

# The effect of semantic memory deficits on global coherence: An analysis of the discourse of patients with the semantic variant of primary progressive aphasia

Bruna Seixas Lima<sup>1, 2</sup>, Naida L. Graham<sup>1, 2</sup>, Carol Leonard<sup>1, 3</sup>, Brian Levine<sup>4, 5, 6</sup>, Sandra E. Black<sup>1, 5, 6, 7, 8, 9, 10, 11</sup>, David Tang-Wai<sup>1, 12</sup>, Morris Freedman<sup>5, 6, 13</sup>, Elizabeth Rochon<sup>1, 2</sup>

University of Toronto, Department of Speech-Language Pathology, Canada; 2 University Health Network (TRI-UHN), Toronto Rehabilitation Institute, Canada; 3 University of Ottawa, Audiology and Speech-Language Pathology Program, Canada; 4 University of Toronto, Department of Psychology, Canada; 5 University of Toronto, Department of Medicine (Neurology), Canada; 6 Rotman Research Institute–Baycrest Centre, Canada; 7 Sunnybrook Health Sciences Centre, Canada; 8 University of Toronto, Institute of Medical Science, Canada; 9 Sunnybrook Health, Sciences Centre, L.C. Campbell Cognitive Neurology Research Unit, Canada; 10 Sunnybrook Research Institute, Brain Sciences Research Program, Canada; 11 Partnership for Stroke Recovery, Heart and Stroke Foundation, Canada; 12 University Health Network (TWH-UHN), Toronto Western Hospital, Canada; 13 Baycrest Centre, Centre for Memory and Neurotherapeutics, Canada.

## Introduction

- Global coherence in discourse is the relatedness of propositions to the overall topic (Van Dijk, 2013)
- Studies have investigated coherence in the discourse of various populations: e.g., aphasic, elderly (Reese et al., 2011; Arbuckle & Gold, 1993; Ulatowska et al., 2013)
- We studied discourse coherence in semantic variant primary progressive aphasia (svPPA) patients, which has received scant attention in the literature
- In svPPA semantic memory is impaired (general knowledge) while episodic memory (events) is initially spared
- Global coherence impairment in dementia has been linked to deficits in semantic memory (Dijkstra et al., 2004), though solely based on micro-linguistic measures (word finding).

## Results at time 1

- A chi-square analysis showed that controls produced more A and B utterances, while patients produced more C and D utterances,  $X^2(3, N=3278)=321.55, p<.000$ . The chi-square values were turned into z-scores to perform a post hoc test to compare the differences between groups in each of the scores and to control for a type 1 error and a  $p<.000$  was found.
- An independent samples t-test showed a significant difference in the coherence score between groups ( $p<.001$ ).
- Patients produced fewer episodic details than controls ( $p<.001$ ), and while proportionally there was no significant difference in *coherent* episodic details ( $p=.09$ ), patients produced significantly fewer *coherent* semantic details ( $p<.001$ ), even though proportionally there was no significant difference in the number of *semantic details* ( $p=.49$ ).

## Results at time 2

- A repeated measures ANOVA showed no difference within groups in any of the measures on the 2<sup>nd</sup> round of interviews (i.e. there was no significant decline in coherence within one year).
- A paired samples t-test on the neuropsychological battery showed patients' micro-linguistic language skills suffered a decline (BNT  $p=.01$ ; PPVT  $p<.01$ ), but other cognitive processes remained stable. This corroborates the idea that coherence may rely on cognitive mechanisms other than those necessary for micro-linguistic processes.

