

Validation of the Brief Evaluation of Receptive Aphasia (BERA) tool in post-comatose patients: Preliminary data

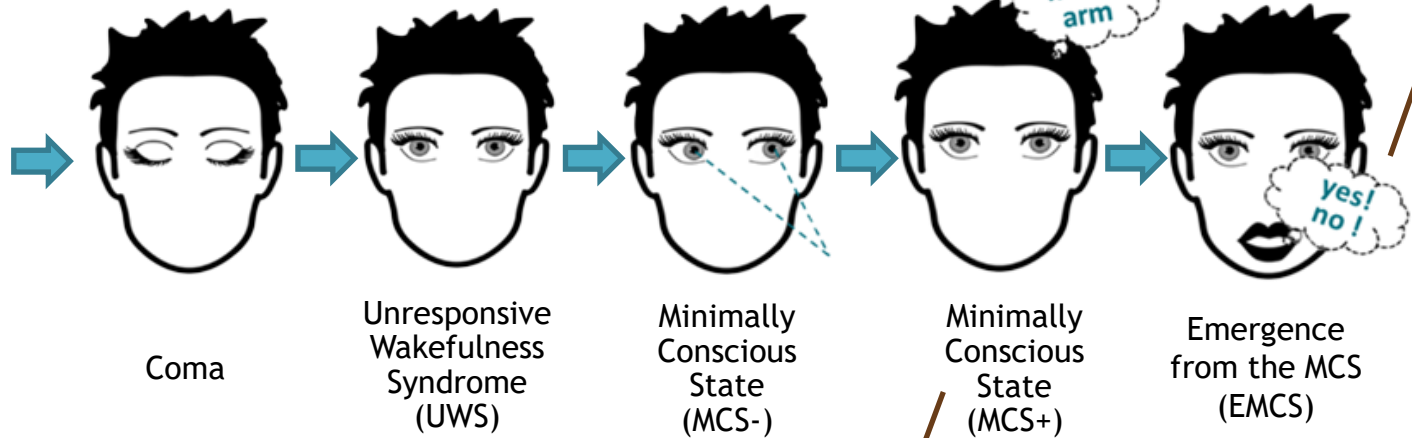
BAPS Meeting
May 31st, 2024

Aubinet, C., Regnier, A., Fritz, P., Pauls, M.,
Cardone, P., Gosseries, O. & Majerus, S.

Introduction

Language recovery after coma

Trauma
Anoxia
Hemorrhage
Metabolic
Infection
Inflammation



Functional communication and/or object use

Command-following
Intelligible verbalization
Intentional communication

Giacino et al., *Neurology*, 2002
Wannez et al., *Neuropsychol Rehabil*, 2017

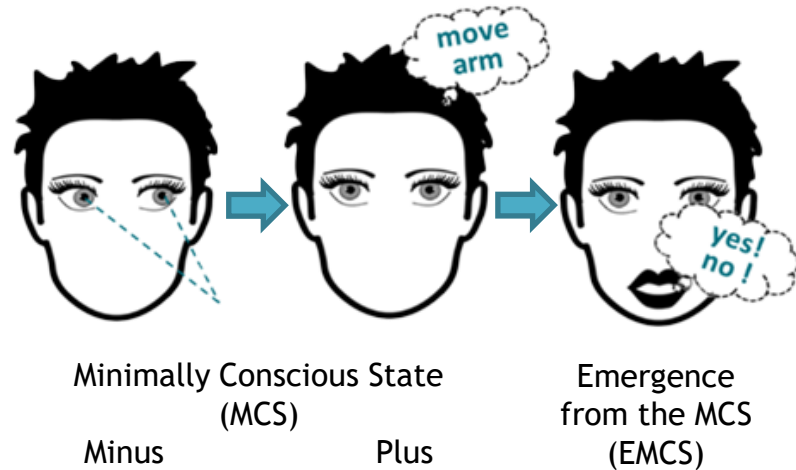
30-40% risk of DoC misdiagnosis

Deafness
Blindness
Motor impairment
Aphasia

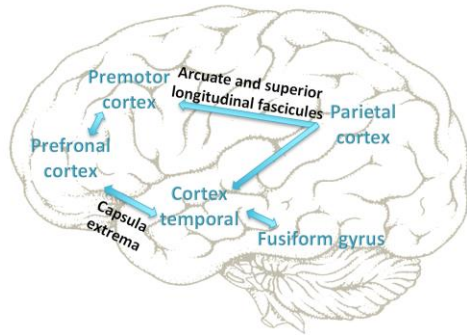
...



