한국어 어휘 처리 과정에서 글자 정보와 발음 정보의 연결성

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Orthographic and phonological links in Korean lexical processing.

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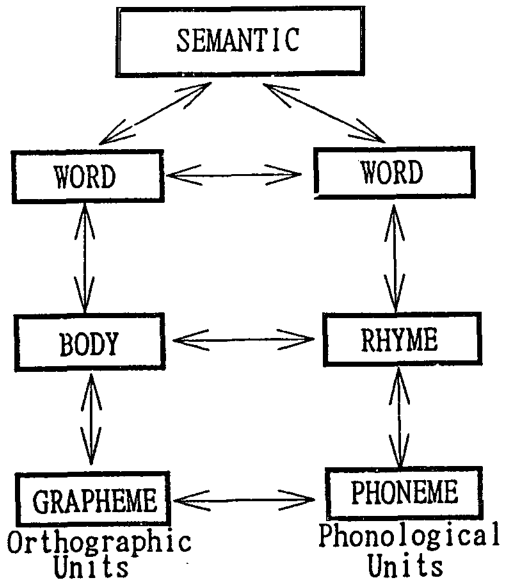
At what level of orthographic representation is phonology linked in thelexicon? Is it at the whole word level, the syllable level, letter level, etc? This question can be addressed by comparing the two scripts used in Korean, logographic Hanmoon and alphabetic/syllabic Hangul, on a task where judgements must be made about the phonology of a visually presented word. Four experiments are reported using a "homophone decision task" and manipulating the sub-lexical relationship between orthography and phonology in Hanmoon and Hangul, and the lexical status of the stimuli. Hangul words showed a much higher error rate in judging whether there was another word identically pronounced than both Hangul nonwords and Hanmoon words. It is concluded that the relationship between orthography and phonology in the lexicon differs according to the type of script owing to the availability of sub-lexical information; the process of making a homophone decision is based on a spread of activation exclusively among lexical entries, from orthography to phonology and vice versa (called "Orthography-Phonology-Orthography Rebound" or "OPO Rebound"). The results are explained within the mulitilevel interactive activation model with orthographic units linked to phonological units at each level.

The present research reported here looks at the question of how sub-lexical structures (syllables and morphemes) are represented in the mental lexicon both in terms of orthographic and phonology. Conclusions are drawn from an examination of homophone judgements to bi-syllabic and bi-morphemic Korean words presented in both Hangul and Hanja, where the sub-lexical phonology of the homophonic words is not compatible with their lexical (whole-word) phonology. In particular, the situation is examined where homophony is created through "consonant assimilation" (as with 장문 and 작문; 長文 and 作文) or through "position change" (as with 집안 and 지반).

If such words turn out to be difficult to judge as being homophones, it must be the case that orthographic-phonological links are lexically represented in terms of syllables as well as whole-words. A useful framework in which to think about this is a Multilevel Interactive-Activation model along the lines postulated by McClelland and Rumelhart (1981) in which activtion can occur at different levels of representation potentially ranging fromsingle letters up to whole words, and where orthographic units are associated with phonological units at each level (see Taft, 1991).

FIG 1 : The Multilevel Interactive-Activation Framework



In such a model, depicted in Fig.1, activation can spread from the graphemic level or phonemic level (according to the modality of the stimulus), to higher orthographic and phonological units via connections between levels and also between rthographic and phonological units at the same level via cross-activation. In addition, activation can feed back

from the higher level units to the lower level units in the same manner. In this version of the Multilevel Interactive-Activation model, phonology is linked to orthography at the grapheme, body(*1), and word levels. When a word is visually presented, the phonological units which are activated at all these levels are used to generate a pronuncition.

FIG 2 : Representation of homophony:

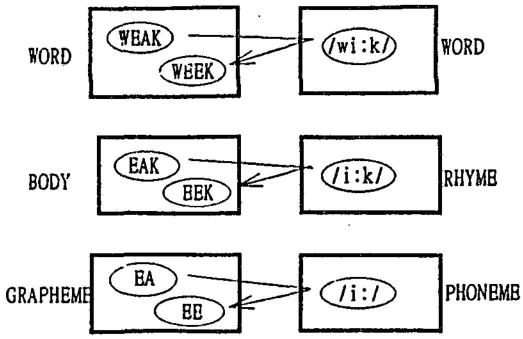


Fig.2 give a description of how homophony would be represented in such a model using the English examples of WEEK and WEAK. At the word level, homophonic pairs are represented by two orthographic units linked to a single phonological unit (/wi:k/). When a stimulus word is presented (e.g., WEAK) and the task is to decide whether there exists another word pronounced identicall to that word (the "homophone decision task"), the orthographic word unit for the stimulus becomes activated and automatically sends activation to its phonological word unit (/wi:k/). This, in turn, sends activation back to both orthographic units that are linked to it (WEAK and WEEK). We will term this pathway of activation "Orthographic-Phonological-Orthographic Rebound" or "OPO-Rebound".

