SIGN HUB

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Age of acquisition effects in the comprehension of syntactic structures in LIS and LSF

The SIGN-HUB project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 693349

- ASSESSMENT TOOLS
  - LIS
  - LSF
  - LSC
  - LSE
  - ISL

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  - LIS
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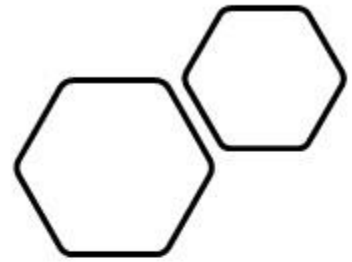
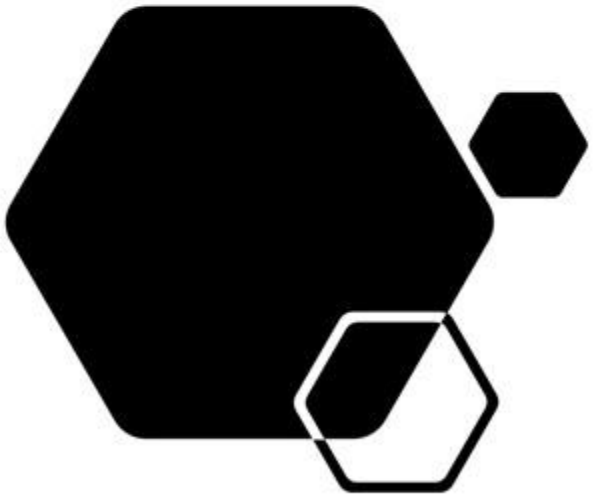
Roadmap

- The population(s) of Deaf signers
- The sign-hub assessment tools
  - RC and WHICH questions comprehension
    - **Effects of age of first language exposure (AoE)**
    - **Subject-Object asymmetries in sign languages**



The population(s) of Deaf signers



Deaf children

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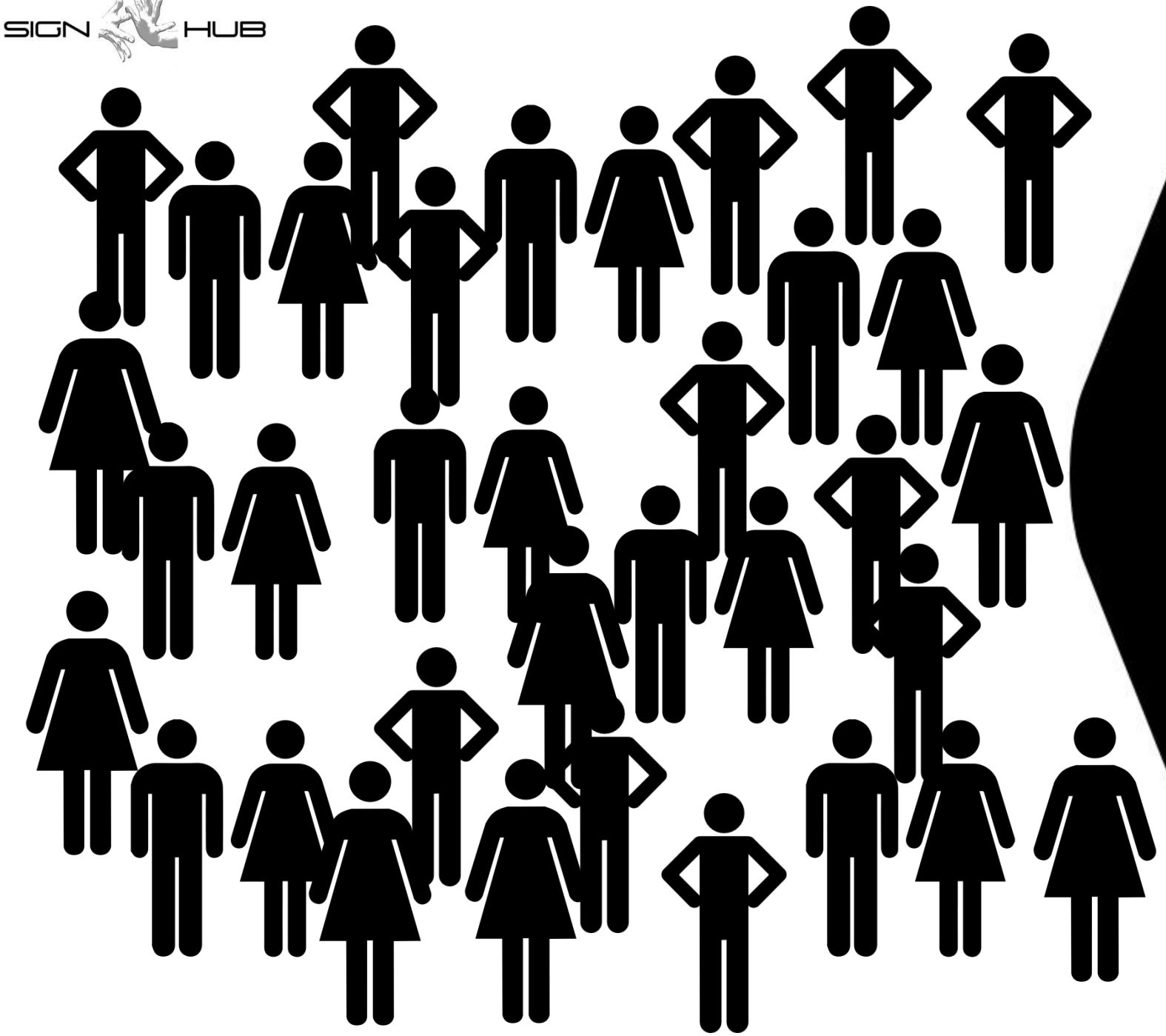