**Underestimated
consciousness!!!**



Aphasia in DoC diagnosis



Post-comatose language impairment



Altered comprehension of verbal commands

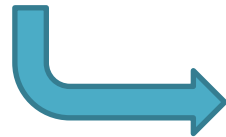


Underestimation of consciousness levels

24 conscious aphasic patients

→ CRS-R assessment

→ 54% of patients with global aphasia: diagnosis = MCS!



Crucial need to detect the presence of language disorders in post-comatose DoC patients

Behavioral scales include command-following

DoC diagnosis

BUT no language assessment...

- Language components?
- Psycholinguistic variables?

Towards a language-specific assessment



Elaboration of the

Brief Evaluation of Receptive Aphasia
(BERA)



Methods

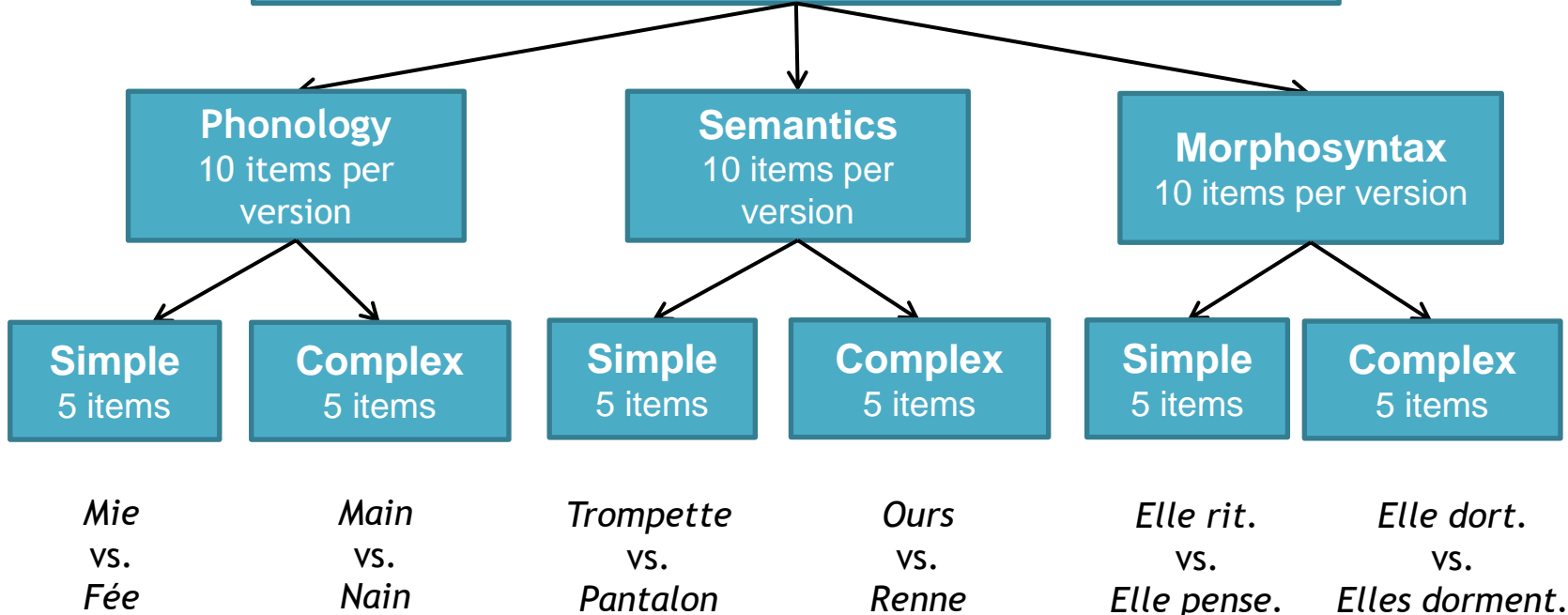
Elaboration of the BERA language-specific tool