When a different orthographic unit to the one representing the stimulus item is activated via OPO-Rebound, a "homophone" response can be made. A "non-homophone" decision would be made when it is determined that no orthographic word unit other than the one corresponding to the presented stimulus is sufficiently active.In general, when a stimulus word has a homophonic partner, it will be the presented word which will be the most strongly activated since it is gaining maximal support from activation feeding up from the lower, sub-lexical levels. However, the homophonic partner can also benefit to some extent from activation coming up from the sub-lexical levels. This is because OPO-Rebound will be occurring at all levels of unit: At the body/rhyme level, the orthographic unit EAK will activate the phonological unit /i:k/ which, in turn, will send activation back to both EAK and EEK, and similarly, EA will activate EE via /i:/ at the grapheme/phoneme level. This multilevel OPO-Rebound is depicted in Fig.2. Now, if this is the correct way to think about the lexical processing system, it should be the case that homophone judgements will be difficult to make if sub-lexical information does not support lexical information. Such a situation can be examined using Korean. Take the Hanja examples, 新任 and 作文 former is homophonic with 信任, while the latter is homophonic with 長文. However, the two words differ from each other inasmuch as 新 is homophonic with 信, while 作 is not homophonic with 長. In the first example ("Normal Homophones"), the homophony of the two-character words is supported by homophony at the sub-lexical level, that is, by the homophony of the individual characters. In the second case ("Modified Homophones"), homophony is created only when the final consonant of the first syallble is assimilated with the first consonant of the second syllable, and therefore, homophony does not occur at the syllable level. The first experiment compared Normal and Modified Homophones where one member of a homophone pair was presented in Hanja for subjects (n=28) to make a judgement of homophony. There were 20 words in each condition, plus 40 non-homophonic foils. Reaction times were measured, but only error rates will be reported since they are more informative. As predicted by the model, Modified Homophones were harder to judge than Normal Homophones (47.5% errors vs 32%). Clearly, the lack of homophony at the syllable level was playing a role.

The second experiment looked at Modified Homophones using the alphabetic Hangul script (e.g., 長文 homophonic with 作文). Since the difficulty with such homophones is supposed to arise from incompatibility between lexical and syllabic information, there is no reason to expect performance in Hangul to be different to that in Hanja since both can be analysed syllabically. With 20 items and 28 subjects, it was found that the errorrate with Modified Homophones was equal to that obtained with such homophones in Hanja (50%).

In addition to the Modified Homophones, another type of homophone was examined in this experiment. Here, the word that was presented was a suffixed word while its homophonic partner was non-suffixed (e.g., the suffixed word 적음 is homophonic with the non-suffixed word 저금; their orthographic syllabic structure differs, but their phonological syallbic structure is the same). The results showed that performance with such suffixed words was considerably better (21% errors) than with the non-suffixed Modified Homophones.

An explanation for this can be given in terms of suffixed words not having whole-word orthographic representations. When a suffixed word is presented, its pronunciation is constructed by combining the pronunciation of the stem and the pronunciation of the suffix. The whole-word phonological representation so accessed then sends activation back to the whole-word orthographic level which results in the non-suffixed homophonic partner being accessed. There is no representation of the suffixed word to be accessed and therefore there is no competition taking place during OPO-Rebound. In other words, it is proposed that when there are two orthographic representations at the whole-word level, they compete with each other during OPO-Rebound, but if only the target word exists at thislevel, homophone judgements can be made in an uninhibited fashion.

Support for this idea comes from two further experiments. In one, the stimulus was a

non-suffixed word and it was the target which was suffixed. Performance with such words was as poor as with other Modified Homophones (48.5%), which was expected because OPO-Rebound should keep returning to the orthographic representation of the non-suffixed stimulus word since the suffixed target word has no representation at that level (but must instead be generated by decomposition of the phonological representation into stem and suffix).
In another experiment, the homophonic stimuli were actually nonwords (e.g.,말류 which is homophonic with 만류) and therefore only the target had a representation at the whole word level. Since this precludes any competition during OPO-Rebound, the error-rate should have been low and indeed it was (15.5%). So there appears to be support for the idea that suffixed words have no whole-word orthographic representation, and as such, are comparable to nonwords as stimulus items in the homophone decision task.
In conclusion, the experiments reported here are consistent with the idea that in the Korean lexical processing system, activation passes through a syllable level to get to the lexical level and that there are orthographic-phonological links at each of those levels. Furthermore, suffixed words are stored in a decomposed form, at least in relation to their orthographic representation. A similar type of processing system seems to be at work for both Hanja and Hangul.

References

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*1: The body is the orthographic equivalent of the "rhyme" of a word, e.g., the OOK of BOOK, and has been shown to be important in lexical processing in English (e.g., Taft, 1992).