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# Is Musical Ability Related to the Prosody Learning of Second Language?

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Some recent studies have reported that phonological ability for second language (L2) is correlated with phonological loop capacity (e.g. Baddeley, Gathercole, & Papagno, 1998). In addition, Slevc & Miyake (Manuscript in preparation) reported that adult learners' L2 phonological ability is correlated with their musical ability.

However, the previous studies have dealt only with phonology. The purpose of this study is to examine the prosodic aspect, especially the intonation, and its relations to musical and verbal memory abilities in L2 learning. We use Chinese language as L2 because it has an intonational property known as "four tones".

## Method

### Participants

The participants were 35 high school and undergraduate students in Japan. None of them had ever learned Chinese.

### Materials and Procedures

The experiment consisted of three parts: musical ability test, verbal memory ability tests, and Chinese learning session.

**Musical Ability Test** The frequency difference limen for pure tone was recorded. Though this pitch discrimination ability is only a part of musical ability, we refer to this measure as musical ability for convenience.

**Verbal Memory Ability Tests** Two tests were used to measure verbal memory ability. Reading span (RS) was measured by the Japanese version of the reading span task; and letter span (LS) was measured by the letter span task.

**Chinese Learning Session** Session consisted of five blocks. Each block had a learning phase and a test phase. In the learning phases, the speech sound of the Chinese words and the Japanese equivalents were presented. In the test phases,

a target and a distractor were auditorially presented after a Japanese word was presented. Participants' task was to choose a correct word in 2-alternative forced-choice form. The distractor was one of the following words: phonologically-changed words, words differing in intonation, or other words presented in learning phases. The scores for the trials with these distractor words were recorded as phonological, prosodic, and associative scores, respectively.

## Results and Discussion

Table 1 shows the correlations between the memory ability measures and the mean scores of the five test phases (from 1<sup>st</sup> through 5<sup>th</sup> blocks) in the Chinese learning session. The prosodic score significantly correlated only with RS, while the associative and the phonological scores correlated with both LS and RS. Performance in the RS task is considered to be closely related to efficiency of the central construct of working memory. Therefore, these results imply that prosody learning is free from phonological loop capacity and is related to the central construct.

Table 2 shows the improvements (correct rate of 5<sup>th</sup> block – that of 1<sup>st</sup> block) of each scores for high and low musical ability groups. There was a significant difference only in the improvements of the prosodic scores between high and low groups ( $F(1,33)=7.39, p<.05$ ). This result can be interpreted that the learners with high musical ability are able to analyze the intonational feature with higher accuracy.

In sum, the results imply that when we learn the auditory features of L2, the prosodic features are learned through musical ability, while the phonological features are learned through verbal memory ability.

## References

- Baddeley, A. D., Gathercole, S. E. & Papagno, C. (1998). The phonological loop as a language learning device. *Psychological Review*, 41, 78-104.
- Slevc, B & Miyake, A. (Manuscript in preparation). Individual differences in second language proficiency: Does "Good Ear" really matter?

Table 1: Correlations of mean scores for all the Chinese learning session with memory ability measures

| Score Type   | Memory Ability |       |
|--------------|----------------|-------|
|              | LS             | RS    |
| Phonological | .40*           | .49** |
| Prosodic     | .29            | .58** |
| Associative  | .52**          | .58** |

Note. \*  $p<.05$  \*\*  $p<.01$

Table 2: Improvements in the Chinese scores for high and low musical ability groups

| Score Type (improvement) | Musical Ability |      |
|--------------------------|-----------------|------|
|                          | High            | Low  |
| Phonological             | 9.38            | 5.88 |
| Prosodic                 | 19.79           | 5.88 |
| Associative              | 9.03            | 8.82 |