

## The ERP Repetition Effects on Spoken and Written Chinese Words Recognition

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### Introduction

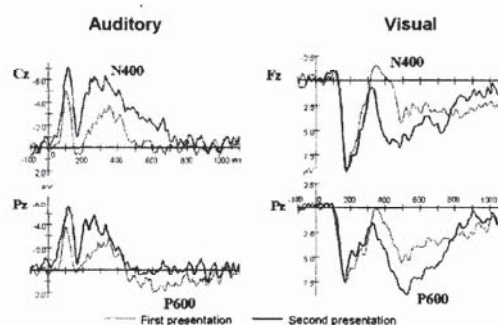
Previous recognition memory studies using English words have revealed differential ERP effects on learned vs. novel words. That is, the old items evoked more positive-going ERP components than do new items (e.g., Rugg, 1995). Our earlier studies using Chinese words recognition have found that the N400 elicited by Chinese language, as a language of ideographical writing system, is different to western language (English) in temporal course and scalp distribution (Luo et al, 1999). To examine whether this ERP recognition effect during Chinese words recognition is restricted only in visual modality, the present study examined ERP repetition effects during recognition of both spoken and written Chinese words.

### Methods

The ERPs were recorded while 13 normal young subjects (age range 23-32 years) were recognizing Chinese words presented in either auditory or visual modality. The traditional "learning-recognition" paradigm was used. For the "learning" stage, 40 words were presented on the screen or through ear phones respectively. 20 of them were "first presentation" and another 20 were distracters. For the recalling stage, 40 words including 20 repeated/"old" words and 20 "new" words were presented. Total 5 blocks of experimental of trials were conducted.

### Results

The N1, P2, N2 and positive slow wave (PSW) was elicited by both written and spoken words. The ERP repetition effects between first and repeated present words were analyzed. That means the late components of ERP elicited by repeated written words have a positive-going variation but those by repeated spoken words have a negative-going variation. The latency of N400 for the repeated words was significantly shorter than that for the first representation words,  $F_{1,12} = 13.96$ ,  $P < 0.005$ . The amplitude of the P600 was larger ( $F_{1,12} = 7.52$ ,  $P < 0.05$ ), the latency was shorter ( $F_{1,12} = 7.54$ ,  $P < 0.05$ ) for the repeated words than those for the first representation words. In addition, there is a larger P600 effect at right hemisphere.



### Conclusions

The ERPs elicited by repeated written Chinese words has more positive-going than those by the first presented words, which effect is consistent with that of English language. The ERP repeated effect for recognizing spoken Chinese words has more negative-going and probably need further evidences from studies of western language. The P600 effect was dominant at right hemisphere and this probably suggests the brain activity peculiarity of ideographical writing system.

### References

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