Brief Evaluation of Receptive Aphasia (BERA)
2 versions of 30 items

Language
domain

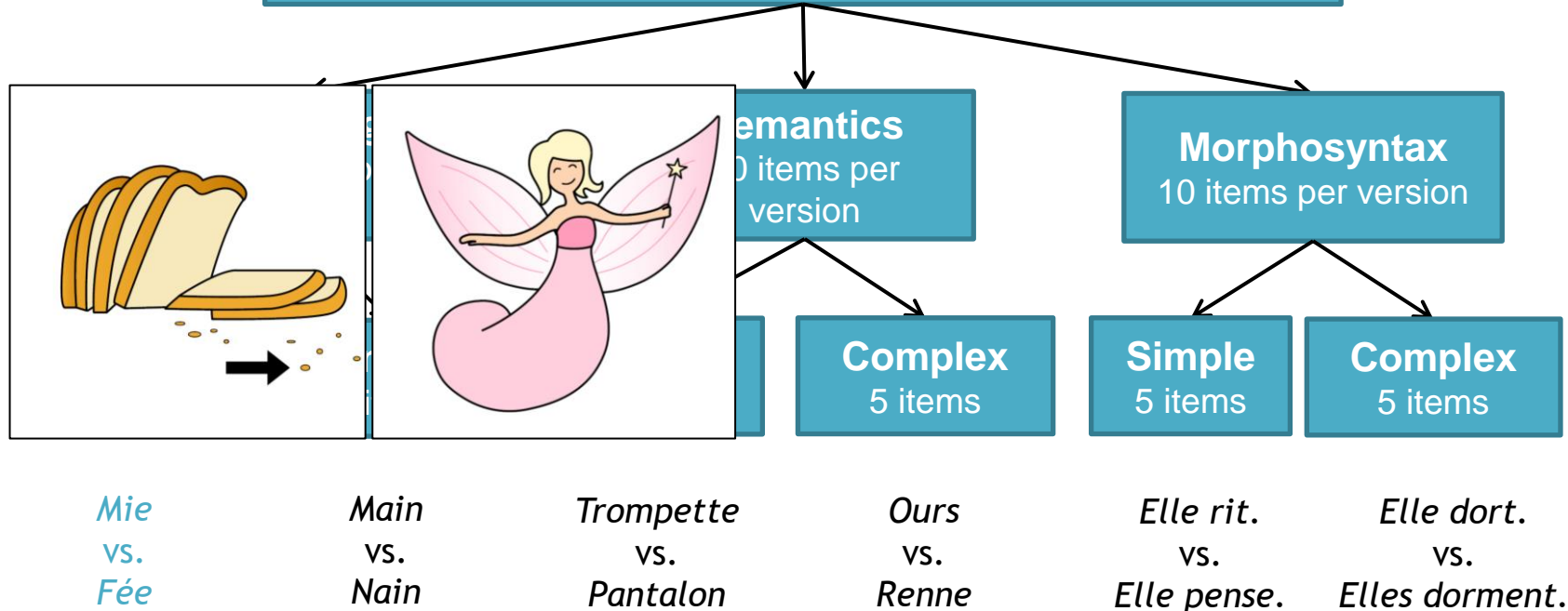
Complexity
level

Example



Elaboration of the BERA language-specific tool

Brief Evaluation of Receptive Aphasia (BERA)
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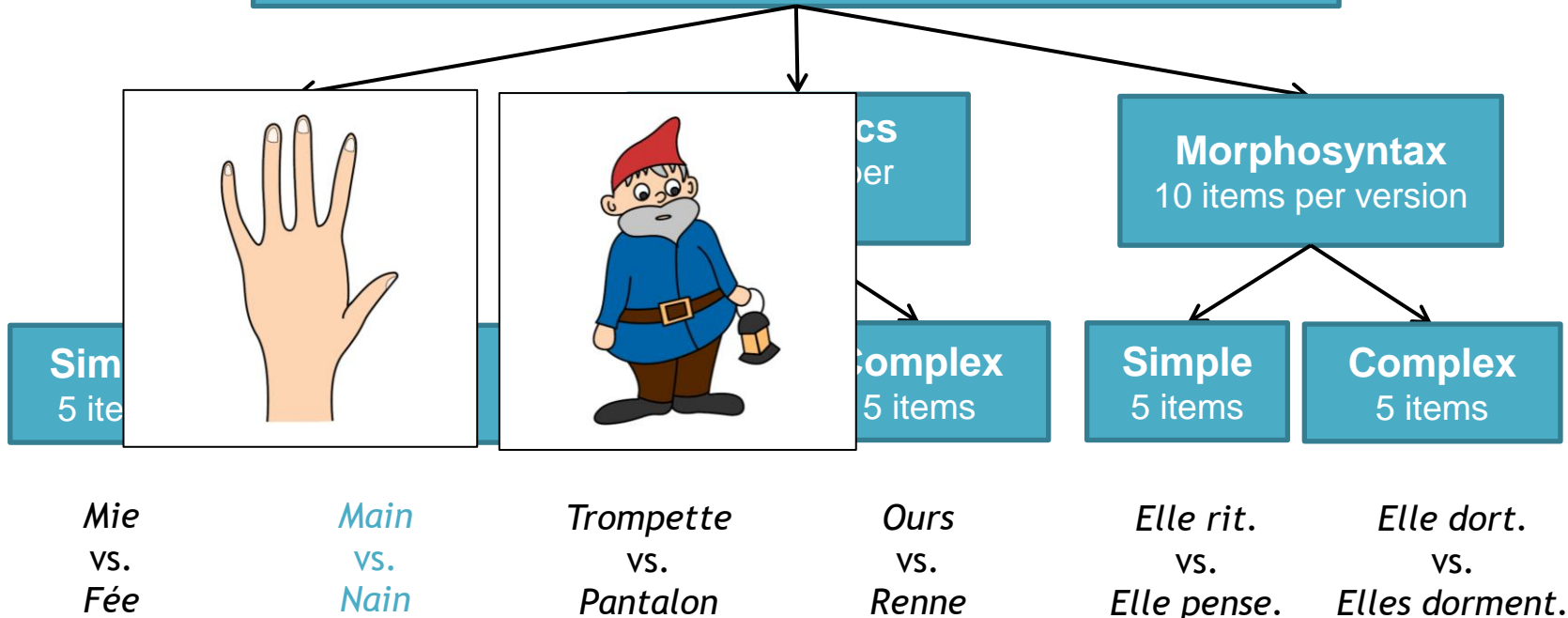
