

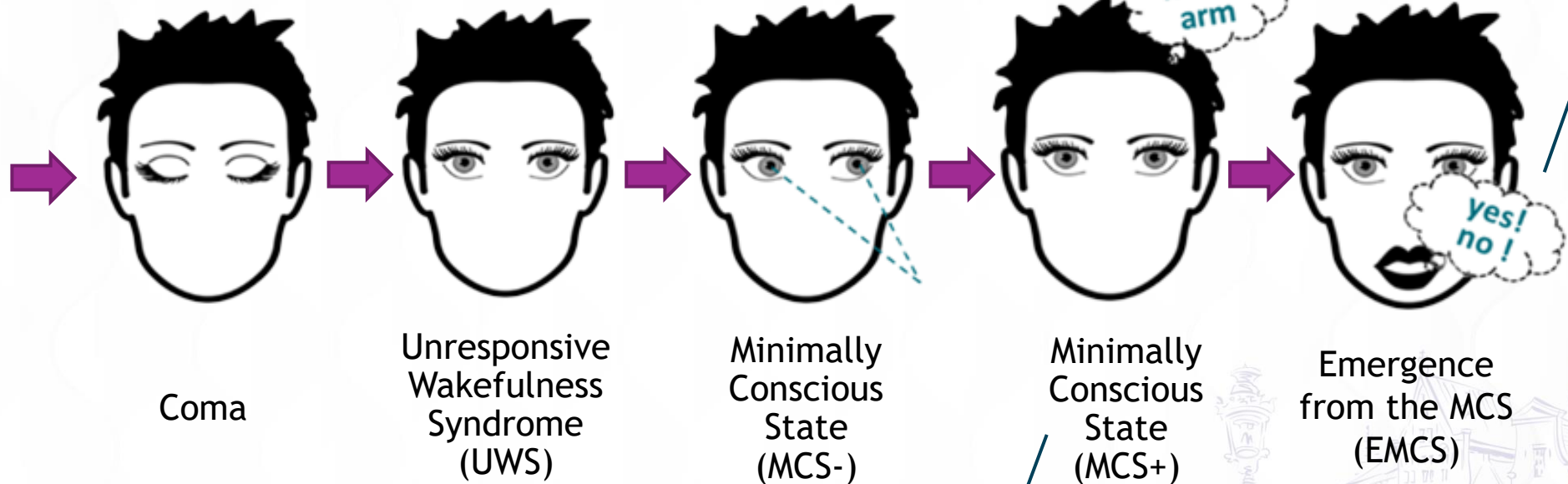
The Brief Evaluation of Receptive Aphasia (BERA) tool to assess language comprehension in post-comatose patients

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



Language recovery after coma

Trauma
Anoxia
Hemorrhage
Metabolic
Infection
Inflammation



Functional communication and/or object use

Command-following
Intelligible verbalization
Intentional communication

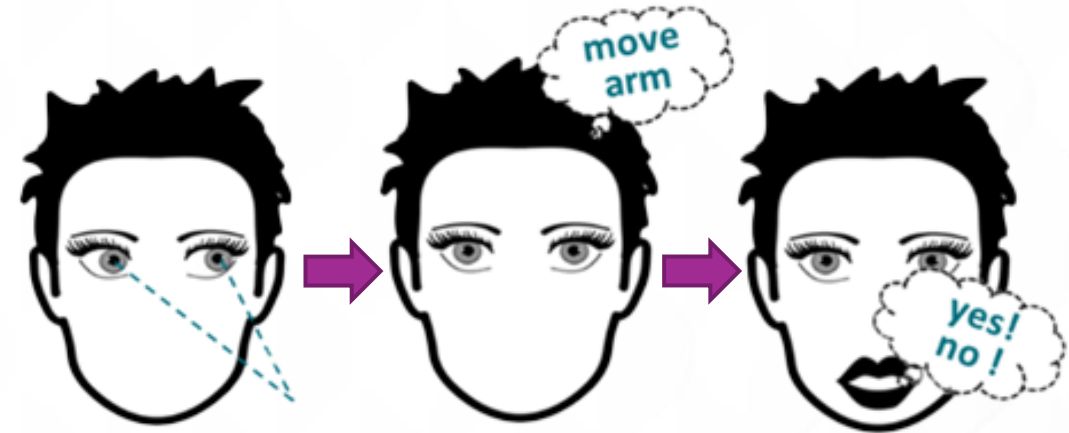
30-40% risk of consciousness misdiagnosis

Deafness
Blindness
Motor impairment
Aphasia

...



