

Eléa MILLIEN\*, Melike SEMIZ & Isabelle SIMOES LOUREIRO

# Investigating the effect of Elaborated Semantic Feature Analysis on anomia in early Alzheimer's disease : Presentation of four cases studies

\*[elea.millien@student.umons.ac.be](mailto:elea.millien@student.umons.ac.be)

## INTRODUCTION

Alzheimer's disease (AD) is a common neurodegenerative pathology affecting more and more people worldwide (Wimo et al., 2015). Among its symptoms, **anomia** is early observed (Bertola et al., 2014) and **affects speech** (Frouin et al., 2014), due to a combination of **lexical retrieval deficit** and **semantic memory deterioration**. To overcome this lack of word, a method called Semantic Feature Analysis (SFA) was created by Ylvisaker and Szekeres (1985) and further developed by Massaro and Tompkins (1994). It is based on the **Network Theory** (Collins & Loftus, 1975) and reinforce the semantic networks of concepts by working on their semantic features, with the aim of involving their retrieval. Papathanasiou et al (2006) sought to extend this method and developed the **Elaborated Semantic Feature Analysis (ESFA)**, which is based on the same principles, but additionally requires the generation of a sentence incorporating semantic features of the concept to transfer learning to discourse. The aim of this study is to investigate the effects of this intervention on a population with early-stage Alzheimer's disease.

## METHODOLOGY

### POPULATION

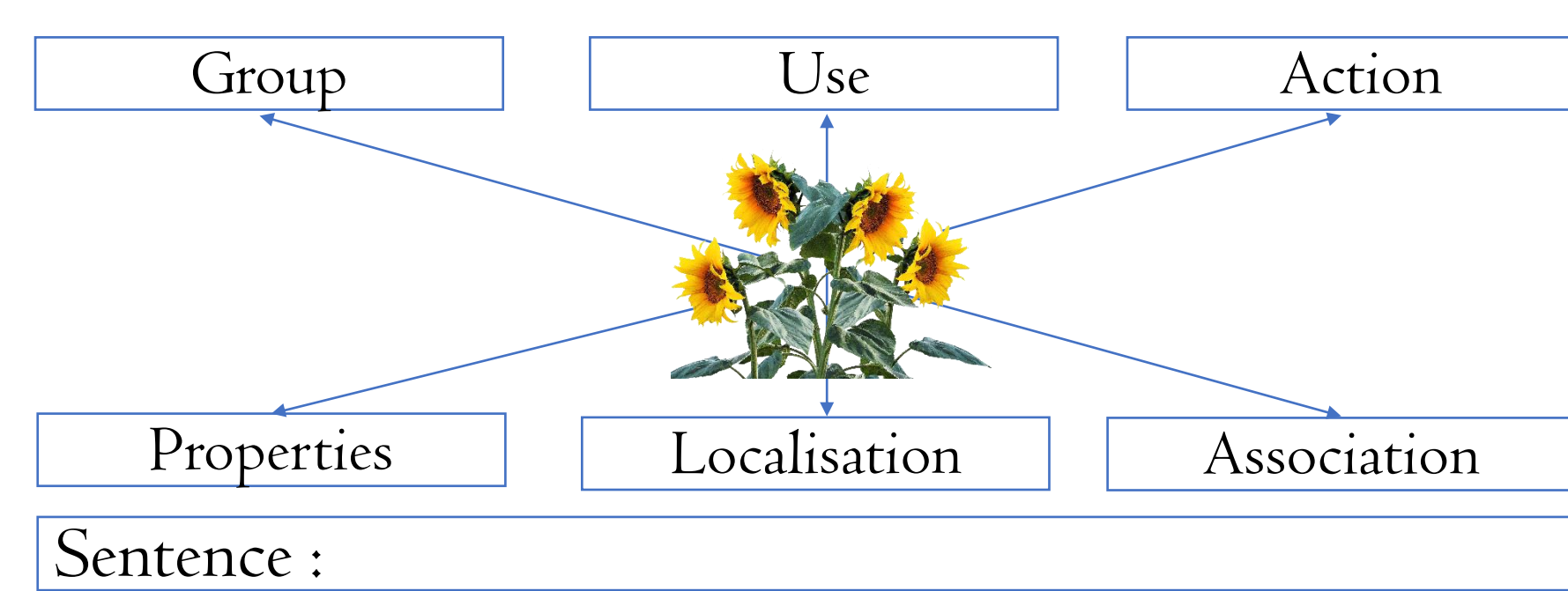
Four participants with early-stage AD were recruited