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Brief Evaluation of Receptive Aphasia (BERA) 2 versions of 30 items

Language domain

Complexity level

Example



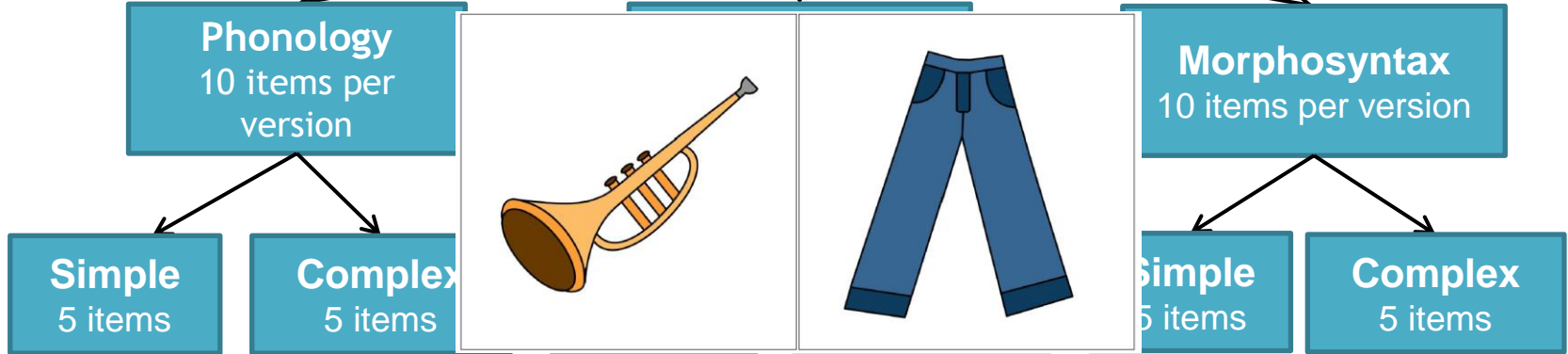
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2 versions of 30 items

Language domain

Complexity level

Example



Mie
vs.
Fée

Main
vs.
Nain

Trompette
vs.
Pantalon

Ours
vs.
Renne

Elle rit.
vs.
Elle pense.