**Underestimated
consciousness!!!**



Minimally Conscious State
(MCS)
Minus Plus

Emergence
from the MCS
(EMCS)

Behavioral scales include command-following

Diagnosis of consciousness levels

BUT no language assessment...

- Language components?
- Psycholinguistic variables?

Towards a language-specific assessment

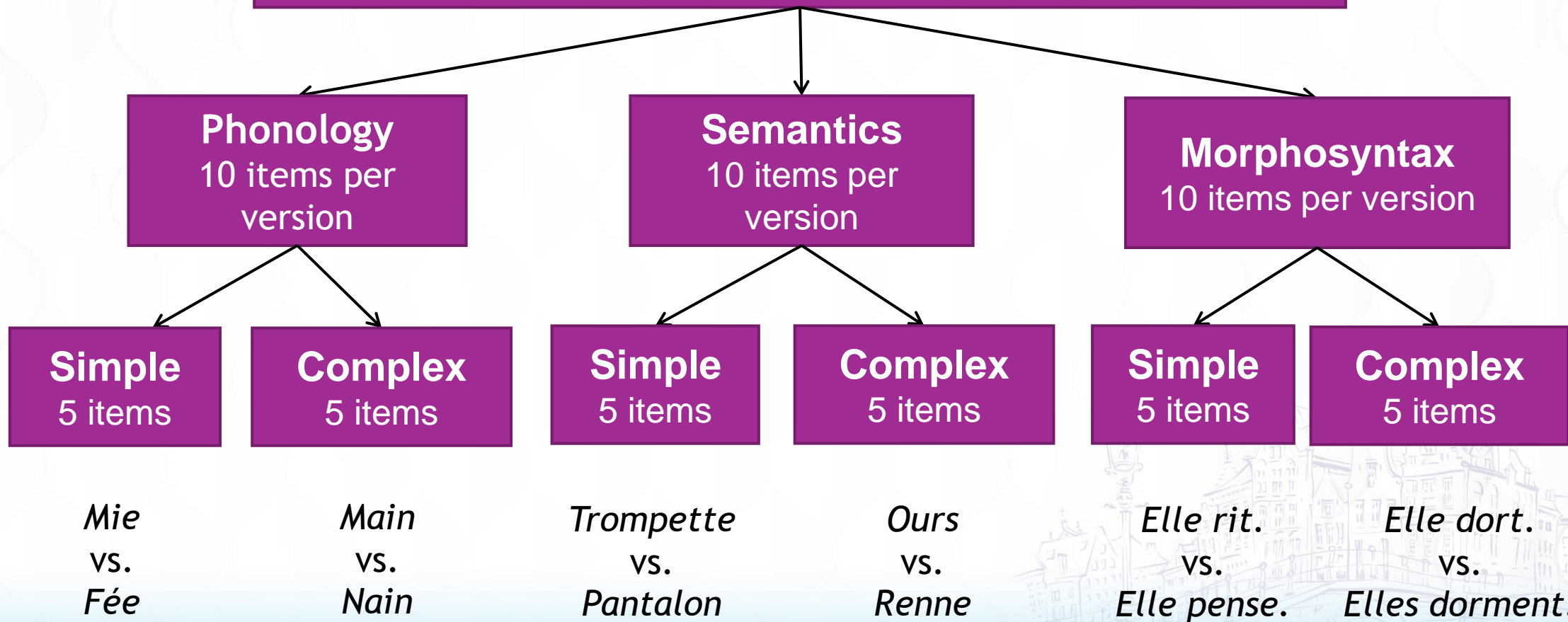
↳ Elaboration of the
Brief Evaluation of Receptive Aphasia
(BERA)



