

Thematic roles in dementia: the case of psychological verbs

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Abstract

This study investigates the difficulty of people with Mild Cognitive Impairment (MCI), mild and moderate Alzheimer's disease (AD) in the production and comprehension of psychological verbs, as thematic realization may involve both the canonical and non-canonical realization of arguments. More specifically, we aim to examine whether there is a deficit in the mapping of syntactic and semantic representations in psych-predicates regarding Greek-speaking individuals with MCI and AD, and whether the linguistic abilities associated with θ -role assignment decrease as the disease progresses. Moreover, given the decline of cognitive abilities in people with MCI and AD, we explore the effects of components of memory (Semantic, Episodic, and Working Memory) on the assignment of thematic roles in constructions with psychological verbs.

Keywords: thematic roles, psychological verbs, Mild Cognitive Impairment (MCI), Alzheimer's disease (AD), sentence-picture matching

Introduction

Assignment of θ -roles has been shown to be problematic for populations with AD, especially in the case of psychological predicates which seem to add a further level of difficulty (see Manouilidou et al., 2009, a.o., for studies conducted on English-speaking populations). However, the number of studies regarding such populations is limited and does not involve a wide range of languages. Even fewer studies have examined θ -role assignment in populations with MCI, which in most cases is the precursor of a dementia type (Campbell et al., 2013). Previous work examining linguistic deficit in people with Mild Cognitive Impairment (MCI) demonstrated that language impairment begins before entering dementia.

This study aims to address the following research questions: (1) Is there a deficit in the mapping between syntactic and semantic representations in populations with MCI and AD and especially in psychological verbs? (2) Is there the same degree of severity in assigning θ -roles among MCI and AD groups? (3) Are the linguistic difficulties of the population with MCI and AD related to components of memory (working, semantic and episodic)?

Methodology

Participants

Twenty monolingual Greek-speaking people with MCI, sixteen with mild AD, eleven with moderate AD, and forty-seven matched healthy individuals participated in the study (see Table 1).

Table 1. Participant profile. Group means for the 3 experimental groups.

| | MCI (N=20) | AD mild (N=16) | AD moderate (N=11) |
|-----------|---------------|----------------|--------------------|
| Age | 74.70 | 75.00 | 78.55 |
| Education | 11.30 | 9.69 | 8.18 |
| MMSE | 27.55 | 20.38 | 14.09 |
| CDR | 1.175 | 4.850 | 10.591 |
| FUCAS | 43.40 | 50.73 | 0 |
| MoCA | 23.70 | 22.14 | 73.36 |

Tests

Two Sentence-Picture Matchings Tasks (SPMTs) aiming to assess the comprehension and the production of thematic roles were administered to the participants. They included verbs that follow the canonical thematic hierarchy (e.g. *The man pushes the woman*) and verbs that follow non-canonical thematic *Theme < Experiencer* argument realization (e.g. *frighten, surprise*) resulting in 24 stimulus sentences. The Greek version of the Rivermead Behavioral Memory Test (RBMT; Efklides et al., 2002), and the Working Memory Test with digit forward and backwards tasks (Wechsler, 1987) were also administered prior to the main experimental tasks aiming to investigate memory effects. In particular, RBMT measured the episodic and semantic components of memory and the digit tasks measured the working memory.

Results

Data analysis identified a deficit in the assignment of thematic roles with greater difficulty in sentences involving the *Experiencer* thematic role or otherwise involving psychological verbs. When compared to the healthy population group, scores of population with MCI and AD revealed that there is a gradual decrease in performance in both production and comprehension, as the disease progresses (see Figures 1 and 2). Moreover, the performance of dementia groups has proven to be even worse in sentences involving a psychological verb in both levels of production and comprehension, as shown in Figures 3 and 4. With regard to the possible effects of the components of memory on language performance, correlation analyses showed a strong correlation between language performance and both semantic and episodic memory, but a weak one as regards working memory.

Production

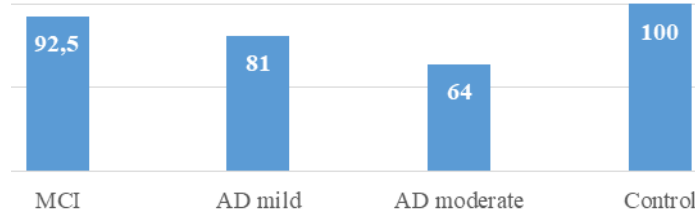


Figure 1. Accuracy of Production.

Comprehension

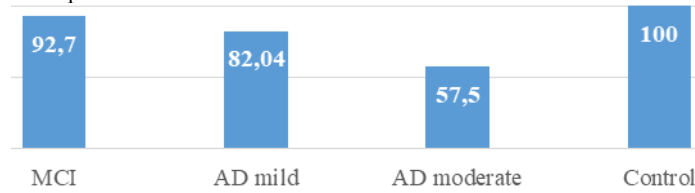


Figure 2. Accuracy of Comprehension.

Production

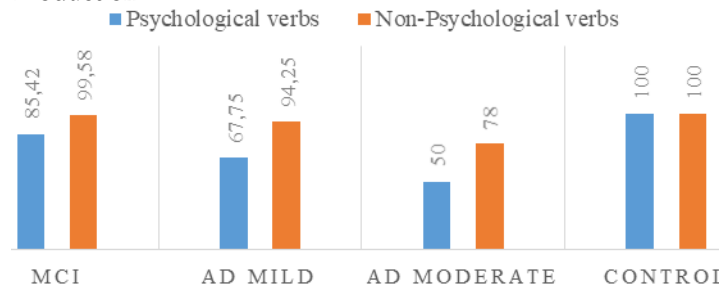


Figure 3. Production of Psychological and Non-Psychological verbs.

Comprehension

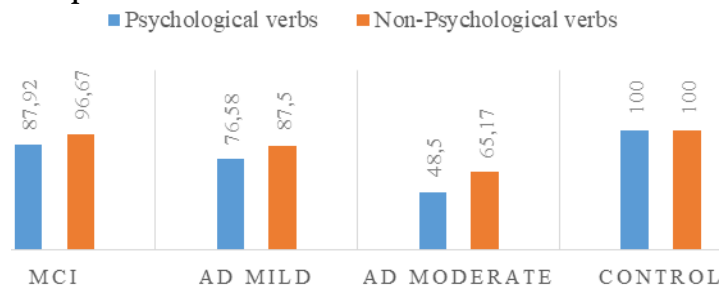


Figure 4. Comprehension of Psychological and Non-Psychological verbs among groups.

Discussion

The findings of this study suggest that there is gradual degradation of assigning thematic roles as the disease progresses, especially in sentences involving psychological verbs. The overall picture of the participants with MCI and AD reveals that θ -role assignment in sentences deviating from canonical thematic hierarchy (psychological verbs) creates confusion in dementia populations. Their evident semantic deficit impacts on the syntax-semantics interface, which leads to the observation that the deficit is more of a general one in mapping semantic participants onto syntactic structures rather than a limited one.

With regard to the possible effects of the components of memory on language performance, the weak relationship between linguistic abilities and working memory contradicts previous work in this field. This result may be due because of the memory training that participants with MCI and AD have been receiving, leading to higher performance than expected. The strong relationship of language performance and both semantic and episodic memory supports the significant involvement of semantic memory in processing argument structure (Grossman and White-Devine, 1998) and provides further evidence for the necessity of more efficient and in-depth co-examination.

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