Elle dort.
vs.
Elles dorment.

Elaboration of the BERA language-specific tool

Brief Evaluation of Receptive Aphasia (BERA)
2 versions of 30 items

Language domain

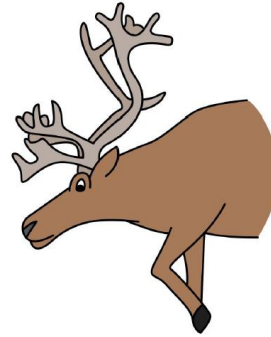
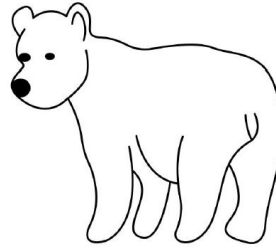
Complexity level

Example

Phonology
10 items per version

Simple
5 items

Complex
5 items



Morphosyntax
10 items per version

Simple
5 items

Complex
5 items

Mie
vs.
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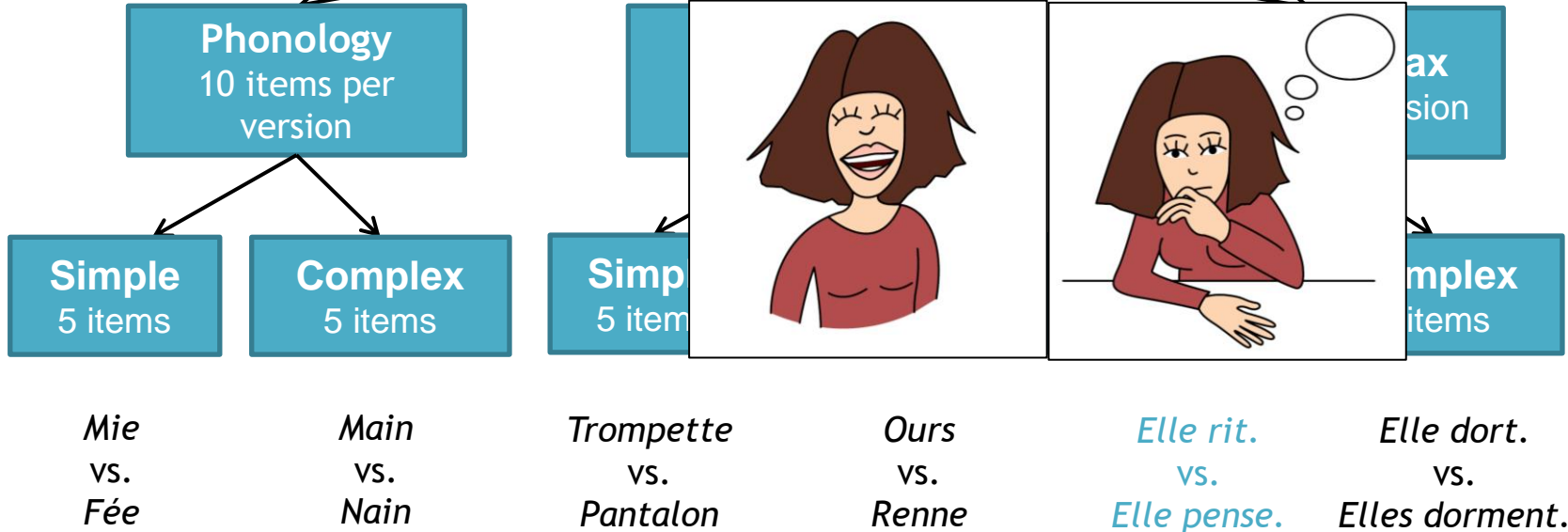
Elaboration of the BERA language-specific tool