Elaboration of the BERA

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

Language domain
Complexity level
Example



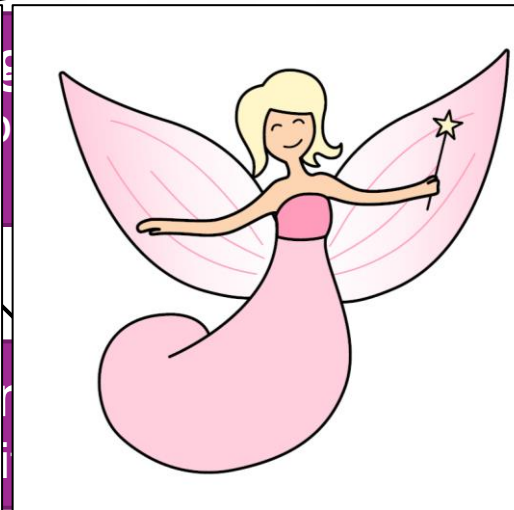
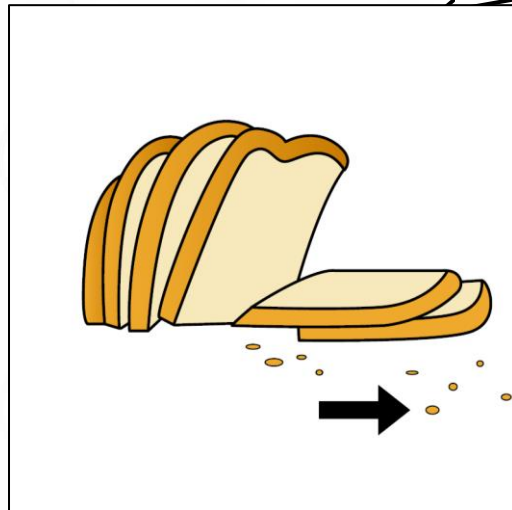
Elaboration of the BERA

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

Language domain

Complexity level

Example



Semantics
20 items per version

Morphosyntax
10 items per version

Complex
5 items

Simple
5 items

Complex
5 items

Mie
vs.
Fée

Main
vs.
Nain

Trompette
vs.
Pantalon

Ours
vs.
Renne

Elle rit.
vs.
Elle pense.

Elle dort.
vs.
Elles dorment.