Inclusion criteria	Exclusion criteria
Diagnosis of AD	Uncorrected visual/hearing problems
Early stage of disease (MMSE $\geq$ 20)	Overly invasive anxio-depressive affects
Native language: French	Psychiatric disorders
Presence of lexico-semantic disorders	Neurological disorders other than AD

	Mrs A	Mrs B	Mrs C	Mrs D
Age	79	87	84	84
SCL (/4)	2	4	4	3
MMSE (/30)	23	20	22	20
BECS-GRECO (/40)	36	30	40	32
Mini-QCS (/12)	10	6	11	10
GDS (/15)	4	3	5	5
COVI (/12)	0	0	0	2

Legend : CCT = Camel and Cactus Test ; CETI = Communicative Effectiveness Index ; COVI = Anxiety Severity Scale ; FAB = Frontal Assessment Battery ; GDS = Geriatric Depression Scale ; Mini-QCS = Mini Semantic Knowledge Questionnaire ; MMSE = Mini-Mental State Examination ; QoL-AD = Quality of life in Alzheimer's disease ; SCL = Socio-Cultural Level

### MATERIAL

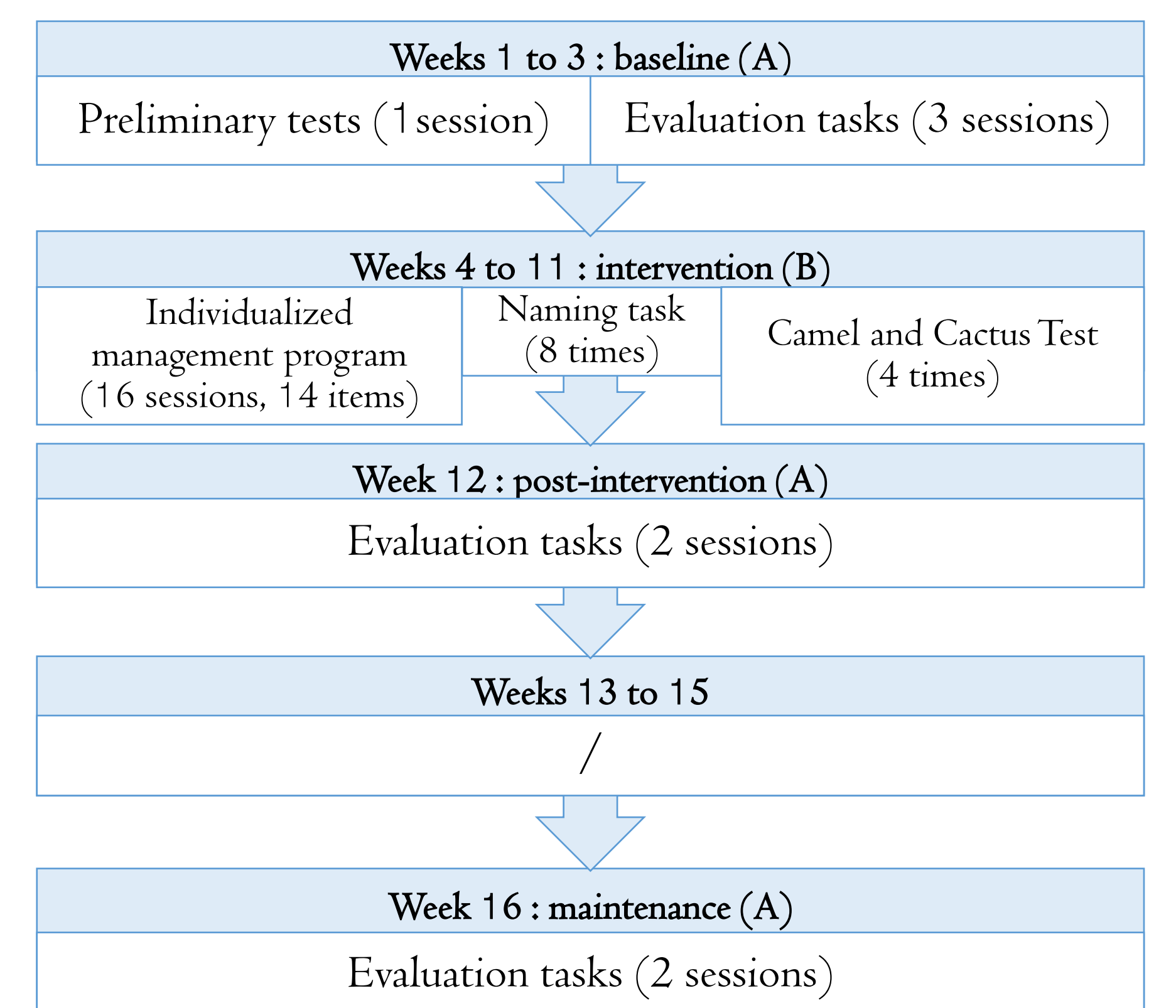


Preliminary tests	Evaluation tasks
MMSE (Cognitive skills)	Naming task (Lexical-semantic skills)
GDS 15 (Depressive affects)	CCT (Semantic matching)
Mini-QCS (Semantic knowledge)	Verbal fluency (Executive functions)
COVI (Anxiety)	FAB (Executive functions)
BECS-GRECO (Naming)	5 words (Episodic memory)
	GreMots (Speech task)
	CETI (Communication skills)
	QoL-AD (Life quality)

The naming task is a **primary repeated measure** and the CCT is a **secondary repeated measure**

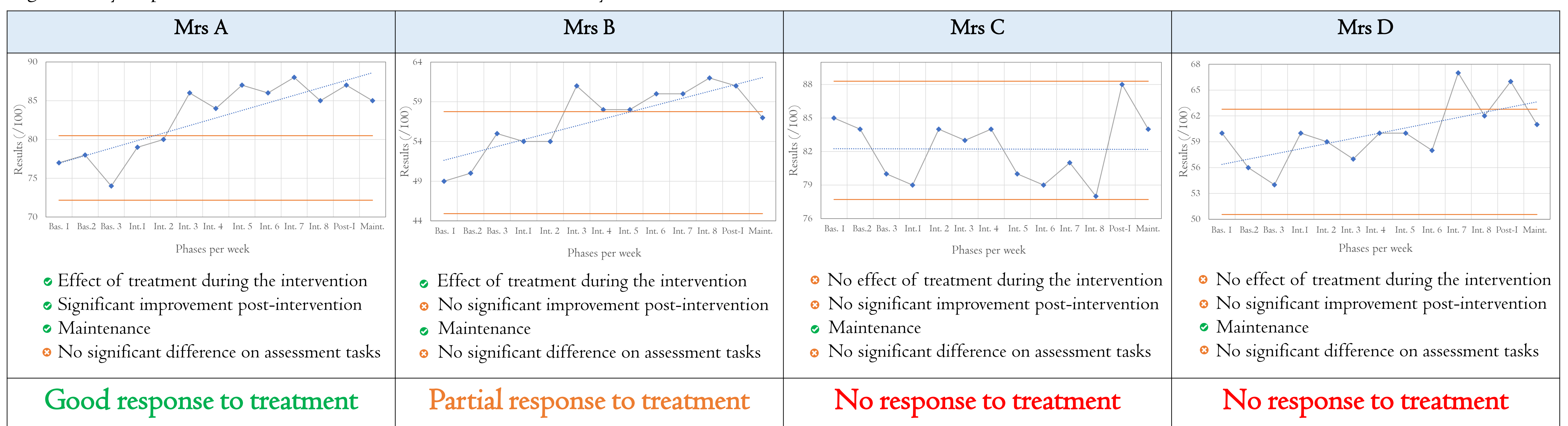
### EXPERIMENTAL DESIGN

The Single Case Experimental Design was used following the Evidence-Based Practice : a four-phase methodology (ABAA)