Deaf signers

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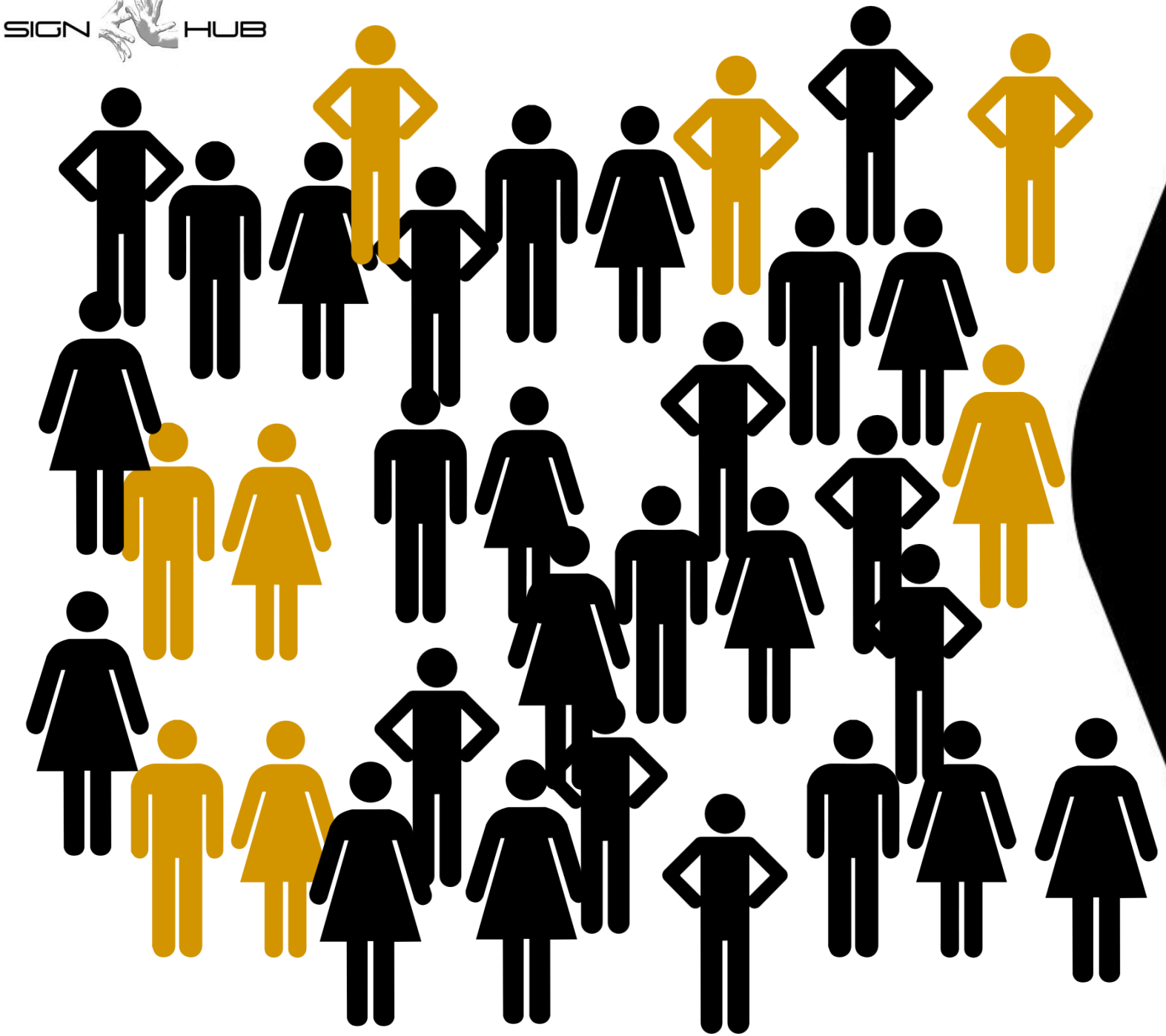