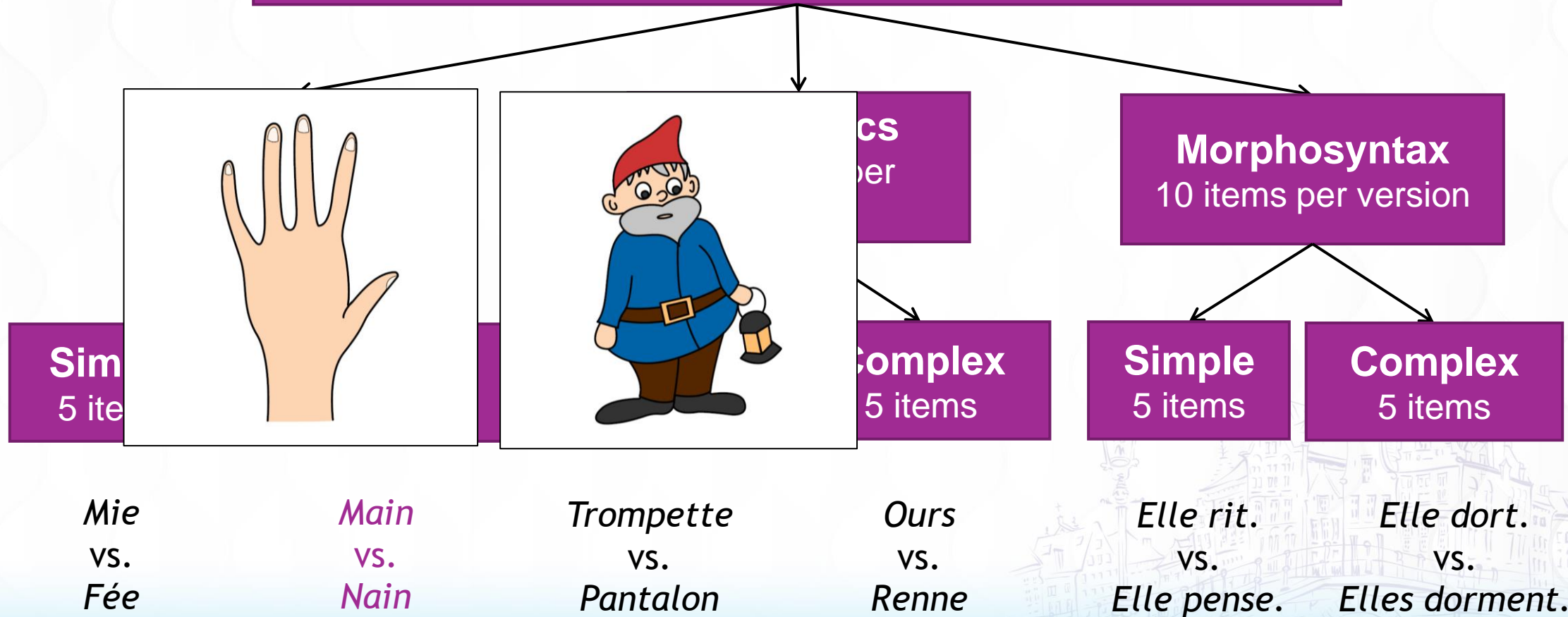
Elaboration of the BERA

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Language domain

Complexity level

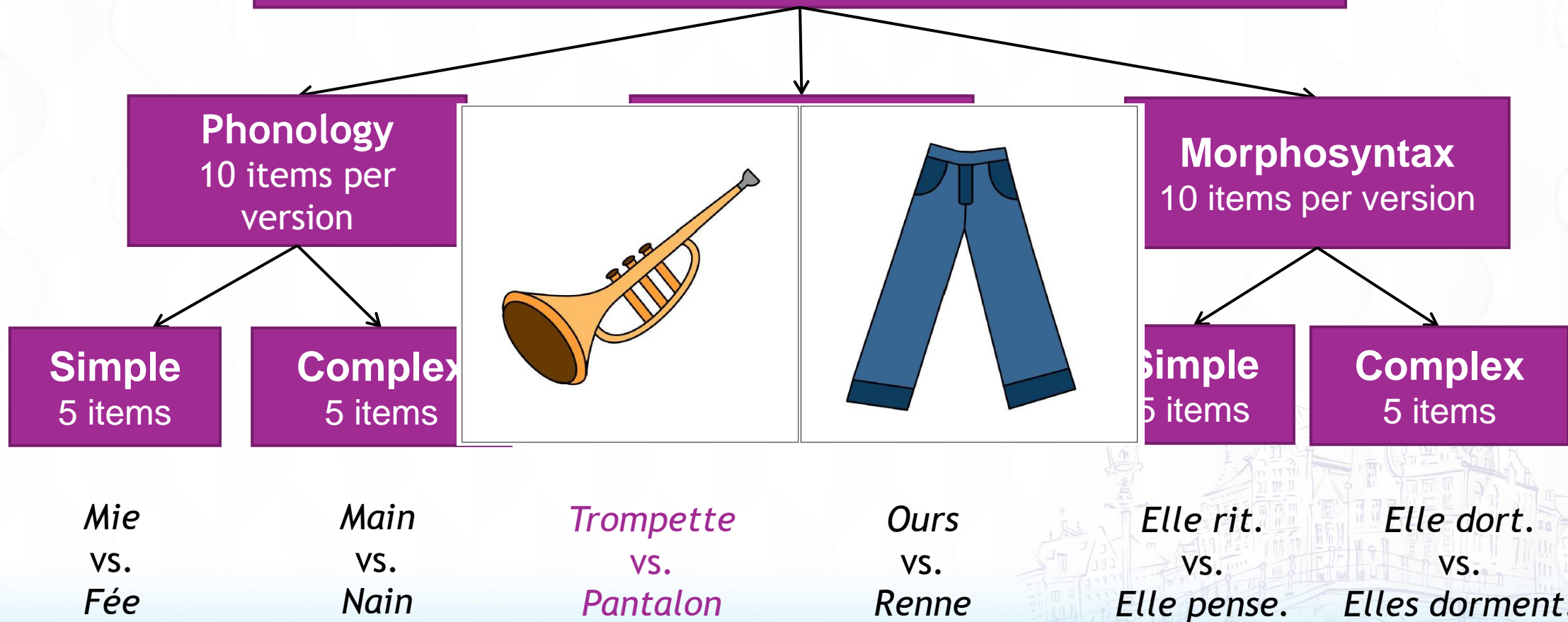
Example



Elaboration of the BERA

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

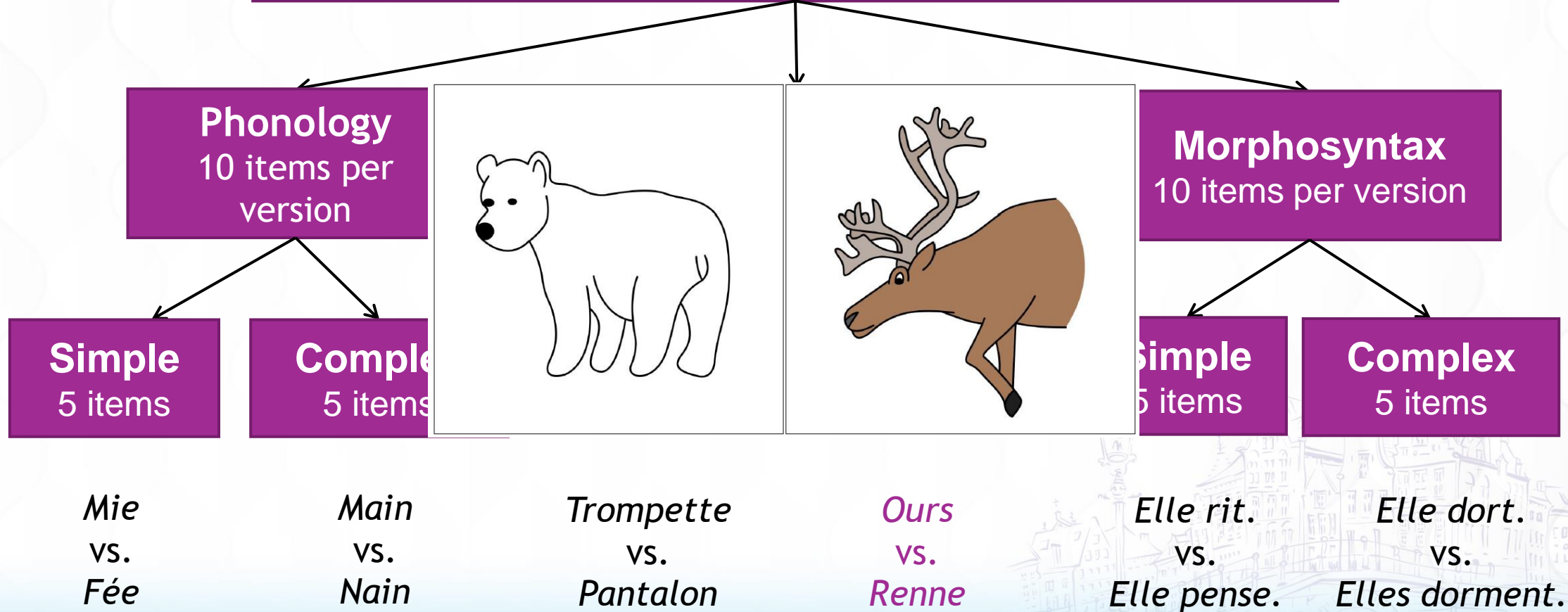
Language domain
Complexity level
Example



Elaboration of the BERA

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

Language domain
Complexity level
Example



Elaboration of the BERA

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

Simple
5 items



Max
sion

Complex
items

Mie
vs.
Fée

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vs.
Nain

Trompette
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Elaboration of the BERA