## RESULTS

By plotting an **envelope of two standard deviations** around the baseline mean, it is possible to determine whether the intervention had an effect. This can be seen if at least two consecutive treatment data points are above the envelope (Krasny-Pacini et Evans, 2018). The **Q' test** of Michael (2007) is used to determine whether the subject has significantly improved the tasks after the intervention and to verify maintenance.



## DISCUSSION

This study explored the benefits of ESFA in four case studies. The method was efficient for Mrs A who is the participant with the lowest age and the highest MMSE score, showing a significant improvement in naming and a sustained benefit in the maintenance phase. ESFA was partially efficient for Mrs B who does not achieve significant improvement after the intervention. We observed in these two participants a **semantic reorganization**, with variations in the type of errors, including fewer non-responses. In contrast, Mrs C and Mrs D's naming performances did not significantly change. However, the type of errors made in the naming task varied greatly from week to week, which could indicate a start of a reorganization of semantic memory and a need to extend treatment time. The transfer of learning to speech was not measured in our task for any participant, although a significant improvement in communication was noted in Mrs A's questionnaire. A certain stability in post-intervention and maintenance results could be a sign of a **slowdown in AD-related semantic decline**. In conclusion, the ESFA has enabled the semantic reorganization of two participants, although **different responses to treatment** are observed, which could be partly explained by the different general cognitive and semantic decline and possibly by the motivation, a factor that could be measured in future studies.

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