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2 versions of 30 items

Language domain

Complexity level

Example



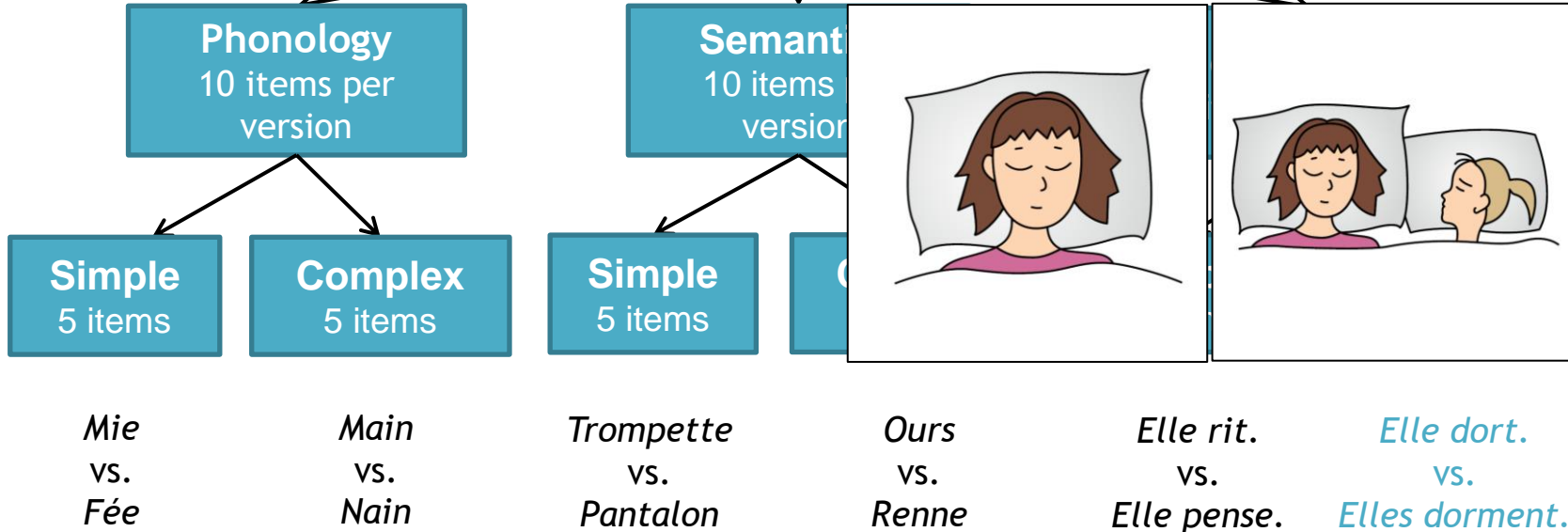
Elaboration of the BERA language-specific tool