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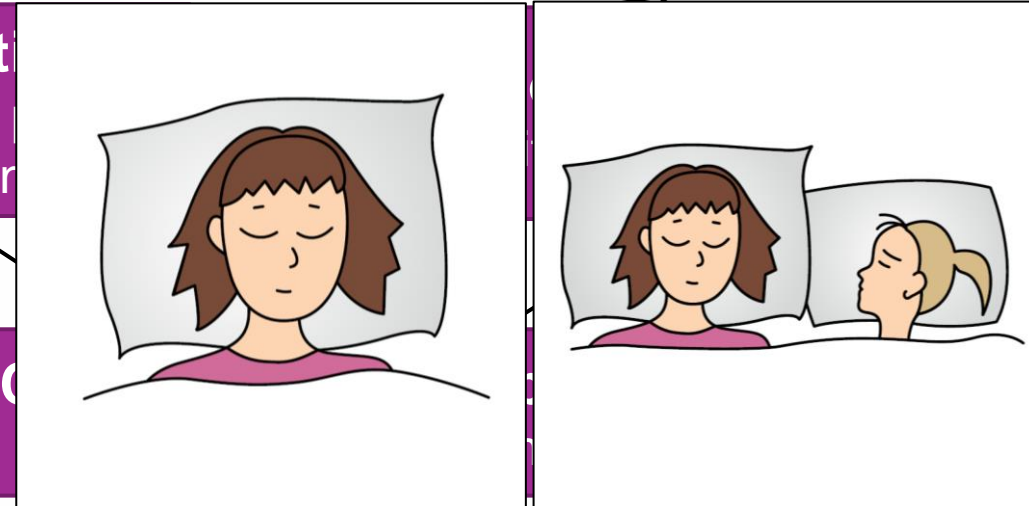
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Semantics
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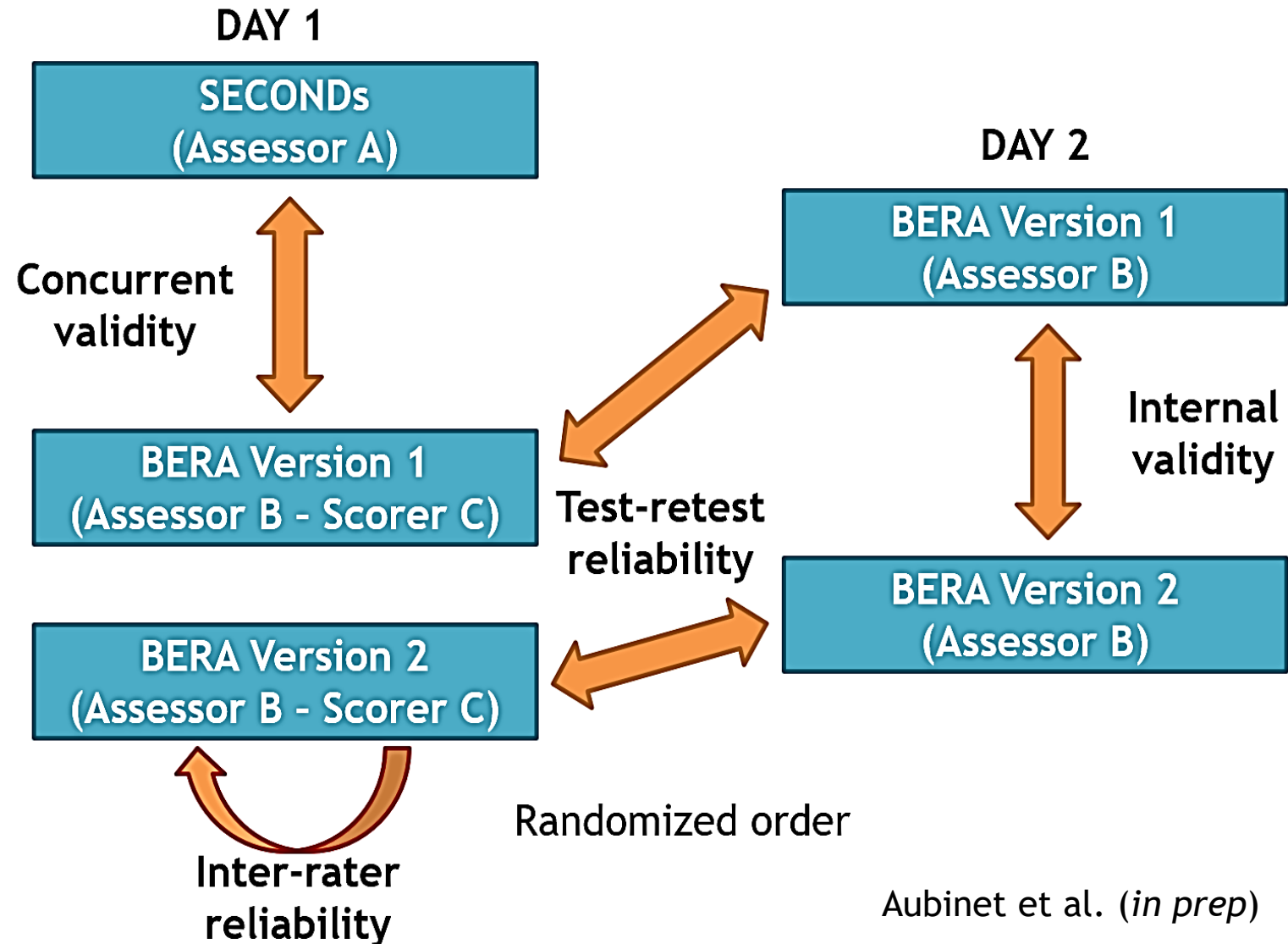
Elle dort.
vs.
Elles dorment.