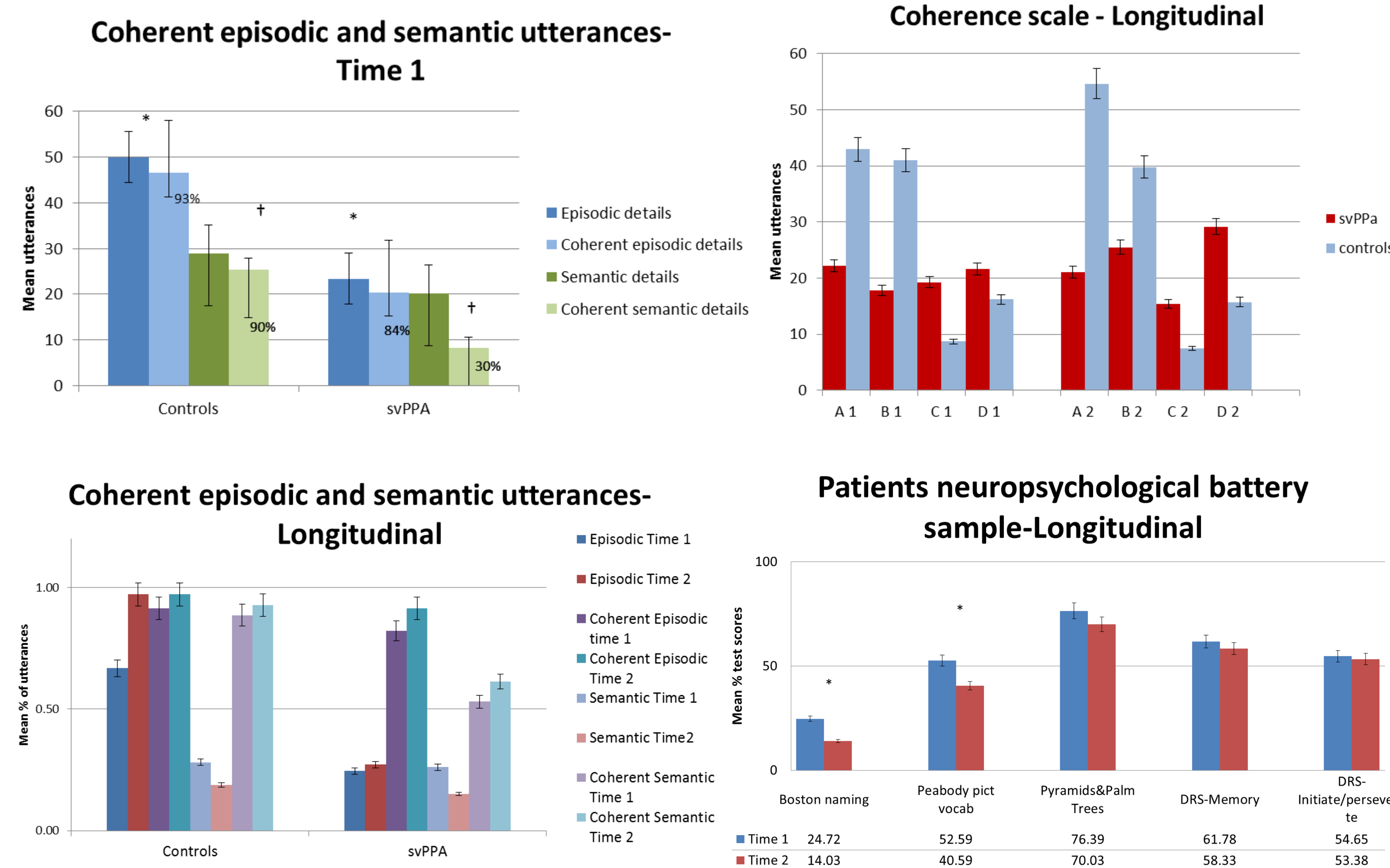
## Methods

### Hypotheses:

a) svPPA patients' discourse will be less coherent than controls'; b) Semantic details will be less coherent than episodic details in patients' discourse relative to controls.

Participants	Task	Coding	Neuropsychological tests
1 <sup>st</sup> round= 18 patients, 17 controls; 2 <sup>nd</sup> round =12 patients, 11 controls	Participants went through interviews with one year interval and answered questions about personal past events (Koppelman et al., 1990) which generated extended stretches of discourse.	1- Answers were transcribed and segmented into utterances; 2-The content of the utterances was analysed using a scale we developed to measure coherence; 3 – Scores were tallied and divided by number of utterances (Rogalski et al., 2010); 4- The utterances were categorized as episodic or semantic details (Levine, 2002)	Patients underwent a battery of neuropsychological tests in order to measure cognitive impairment and decline.

Coherence scale	"Who was your best man?"
A represents an element of the semantic frame	"um the best man would have been a friend of mine
B a relevant implication of the frame	"who I went to university with back in 1958 to 1964" "um who now lives in Vancouver"
C neither and element of the frame nor relevant to the topic	"actually lives up not in Vancouver but in... " "um where's where's the Olympics going to be this Winter?" "um that's where he lives"
D devoid of semantic content	"yeah"



## Discussion

- This is the first study analysing macro-linguistic features of coherence in the context of semantic impairment
- Results show semantic memory impairment is associated with reduction in coherence of semantic, but not episodic, information in discourse, which corroborates previous findings regarding micro-linguistic features
- Macro-linguistic processes have been said to not completely overlap micro-linguistic ones such as those required for processing and producing individual words and sentences (Glosser & Deser, 1992). This study demonstrates that semantic memory impairment affects global coherence. Additional studies will investigate other cognitive measures.

## Future steps

- A third round of interviews with svPPA patients and controls
- Investigation of the possible correlation between cognitive measures and coherence of discourse
- A study with non-fluent PPA as well as MCI patients, whose memory deficits differ from svPPA.

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