Brief Evaluation of Receptive Aphasia (BERA)
2 versions of 30 items

Language domain

Complexity level

Example





Administration and scoring of the BERA tool

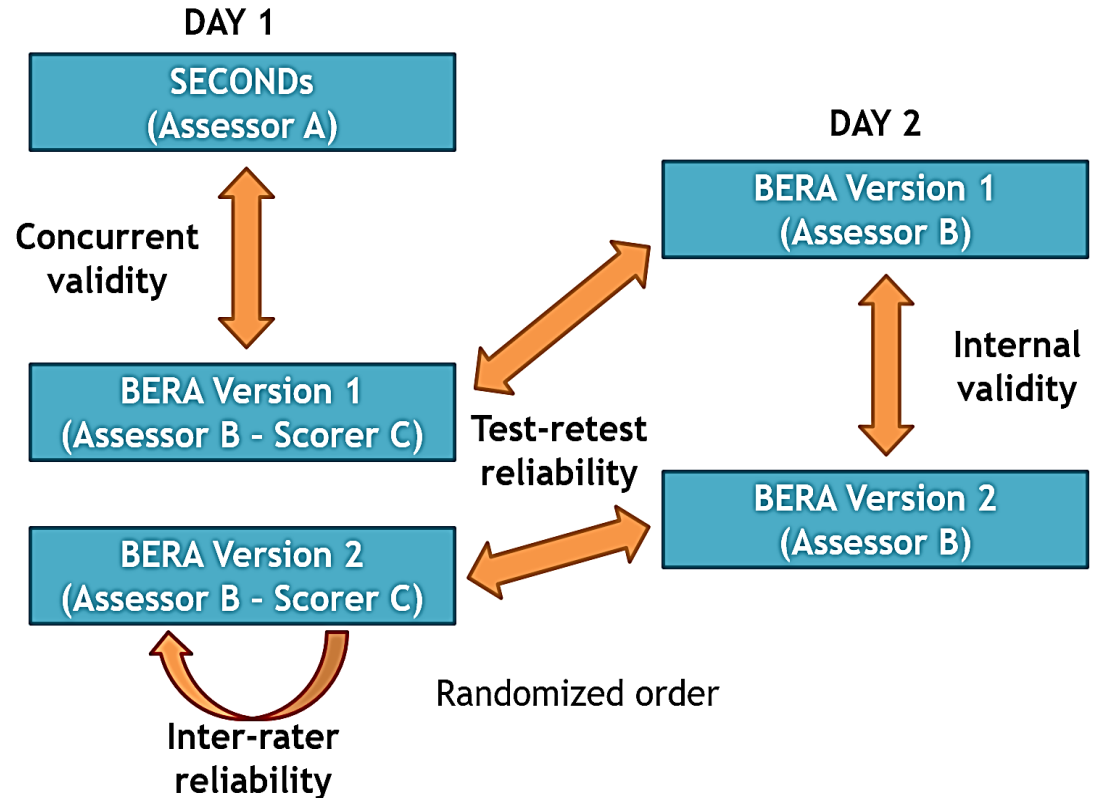
- ▶ Word comprehension (= phonology and semantics) then sentence comprehension if the patient succeeds at least for half of word targets
- ▶ For each item, indicate whether the fixation was:
 - Correct (C)
 - Incorrect (E) = towards the distractor
 - Hesitant (H) = from one image to the other one
 - Random (A) = elsewhere, anywhere
- ▶ Words /20 + Sentences /10
 - Subscales /10 → simple /5 vs. complex /5
 - + Semantics: /10 → frequent /5 vs. non-frequent /5
 - Left /10 or /15 vs. right /10 or /15
- ▶ Stop criterion : no visual fixation (either correct or incorrect) for 5 consecutive items



Inclusion criteria and validation procedure

n = 48 patients

- Coma following severe brain injury
- Time post-onset: > 28 days
- Age: 18-80 y.o.
- French-speakers
- Preserved visual fixation or pursuit

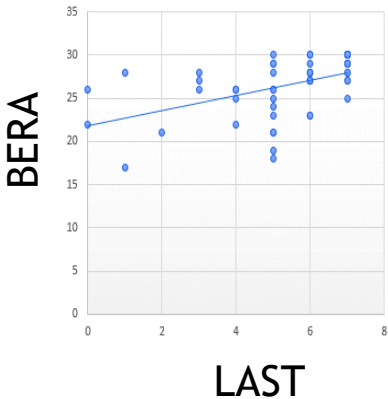


Preliminary results

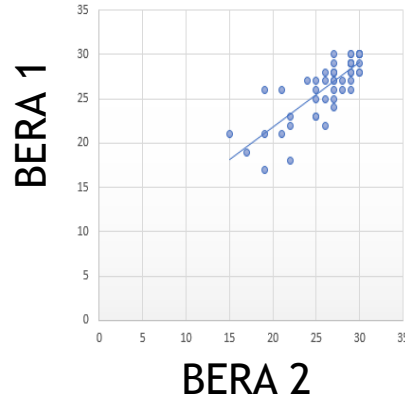


Validation in 52 aphasic conscious patients

Concurrent validity



Intra-rater reliability



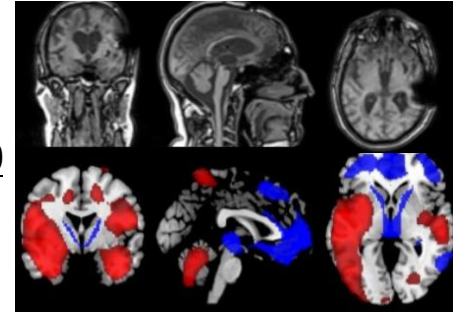
Inter-rater reliability: $\alpha=0,919^*$

