case, the Eojeol means only "hold" due to the grammatical role of "어“), only the meaning of "hold" will be activated. The results showed that only the meaning of "hold" was activated, and thus word recognition of "hand" was facilitated. This fact support the hypothesis of the full list form representation. The above study was about the mental representation of the verb Eojeols. In another study, the representation type of the compound nouns was examined. Korean compound nouns are one of the three types; (1)손발 (in English, hand + foot, where two nouns have the autonomic and independent status in the compound noun), (2)학교운동장 (English, school + ground, where the first noun constrains the meaning range of the second noun.), and (3) 콩밥 (in English, bean + food, where the compounds of two nouns generates the new meaning "jail".). The repetition priming technique was adopted. The results showed that in all three types only the meaning of the compound noun meaning was activated, which supports the hypothesis of the full list representation of the Korean compound noun. Based on the above two studies, it can be concluded that Korean Eojeols are represented in the full form rather than in the decomposed and component-based form.

In order to examine the element unit of the mentally represented Eojeols, the lexical decision task and the form primed lexical decision task were used. In the first study, whether the syllable is the lexical unit was examined by investigating the neighborhood size effect. If Korean Eojeols are represented in the connection of syllables, the neighborhood size effect should be caused by the shared syllable neighbors. The defining units of neighbors were manipulated. For example, there were three candidates of

the different lexical units, such as body, syllable, and BOSS. The neighborhood size effect occurred in the syllable-based neighbors but not in the other unit neighbors. This fact implicates that the lexical unit in Korean words is syllable. To see the validity of this hypothesis, the form primed-lexical decision task was used. If the syllable unit is the lexical unit, it is reasoned that the presentation of the prime words, which shares the first syllable with the target word, will make the recognition of the target words be delayed due to the lexical competition. The prime words were presented visually and auditorily, and the result showed that the sharedness of the first syllable between the prime and target words inhibits the recognition of the target words, which supports the above hypothesis. In the third study, the similar neighborhood effect logic was employed to see whether the lexical units of syllables have the orthography-based property or the phonology-based property. The orthographic and phonological neighbors were defined by the way of whether the first overlapping syllable between the target and neighbor words is orthographic or phonological. The neighborhood size effect occurred only by the number of the phonological neighbors but not by the number of the orthographic neighbors. Thus, it can be concluded safely that the lexical unit of Korean words is the syllable unit and the syllable unit is not orthographic but phonological.

Based on the above experiments, in conclusion, Korean Eojeols are represented in the full form in nouns and verbs. And the unit of the Eojeol is the phonological syllable unit. Thus, in the Korean mental lexicon, Eojeols are represented in the connections of the phonological syllables. In order to confirm this conclusion, the computer simulation study was done. In this computational model, several lexical effects (e.g. frequency effect, word length effect, and neighborhood size effect) were simulated successfully. Based on this simulation study, we propose a Korean word recognition model, and this model will be discussed fully in the presentation.

Cross-Language Transfer of Morphological and Phonological Awareness

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Abstract

This study examined the effects of cross-language transfer of Korean morphological awareness and phonological processing skills on reading and spelling in L2 English and Chinese Hanja among Korean elementary school children. In regression equations, Korean morphological production task predicted unique variance in reading and spelling in both English and Chinese Hanja. In addition, Korean phoneme awareness was predictive of unique variance in reading and spelling in English but not in Hanja. These results suggest the cross-language transfer of morphological and phonological awareness.

This study was to examine the extent to which Korean morphological and phonological processing are associated with reading and spelling in L1 Korean and L2 English and Chinese Hanja among 107 Korean sixth graders. There is a relatively large body of literature establishing the phenomenon that phonological processing skills in one language can predict reading in a second language (Comeau, Cormier, Grandmaison, & Lacroix, 1999; Lindsey, Manis, & Bailey, 2003). In Korean studies, Cho & McBride-Chang (2005a) have demonstrated that both phonemic and syllable level awareness are uniquely associated with Korean Hangul word recognition in concurrently collected data among both kindergarten and second grade children. In a one-year longitudinal study, Cho and McBride-Chang (2005b) found that Korean phoneme awareness predicted L2 English reading, suggesting cross-language transfer.

