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PRESS

Brain and Language 82 (2002) 113–145

Brain
and
Language

www.academicpress.com

Phonological neighborhood effects in aphasic speech errors: spontaneous and structured contexts[☆]

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Accepted 6 November 2001

Abstract

The current study investigates the influence of phonological neighborhoods on the accuracy of speech production in aphasia by examining errors produced in both spontaneous and structured speech tasks. Characteristics of the phonological neighborhoods of spontaneously produced aphasic errors are compared to the neighborhood characteristics of correctly produced targets in a picture description task. Accuracy of picture naming is also examined with reference to the phonological neighborhood characteristics of the stimuli. Results show that frequency of occurrence and neighborhood density play a facilitative role in speech production, replicating findings from recent studies with normal subjects. It is argued that the results are most parsimoniously explained within an interactive activation framework of lexical access. © 2002 Elsevier Science (USA). All rights reserved.

Keywords: Aphasia; Lexical access; Neighborhood effects; Speech errors

1. Introduction

One of the most compelling aspects of aphasia is the production of paraphasic utterances. Hesitations, false starts, and vague referents are clear indications of word-finding difficulties in both normal and aphasic language production, but the inaccurate words or nonwords that are sometimes produced by aphasic speakers in place of an intended utterance can be jarring reminders of the pathological workings

[☆] Portions of this work were carried out in partial fulfillment of the requirements of the degree of Ph.D. at McGill University and as postdoctoral research at the Beckman Institute, University of Illinois at Urbana-Champaign. Funding was provided through scholarships to the author from the Natural Sciences and Engineering Research Council of Canada and the Fonds de Recherche en Santé du Québec and a research grant to Dr. Shari R. Baum from the Medical Research Council of Canada. The author also thanks Drs. Shari Baum, Hugh Buckingham, Marc Pell, and Gary Dell for their valuable input during the production of this research.

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of the damaged brain. Speech errors produced in both normal and aphasic discourse have provided clues about the underlying mechanisms of lexical retrieval during language production, addressing questions such as: What are the specific factors which make particular lexical items vulnerable to error, and what are the factors which determine the ultimate form of the errors produced? What can the study of aphasic speech production tell us about normal speech production? The current study contributes to this body of work through an examination of the phonological errors produced by aphasic individuals in both spontaneous and structured speech tasks. The investigation explores a structural aspect of the lexicon which is currently receiving a fair amount of attention in psycholinguistic research with non-brain-damaged subjects, that is, the role of the phonological “neighborhood,” or the set of phonologically related words with which a target is assumed to compete for lexical selection. It is hoped that replicating normal speech-error analyses on corpora of aphasic speech errors will provide some insight into normal speech production processes and their vulnerability to breakdown in both non-brain-damaged and aphasic speakers. Furthermore, examining factors that have not been considered before in reference to lexical access deficits of aphasia may help to reveal undiscovered mechanisms giving rise to aphasic errors.

The primary goal of the past century of speech-error research has been to reveal the structures and processes of normal language production, by investigating factors which appear to promote errors and those which appear to restrict their occurrence. Following in the footsteps of Hughlings Jackson and others, researchers have made use of “[t]he general strategy . . . of inferring relevant properties of an unobservable system on the basis of its output characteristics” (Boomer & Laver, 1968, p. 3). Although some have argued that anomalies of speech production should not be relied upon to reveal normal speech production processes (Levelt, Roelofs, & Meyer, 1999; Meyer, 1992), speech errors have been informative precisely because they are not random utterances, but rather bear “a principled relation to production” (Garrett, 1980, p. 217). These observed regularities have provided evidence for different levels of linguistic representations and the rules governing their production. Two general conclusions have come out of speech error research: (1) that the accuracy of production is influenced by a number of characteristics of the way in which linguistic structures are represented and retrieved during the course of speech production and (2) that the nature of the errors produced is constrained by these factors. Furthermore, these constraints on error outcome have been observed to operate in one of two ways: (a) to restrict the extent to which the error deviates from its target and (b) to influence the direction of that deviation. The latter point has been addressed particularly in the study of aphasic speech errors.

Error studies have shown that some types of representations are more vulnerable to disruption than others. Many linguistic factors have been shown to have an impact on the ease or automaticity with which words are produced and, hence, their “slipability” (Dell, 1990): semantic factors such as frequency, familiarity, imageability, and concreteness (e.g., Blanken, 1990; Goodglass, Hyde, & Blumstein, 1969; Kay & Ellis, 1987; Laine, Kujala, Niemi, & Uusipaikka, 1992; Nickels & Howard, 1995); syntactic factors such as grammatical class (e.g., Berndt, Mitchum, Haendiges, & Sandson, 1997; Buckingham & Kertesz, 1974; Butterworth, 1979; Garrett, 1975, 1980; Kohn & Smith, 1990; Williams & Canter, 1982, 1987; Zingeser & Berndt, 1990) and morphological function (e.g., Buckingham & Kertesz, 1974; Garrett, 1980; Goldberg & Opler, 1997); structural factors such as level of stress (e.g., Boomer & Laver, 1968; Nooteboom, 1973; Shattuck-Hufnagel, 1992), syllabic position (e.g., Bierwisch, 1981; Blanken, 1990; Dell & Reich, 1981; Gagnon & Schwartz, 1997; Gagnon, Schwartz, Martin, Dell, & Saffran, 1997; Garnham, Shillcock, Brown, Mill,

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