

Connectionism: Comparing Speech Error Patterns in Normals and Aphasics in Mandarin

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This paper aims to demonstrate general and specific comparisons between normal speakers and left-brain damaged patients in Mandarin by looking at their phonological performance errors, and shows how the two error corpora can help provide adequate evidence in support of connectionist approach to phonological encoding.

A total of 5,495 relevant speech errors from native speakers of Mandarin and 3,000 errors from Mandarin aphasic patients, both collected by the author and her research team in a naturalistic setting, are provided to examine the following questions.

- (1) Is there any equal proportion of phonological errors and lexical errors or do Mandarin speakers have a preference to produce errors of one kind more commonly than the other? Furthermore, in speech-error data involving phonological units, which phonological elements have a wider error distribution? The rationale for this question is that phonological errors are more common than lexical errors in cross-linguistic studies (e.g., Nootboom, 1973; Stemberger, 1989; Wells-Jensen, 1999; Wan & Jaeger, 2003).
- (2) Do the two error corpora in the present study involve more contextual errors or non-contextual errors? When there is an identical source unit in the vicinity of the error, this is classified as contextual. The contextual window usually refers to target-source elements interacting within a clause. The rationale for this question is that studies on cross-linguistic speech errors have shown that source segments influencing target segments usually occur within the context of utterance (e.g., Nootboom, 1973; Garnham et al., 1982; Wan, 2005).
- (3) What is the distance in a syllable between a source and error unit in the two error corpora? The rationale for this question is that we can measure contextual errors between the source and error segments in terms of how many syllables there are. The answer to this question would help one define how many syllable spans there are between the source and error units which may be potentially classified as contextual errors (e.g., Jaeger, 2004; Berg, 2006; Wan, 2007a).
- (4) Does the largest proportion of errors involve substitutions in the two error corpora in Mandarin? What is the frequency of omission and addition errors?

Is there an equal proportion of omission and addition errors or not? The rationale for this question is that studies from naturally-occurring speech errors show a general hierarchy of error type in which substitution errors occur more frequently than addition errors, which in turn outnumber deletion errors (Nootheboom, 1973; Berg, 1987; Wells-Jensen, 1999).

- (5) Does the error distribution in the two error corpora honor syllable structure? That is, do the target and source segments share the same syllable structure position? The rationale for this question is that MacKay (1970) and Shattuck-Hafnagel and Klatt (1979) found almost no exceptions in their analysis of naturally-occurring speech errors in which an initial consonant interacts with another initial consonant, a nuclear vowel interacts with another nuclear vowel, and a coda consonant interacts with another coda consonant. Data from Stemberger (1985) and Berg (1997) confirm this property.
- (6) What is the directionality of the errors occurring in the two error corpora in Mandarin? Some researchers further subdivide contextual errors into anticipation (where the error unit precedes the source element) and perseveration (where the error unit follows the source element). The rationale for this question is that it is reported that there is a tendency to produce more phonological anticipations than perseverations and exchanges in English and other Germanic speech errors (e.g., Nooteboom, 1973; Stemberger, 1989; Dell, Burger, & Svec, 1997; Wells-Jensen, 1999). However, Gandour (1977) and Wan (2007b) found the opposite occurring in Thai and Mandarin tone errors, respectively, with more perseverations than anticipations and exchanges.

This paper will start out with a general exploration of errors categorized into phonological patterns and an overview of paraphasic studies in cross-linguistic perspectives, focusing on longstanding problems and the aspects of speech production models to which these problems are pertinent. This study will then consolidate and reconcile a number of competing theoretical models regarding the cognitive status of phonological processes which occur during speech production planning and execution in Mandarin, in light of evidence from naturally-occurring speech-error data and from production deficits in left-brain-damaged aphasic patients. Finally, this study will conclude that the model of speech production with connectionist approach fares much better in that the data correctly predict the bidirectional interaction between semantic and phonological representations, evidenced by speech and aphasic errors that exhibit both phonological and semantic properties simultaneously. This connectionist approach is especially 'economical' for the representation of principles of parallel processing in the generation of speech.

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