However, there are not many studies on morphological awareness in reading in first and second languages. Morphological awareness is the ability to manipulate and recognize morphemes. In previous research (McBride-Chang et al., 2005), morphological construction awareness was found to predict unique variance in reading in both Korean and Chinese.

Korean language and script have several unique features. Although Korean is a phonemic alphabet, Hangul letters are printed in syllable blocks. Both syllables and phonemes are important units. Thus, Korean Hangul has been described as an alphabetic-syllabary. A syllable reflects both the entire syllabic structure and its phonemic components, and represents a morpheme. Korean has a rich compounding system and a relatively transparent semantic structure like Chinese. It has been estimated that approximately 50% of Korean words are borrowed from Chinese. That is, Korean relies heavily on lexical compounding for vocabulary terms. Most words in Korean are comprised of two or more morphemes, and these morphemes are often directly relevant to the meanings of the words.

We included morpheme production and morpheme judgment tasks as in Shu and her colleagues (in press) to test morphological awareness. Tasks such as speeded naming, processing speed (Woodcock & Johnson, 1989), syllable deletion and phoneme deletion were also included.

The results of regression analyses are shown in Tables 1, 2, and 3. Phoneme deletion, rapid number naming and morpheme judgment explained unique variance in Korean Hangul reading, whereas phoneme deletion, rapid number naming and morpheme production predicted unique variance in Hangul spelling. Phoneme deletion, visual matching and morpheme production were uniquely associated with reading and spelling in English. Rapid number naming and morpheme production explained unique

variance in Hanja reading, and only morpheme production predicted Hanja spelling.

In conclusion, phoneme awareness, number naming speed, and morphological awareness predicted Korean Hangul reading and spelling among Korean 6th graders. Korean phoneme awareness transfers to reading and spelling in L2 English but not in Hanja. Morphological awareness transfers to reading and spelling in both L2 Chinese and English. It is suggested that morphological awareness is a general and not a language-specific cognitive process.

Table 1. Standardized Beta weights for regression equation with L1 Korean Hangul word reading and spelling as the dependent measures.

Variable	Hangul reading		Hangul spelling	
	B	*t*-value	*B*	*t*-value
Syllable deletion	-.05	-.67	-.06	-.83
Phoneme deletion	.18	2.21*	.36	4.72***
Number naming	-.59	-6.97***	-.35	-4.38***
Object naming	.11	1.23	.03	.35
Morpheme production	.10	1.18	.26	3.51***
Morpheme judgment	.22	2.65**	-.01	-.17
Cross-out	.03	.43	.03	.34
Visual matching	-.00	-.04	.14	1.62

* $p<.05$, ** $p<.01$, *** $p<.001$

Table 2. Standardized Beta weights for regression equation with L2 English word reading and spelling as the dependent measures.

Variable	English reading		English spelling	
	B	*t*-value	*B*	*t*-value
Syllable deletion	-.14	-1.65	-.10	-1.15
Phoneme deletion	.37	4.14***	.27	2.97**
Number naming	-.12	-1.31	-.17	-1.76
Object naming	-.06	-.67	-.09	-.96
Morpheme production	.26	2.97**	.26	2.85**
Morpheme judgment	-.07	-.81	-.11	-1.16
Cross-out	-.04	-.50	-.06	-.65
Visual matching	.22	2.10*	.22	2.09*

* $p<.05$, ** $p<.01$, *** $p<.001$

Table 3. Standardized Beta weights for regression equation with L2 Chinese Hanja character reading and spelling as the dependent measures.

Variable	Hanja reading		Hanja spelling	
	B	*t*-value	*B*	*t*-value
Syllable deletion	-.05	-.52	-.16	-1.79
Phoneme deletion	.05	.52	.07	.81
Number naming	-.22	-2.19*	-.09	-.96
Object naming	-.08	-.79	-.16	-1.66
Morpheme production	.43	4.62***	.49	5.34***
Morpheme judgment	.06	.64	.10	1.02
Cross-out	-.08	-.81	-.12	-1.28
Visual matching	.08	.70	.09	.87

* $p<.05$, ** $p<.01$, *** $p<.001$

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