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Let's Eat an Ice Cream, Even Though I Don't Know What It Is: Semantic Loss with Syntactic Preservation in an SD Subject

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Introduction

In semantic dementia (SD), syntactic abilities are spared as opposed to the severe semantic impairment (e.g. Breedin & Saffran, 1999; Hodges et al., 1994). In order to analyze patients' abilities in manipulating semantic and syntactic information of nouns, the distinction between mass and count nouns can be used (e.g. Garrard et al., 2004; Semenza et al., 1997): this distinction has a semantic foundation, and also a syntactic dimension, mainly represented by the determiner assignment.

We analyzed the ability to handle syntactic operations on mass/count names in an SD patient with a severe impairment of semantic knowledge, in order to assess whether the two meaning components (i.e. Referential Semantics, conveying the word's reference, and Lexical Semantics, conveying morphosyntactically relevant word's features; see Levin & Rappaport, 1995) are independently represented in the brain.

Case Report

MC was a 75-year old right-handed retired teacher, with a severe semantic deficit, while other cognitive functions, such as spatial short- and long-term memory, selective and divided attention, abstract reasoning, and visuo-spatial cognition were unimpaired. An MRI showed a marked atrophy involving the temporal lobe and the insula bilaterally (>left).

To assess her ability to handle semantic and syntactic information of nouns, MC was submitted to a battery (Semenza et al., 1997) of tasks on mass and count nouns (word retrieval: naming by definition, naming in sentence completion; semantic tasks: sentence production, semantic association, semantic judgments; syntactic tasks: sentence grammaticality judgment, determiner assignment). The same lexical items (20 count and 20 mass nouns + fillers), matched for frequency, length and complexity, were used in each task.

MC's performance was compared to that of five matched controls.

Results

As regards word retrieval and semantic tasks, MC performed far worse than controls, whereas she showed intact abilities in syntactic tasks (see Table1). In particular, she was able to assign the determiner or the quantifier to words whose meaning was unknown to her.

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Task	MC	Controls' mean	χ^2 (*p* value)
naming by definition	HF 10/20 LF 0/20	HF 19.6±0.5 LF 19.4±0.9	9.61 (.002) 33.89 (.001)
sentence production	11/20	20/20	9.18 (.002)
semantic association	9/28	28/28	25.81 (<.001)
naming in sentence completion	HF 5/30 LF 2/30	HF 29.6±0.5 LF 29±1	38.03 (<.001) 45.12 (<.001)
semantic judgment	8/30	28.2±0.8	25.67 (<.001)
grammaticality judgment	55/60	54.8±2.2	0.07 (.79)
syntactic completion	57/58	57.6±0.5	0.12 (.73)

Table1. MC's performance on word retrieval, semantic and syntactic tasks compared to that of five matched controls

Conclusions

MC's performance revealed a clear dissociation, showing a possible neural distinction between the morphosyntactically and the referential meaning of words.

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