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‘Are there Lexicons?’ A Study of Lexical and Semantic Processing in a Subject with Word-meaning Deafness Suggests ‘Yes’

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Introduction

Cognitive models incorporating mental lexicons have been ‘common sense’ in cognitive neurolinguistics. Recently, however, some researchers have argued for cognitive models without lexicons (e.g., Patterson et al., 2006). In these models, auditory language processing consists of phonological and semantic processing with no lexical representations involved (Jefferies, Sage, & Lambon Ralph., 2007; Lambon Ralph, Moriarty, & Sage, 2002). In these models, the lexical decision task is basically a semantic decision task, and performance on this task should vary with accuracy of semantic processing. Proponents of models with lexicons, in turn, have argued that semantic and lexical processes may dissociate in individual subjects (Coltheart, 2004).

In the present case study, a subject with ‘word meaning deafness’ is assessed in tasks of lexical decision and semantic processing. In ‘word meaning deafness’, access to a word’s meaning is impaired in auditory word processing while pre-semantic phonological processes as well as comprehension of written words are unaffected.

Subject

BB (female, born 1965) suffered strokes affecting superior temporal regions bilaterally 9 months before starting the present study. Auditory lexical decision was unimpaired while comprehension of auditory stimuli was severely impaired. In addition, she suffered from deep dysphasia and anomia.

Experiments

In Experiment 1, BB was unimpaired in lexical decisions (96% correct) while being severely impaired in word-picture matching with semantically related foils (75% correct; controls: 99% correct). In contrast, semantic comprehension of written stimuli was unimpaired (100% correct) and significantly superior to auditory comprehension (Chi-Square=10.1, $p<0.01$).

In Experiment 2, she had to make a lexical decision which was directly followed by a word-picture matching task for the same item (semantic vs formally related foils). Again, lexical decision was preserved (92 and 85% correct) while subsequent semantic comprehension was severely impaired (29% correct). In contrast, matching with formally related foils was significantly superior (73% correct, Chi-Square=14.4, $p<0.01$).

In Experiment 3, BB first made an auditory lexical decision directly followed by a definition task. She exhibited preserved lexical decision (93% correct) with impaired definitions from auditory input (25% correct, judged by two independent raters) and better definitions from written input (93% correct, Chi-Square=26.6, $p<0.01$).

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Conclusions

The experiments suggest that lexical decision can be independent of the ability to comprehend the stimuli and, thus, support models incorporating mental lexicons. The strength of the present study is that lexical decision and comprehension were assessed on an item-specific basis. Furthermore, since semantic comprehension was compared to word picture-matching with formally related foils, factors like delay and task complexity could be controlled.

References

- Coltheart, M. (2004). Are there lexicons? *Quarterly Journal of Experimental Psychology*, 57 A , 1153-1171.
- Jefferies, E., Sage, K., & Lambon Ralph, M.A (2007). Do deep dyslexia, dysphasia and dysgraphia share a common phonological impairment? *Neuropsychologia*, 45, 1553-1570.
- Lambon Ralph, M.A., Moriarty, L., & Sage, K. (2002). Anomia is simply a reflection of semantic and phonological impairments: evidence from a case-series study. *Aphasiology*, 16 , 56-82.
- Patterson, K.E., Lambon Ralph, M.A., Jefferies, E., Woollams, A., Jones, R., Hodges, J.R., & Rogers, T.T. (2006). “Presemantic” cognition in Semantic Dementia: six deficits in search of an explanation. *Journal of Cognitive Neuroscience*, 18, 169-183.