Effects of grammatical class and morphological structure in Chinese: A mixed logit model study on picture and word naming

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Lexical-semantic variables such as word frequency, imageability and age of acquisition have long been studied in order to shed light on the cognitive processes underlying the performance of normal and aphasic speakers (Nickels & Howard, 1995). However, little is known about the role of these variables in Chinese.

Twenty Chinese aphasic patients (either fluent or non-fluent) and twenty healthy individuals matched for age and education participated in this study. They were asked to read aloud written words and to name pictures of objects and actions. The probability of success on each item was estimated through mixed logit models (MLM; Jaeger, 2008) on the basis of word frequency, imageability, age of acquisition, grammatical class (nouns vs. verbs), and morphological structure (simple vs. complex words). The use of MLM allowed us to assess the effects of the predictors: (i) more precisely, because of the reduction of the error variance; (ii) both in the whole sample of participants and in the individual subjects.

The set of significant predictors differs in reading aloud and picture naming, with imageability

playing an important role in the former task, and age of acquisition in the latter. More importantly, grammatical class, morphological structure, and their interaction turned out to be significant predictors in both task, indicating that simple nouns are much easier than complex nouns, but no difference arose between simple and complex verbs (Figure 1). Because grammatical class and morphological structure played a crucial role in explaining the performance of healthy and brain-damaged individuals, we carried out separate MLM analyses on (a) simple nouns, (b) simple verbs, (c) complex nouns, and (d) complex words in both tasks. In the analyses focusing specifically on complex nouns and complex verbs, we introduced the grammatical class of the compound constituents as an additional predictor. Interestingly, this factor did not play a relevant role in explaining the performance of normal and aphasic speakers, possibly indicating that the information on the grammatical class of the constituents was not accessed during word and picture naming.

These results will be discussed in the light of current models of lexical processing in Chinese (e.g., Bi, Han, Weekes, & Shu, 2007).

References

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Figure 1. Interaction between grammatical class and morphological structure as emerged in (a) normal speakers in picture naming, (b) aphasic patients in picture naming, and (c) aphasic patients in reading aloud. Change in probability of success (as estimated by the MLM and expressed in the logit space) is represented on the Y axis as measured against a reference level – i.e., complex nouns.