The loss of meaning in semantic dementia: language and memory patterns

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Introduction

Global coherence is necessary to sustain the continuity of discourse. In order to maintain coherence, discourse must be constrained to a semantic space: not only must denoted facts be related, but the facts must also keep the same topic of discourse (Van Dijk, 2013).

Many studies have investigated coherence and cohesion in the discourse of children (Reese et al., 2011), healthy older adults (Arbuckle & Gold, 1993), and patients with fluent language disorders resulting from Alzheimer's disease (Ellis, 1996) or traumatic brain injury (Van Leer & Turkstra, 1999; Davis & Coelho, 2004). Those studies have developed a range of protocols to evaluate changes in discourse production. In contrast, the coherence of discourse in semantic dementia has received scant attention in the literature.

Current investigation

This study investigates discourse production and coherence in patients suffering from semantic dementia (SD). SD is a variant of primary progressive aphasia (PPA), which is a degenerative neurological disorder in which there is gradual deterioration of language skills.

The semantic impairment in SD has been shown to affect the semantic level of discourse, in that word finding difficulties are a predominant feature (Wilson et al., 2010) and it has been demonstrated that their discourse will lose meaning over time. Much has been done at the micro-level (i.e. word and sentence level) of language analysis in this group of patients, and yet very little attention has been paid to the macro-level (e.g. topic management and coherence).

Methods

Participants

- 8 SD patients and 8 healthy controls; matched on age, education, gender and handedness;

Interview

- Participants were asked to tell the interviewer about their wedding day and the day their first child was born (Kopelman et al., 1990) .

Participants' responses were transcribed and subsequently segmented into clauses based on syntactic and prosodic features

Scoring

Each clause was then categorized on the basis of the degree to which it related to the main topic suggested by the interviewer. Utterances were scored based on whether the information provided was contained in or related to the episode requested (see figure 1).

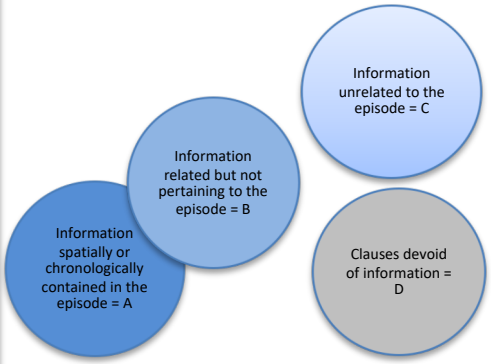

Figure 1: Scoring of information based on relatedness to the topic.

Who was your best man?	Score
um the best man would have been a friend of mine	A
who I went to university with um back in 1958 to 1964	A
um who now lives in Vancouver	B
actually lives up not in Vancouver but in	C
um where's where's the where's the Olympics going to be this Winter?	C
um that's where he lives	C
yeah	D

Table 1: This table illustrates how the coding scheme was applied. In this segment the patient is describing the best man at his wedding.

Results

Independent samples t-tests were used to compare patients with controls on proportion of utterances of each type they produced. Patients produced a total of 730 clauses, while the controls produced 855. Because the patients produced slightly fewer, the analyses were done on proportions of total responses, rather than on raw numbers.

Significant results	Statistics	Cohen's d
Patients produced fewer category A clauses	t(14) = -2.5, p = .02	2 (large)
Patients produced more category C clauses	t(14) = 2.12, p = .05	1.06 (large)

Obs.: The groups did not differ statistically with respect to 1) the proportions of utterances which contained details related but not pertaining to the episode (category B; t(14) = -.007, p>.1), or 2) the proportion of clauses devoid of information (category D; t(14) = .95, p>.1).

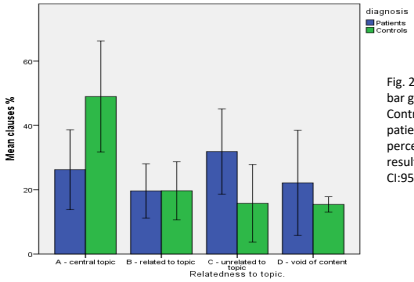

Fig. 2: Errors bar graph: Controls and patients percentage results. CI:95%

Discussion

Relative to controls:

- Patients produced proportionally fewer clauses that were spatially or chronologically related to the topic;
- Patients produced proportionally more clauses comprising information which was unrelated to the topic;

Patients and controls produced equivalent proportions of :

- Clauses which contained information which was relevant to, but not directly pertaining to the topic;
- Clauses devoid of information

Conclusions

- SD patients seemed less able to stay on topic.
- They produced proportionally fewer on-topic comments and tended to produce more irrelevant comments than normal

To our knowledge, there have not been other studies measuring global coherence in the speech of SD patients

Future directions

The reason why the SD patients were less able to stay on topic remains to be investigated. Future studies will incorporate microlinguistic measurements of discourse and an investigation of autobiographical memory in order to measure episodic memory versus semantic memory in SD patients.

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