Inclusion criteria and validation procedure

n = 48 patients

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



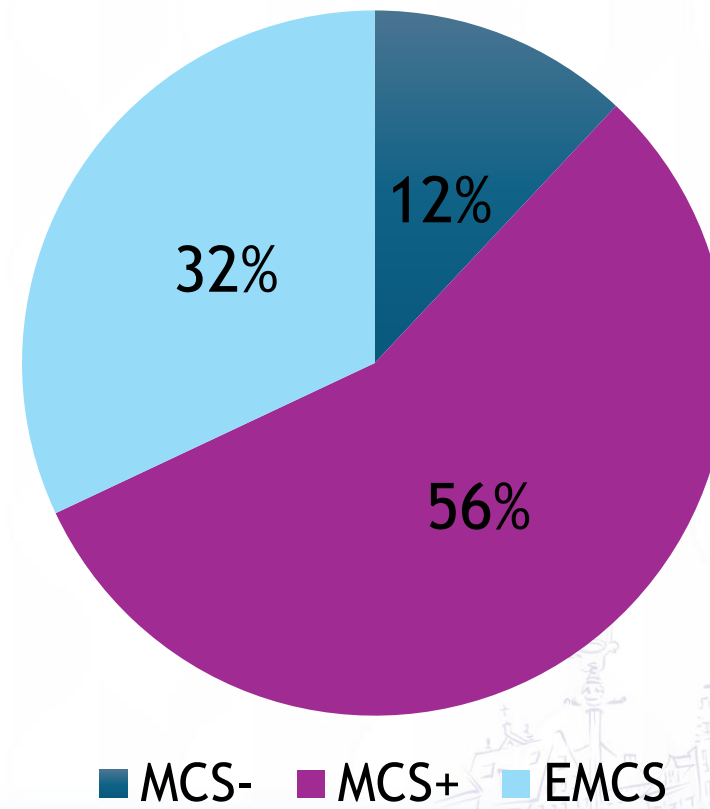


Validation of the BERA tool in post-comatose patients

25 post-comatose patients

- Duration mean for one version: $11,4 \pm 4,6$ min

DoC diagnosis

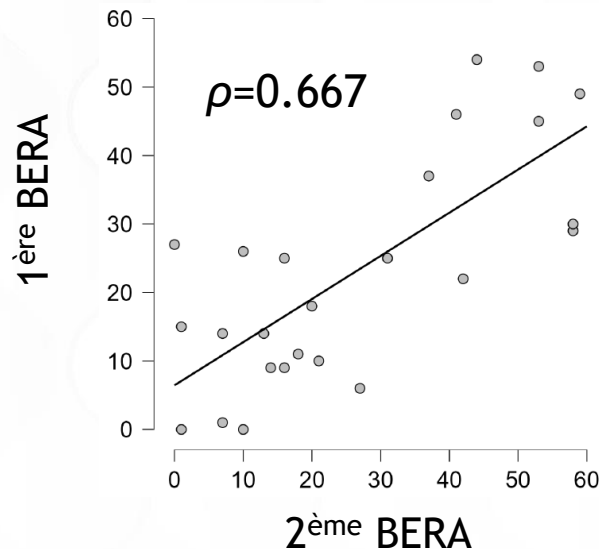




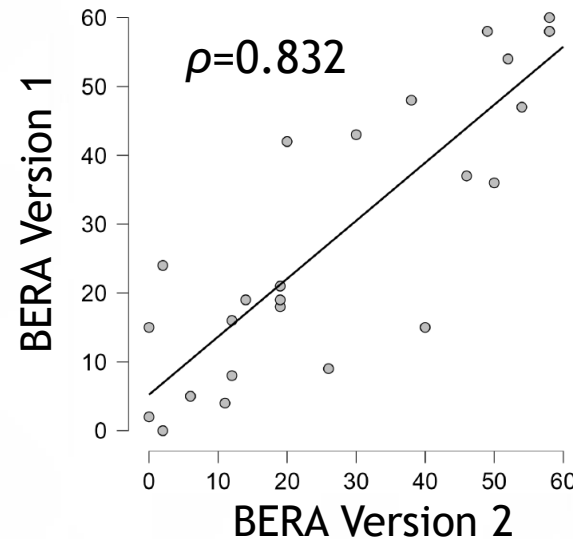
Validation of the BERA tool in post-comatose patients

Psychometric preliminary data (n = 25)

