Journal of Neurolinguistics 26 (2013) 298–311

Contents lists available at SciVerse ScienceDirect

Journal of Neurolinguistics

journal homepage: www.elsevier.com/locate/jneuroling

Factors in action-object semantic disorder for Chinese-speaking persons with or without Alzheimer's disease

Yi-Hsiu Lai [a], Yu-Te Lin [b,*]

[a] National University of Kaohsiung, Taiwan
[b] Kaohsiung Veterans General Hospital, No. 10, Rui-shi Street, Qian-zhen District, Kaohsiung, Taiwan

ARTICLE INFO

Article history:
Received 29 October 2011
Accepted 23 October 2012

Keywords:
Alzheimer's dementia
Category fluency
Picture naming

ABSTRACT

The present study aimed to elucidate the nature of action-object semantic impairment, as revealed in a category fluency task and a picture naming task completed by Chinese-speaking persons with or without Alzheimer's disease (AD). Also, the predictive power of semantic variables on the severity of dementia was addressed. Speech samples were collected from twenty AD persons, twenty control seniors and twenty control adults in Taiwan. Each participant individually completed two tasks: a category fluency task and a picture naming task. Results of the category fluency task indicated that the content of information in Chinese-speaking AD participants was seriously deteriorated, thus producing significantly smaller number of semantic-lexical items. Category Effect was only significant for healthy controls in the semantic fluency task; no significant Category Effect was found in AD participants. Additionally, results of Multiple regression analyses demonstrated that action fluency, action naming and frequency of pictures could reliably predict the severity of dementia. Findings in the present study helped characterize the nature of semantic disorders in Chinese-speaking AD participants and contributed to the predictive power of semantic variables and of pictorial variables on the severity of dementia.

1. Introduction

Over the past decades, persons with Alzheimer's disease (AD) have been characterized by multiple cognitive deficits, the most important of which is the semantic-lexical disorder (Gainotti, Di Betta,

* Corresponding author. Tel.: +886 7 5919255; fax: +886 7 5929254.
E-mail address: wanglovely@yahoo.com.tw (Y.-T. Lin).

0911-6044/$ – see front matter © 2012 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.jneuroling.2012.10.003

& Silveri, 1996). Much research on AD patients' semantic-lexical impairment has been conducted concerning three issues: (a) the nature of deficit, (b) semantic category effects, and (c) pictorial attribute effects.

First of all, the nature of semantic-lexical deficit for AD individuals remains under debate. Some researchers (cf. Abeysinghe, Bayles, & Trosset, 1990; Grober, Buschke, Kawas, & Fuld, 1985; Hodges, Salmon, & Butters, 1992) argue that semantic-lexical disorders result primarily from a loss of information in semantic representations. The content of information stored in AD individuals is reported to be seriously deteriorated. Semantic fluency task is often utilized to fully explore the knowledge of a certain semantic target. Gainotti et al. (1996), for example, asked sixteen AD persons and eleven matched controls to generate in 1 min as many words as possible that were related to a stimulus target. In comparison to normal controls, AD participants produced significantly less amount of information about semantic-lexical items. The "loss of information" hypothesis was empirically supported with a selective loss of specific associates in AD utterances. Other researchers claim that semantic information is intact for AD individuals who are mainly impaired in the conscious access to that information (cf. Nebes, 1989; Nebes & Brady, 1988, 1990; Nebes, Martin, & Horn, 1984; Nicholas, Olber, Albert, & Goodglass, 1985). Nebes et al. conducted a series of studies on semantic processing. Nebes and Brady (1990), for instance, investigated the organization of semantic attributes in Alzheimer's disease, revealing that attribute dominance had a greater impact on AD participants' performance than on normal controls' performance. It was concluded that knowledge of relative importance was retained and that basic organization of semantic attributes was preserved in AD participants. Accounts of naming impairment in normal aging also supported this argument. Nicholas, Olber, Albert, and Goodglass (1985) addressed the issue of lexical retrieval for nouns and verbs in healthy aging with picture naming tests. Results indicated that the ability to name both word types declined with age and that more errors were made on object names especially for older participants. Analysis of response type difference reflected greater difficulties for healthy elders in quantitative ways, not in qualitative ways. This finding led to the conclusion that naming difficulty for normal aging was at the label retrieval stage.

The second issue regarding AD persons' semantic-lexical impairment addresses semantic category effects. Semantic categories have been known to highly correlate with semantic memory deficits. In the past decades, neuropsychological studies have been conducted to examine whether AD patients perform differently in different semantic categories and to elucidate the mechanisms of brain functions and linguistic concept formation. A recent direction on semantic category effects on AD individuals has addressed object/noun naming versus action/verb naming, but findings have not gone undisputed, as reviewed in Vigliocco, Vinson, Druks, Barber, and Cappa (2011). Some studies (Bowles, Obler, & Albert, 1987; Irigaray, 1973; Robinson, Rossor, & Cipolotti, 1999; Williamson, Adair, Raymer, & Heilman, 1998) indicate that the production of verbs is better preserved than that of nouns. Others (Cappa et al., 1998; Druks et al., 2006; Kim & Thompson, 2004; Lee et al., 1998; Mätzig, Druks, Masterson, & Vigliocco, 2009; Robinson, Grossman, White-Devine, & D'Esposito, 1996) argue that action naming is more impaired than object naming in the memory tests. Still others (Almor et al., 2009; Wang, 2010) claim that graceful degradation is found for both nouns and verbs and feature-based semantic representations help account for the impairment.

Empirical support for the object impairment with relative preservation in verbs in AD persons comes primarily from systematic naming studies (Bowles et al., 1987; Irigaray, 1973; Robinson et al., 1999; Williamson et al., 1998; Yang et al., 2006). Investigating the spontaneous speech of dementia individuals, Irigaray (1973) found that more verbs were retained than nouns. This result was similar to the pattern observed for aphasic patients with temporal lobe lesions. Early Alzheimer's disease is centered on the temporal lobe, and is assumed to have a greater impact on noun processing than verb processing. Using the Boston Naming Test (Kaplan, Goodglass, & Weintraub, 1983) and the Action Naming Test (Obler, Albert, & Lozowick, 1986), Bowles et al. (1987) and Williamson et al. (1998) revealed that AD participants performed less well overall than the controls. These AD participants were disproportionably more impaired at naming the object pictures. This claim was also supported in Robinson et al. (1999), in which a probable AD participant with very severe dementia (MMSE score of 7/30) was examined. Results were indicative of a large verb advantage (object naming, 7/40 correct and action naming, 32/40 correct). Recently, Yang et al. (2006) examined semantic memory in