Feasibility in post-comatose patients

BERA: 22/30
Phonology: 7/10
Semantics: 8/10
Morphosyntax: 7/10

CRS-R: 23/23

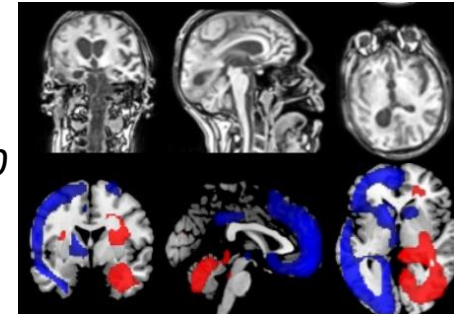
EMCS



BERA: 16/30
Phonology: 7/10
Semantics: 6/10
Morphosyntax: 3/10

CRS-R: 9/23

MCS-

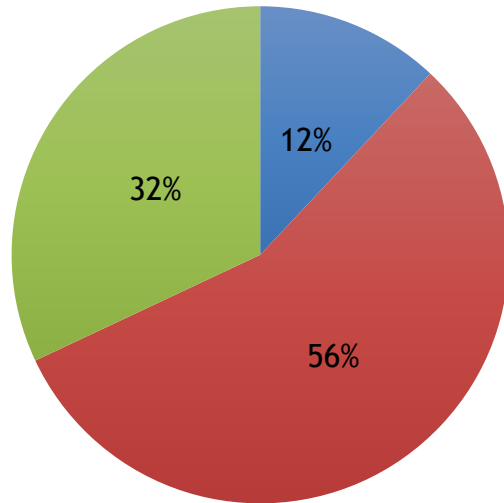


Validation of the BERA tool in post-comatose patients



25 post-comatose patients

DoC diagnosis



■ MCS- ■ MCS+ ■ EMCS

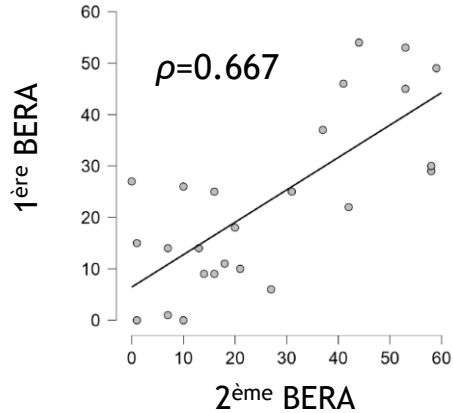
- Duration mean for one version: $11,4 \pm 4,6$ min
- 11/25 patients could perform the morphosyntax sub-scale
 - 4 MCS+
 - 7 EMCS



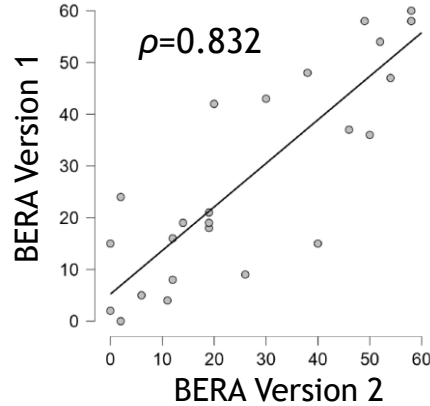
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Psychometric preliminary data (n = 25)

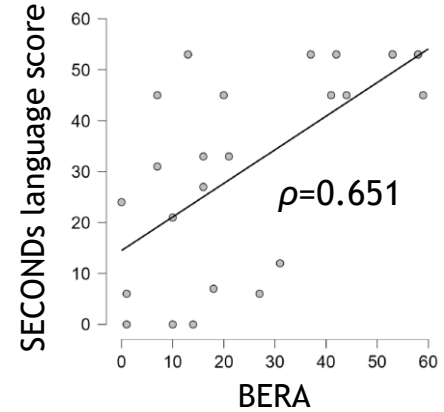
Test-retest reliability



Internal validity



Concurrent validity



Inter-rater reliability: ICC = 0.961

Conclusion



BERA assessment

- ▶ Importance to detect and characterize residual language abilities:
 - To improve/optimize speech-language therapies
 - To avoid the underestimation of consciousness levels!
- ▶ The BERA tool is promising
 - Feasible and appropriate for post-comatose patients
 - Validity of the BERA in conscious aphasic patients → Aubinet, et al. (2021), *Brain Injury*
 - Ongoing validation in post-comatose patients
- ▶ Perspectives
 - Computerized BERA tool using an eye-tracker
 - Ongoing Italian and planned English/Spanish adaptation





Questions?

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Open-access material :
<https://www.coma.uliege.be/severe-brain-injury/#dc-diagnosis>