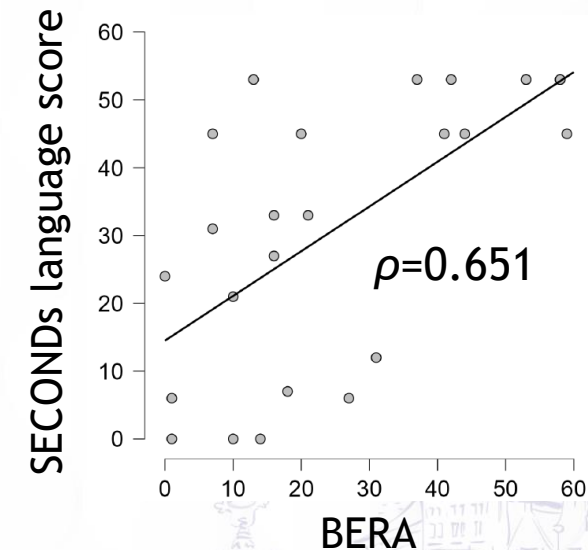
Test-retest reliability



Internal validity



Concurrent validity



Inter-rater reliability: ICC = 0.961



Conclusion & Perspectives

- The BERA may **complement the CRS-R or SECONDS** scales for assessing and diagnosing post-comatose patients
 - Reduce consciousness **misdiagnosis** in aphasic patients
- BERA scores also indicate **selective receptive difficulties** for phonological, semantic and morpho-syntactic abilities
 - Orient speech-language therapies
- Currently adapted in Italian, Spanish, Polish and German
- Development of a computerized BERA with eye-tracking



Thank you!

We need your help!

Open-access material :

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





Administration and scoring

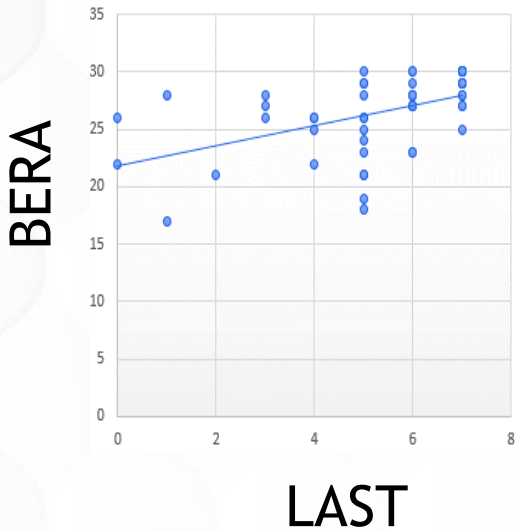
- Word comprehension (= phonology and semantics) then sentence comprehension if the patient succeeds at least for half of word targets
- For each item, indicate whether the fixation was:
 - Correct (C)
 - Incorrect (E) = towards the distractor
 - Hesitant (H) = from one image to the other one
 - Random (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



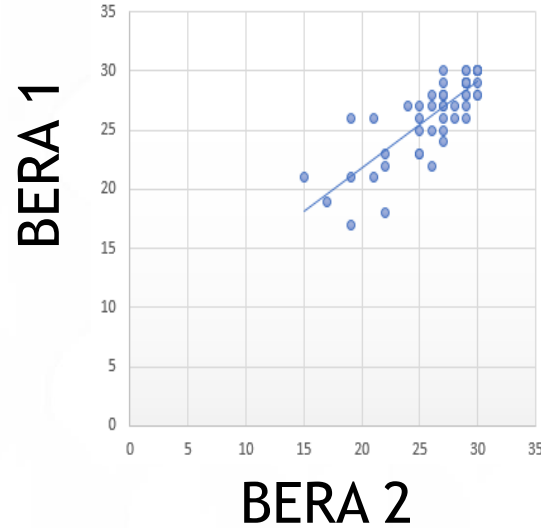


Validation in 52 aphasic conscious patients

Concurrent validity



Intra-rater reliability



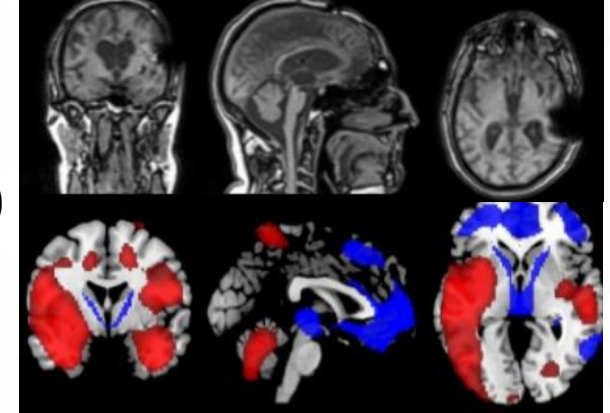
Inter-rater reliability: $\alpha=0,919^*$

Feasibility in post-comatose patients

EMCS

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

CRS-R: 23/23



MCS-

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

CRS-R: 9/23