Native signers

Non-native signers: AoE might vary

SIGN  HUB

EARLY SIGNERS: first exposure during kindergarten, before age 6

LATE SIGNERS: first exposure between 6 and 15 years

In the present research, we did not consider participants with AoE > 15

Research question

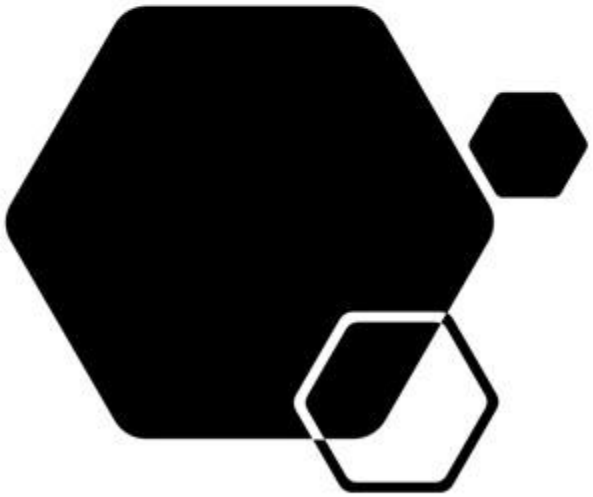
- What are the effects of AoE in adult sign language comprehension?

Language: sensible to critical periods phenomena (e.g. Werker and Hensch 2015)

Previous studies on AoE effects in sign language comprehension and processing

Mainly on ASL, e.g. Mayberry 1993: ASL sentence repetition task – performance declined as AoE increased
and BSL, e.g. Cormier et al. 2012: BSL grammaticality judgement task - performance declined as AoE increased until AoE = 8 yrs

The sign-hub assessment tools



The sign-hub assessment tools

Lexical Tasks	Comprehension	With phonological distractors
		With semantic distractors
	Production	Picture naming
	Comprehension and production	Opposites
Syntactic Tasks	Comprehension	WH Questions
		Relative Clauses
		Role-shift
		Agreement
	Production	Sentence repetition

The sign-hub assessment tools

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		Role-shift
		Agreement
	Production	Sentence repetition

Research question

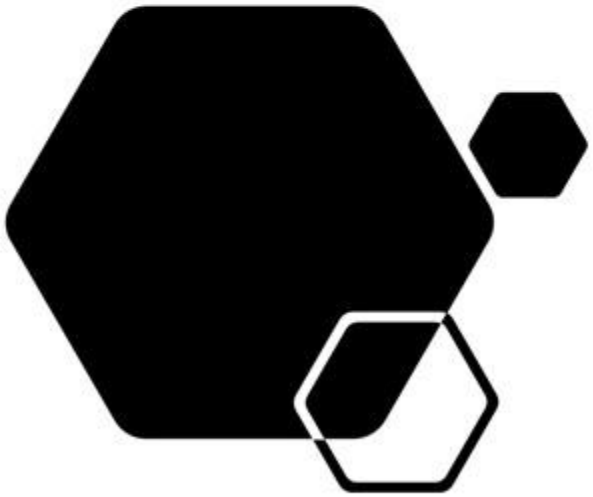
- Do we observe subject/object asymmetries in sign language comprehension?
  - Is it possible to detect (if any) a subject advantage considering the effects of late exposure to language?

SUBJECT/OBJECT ASYMMETRIES IN SPOKEN LANGUAGES, some exempla:

Advantage of subject over object in RC
- acquisition studies with TD children: e.g. Hu et al., 2016
-language processing studies: e.g. Yun et al., 2015

Deficits in the comprehension of object WHICH questions
- acquisition studies with children with SLI: e.g. Friedmann & Novogrodsky, 2011

Comprehension of RC



RC in LIS

SUBJECT RC

[$_{RC}$ **GIRAFFE$_k$** COW$_j$ CL$_{j\ k}$LICK$_j$ **PE$_k$**] CLICK

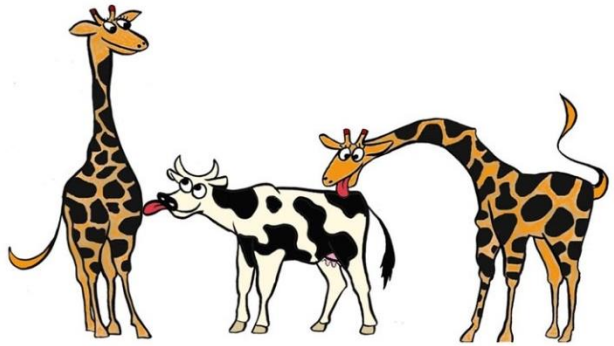
OBJECT RC

[$_{RC}$ **GIRAFFE$_k$** CL$_k$ COW$_{j\ j}$LICK$_k$ **PE$_k$**] CLICK

'(You) have to click the giraffe that licks the cow/ the cow licks.'

LIS

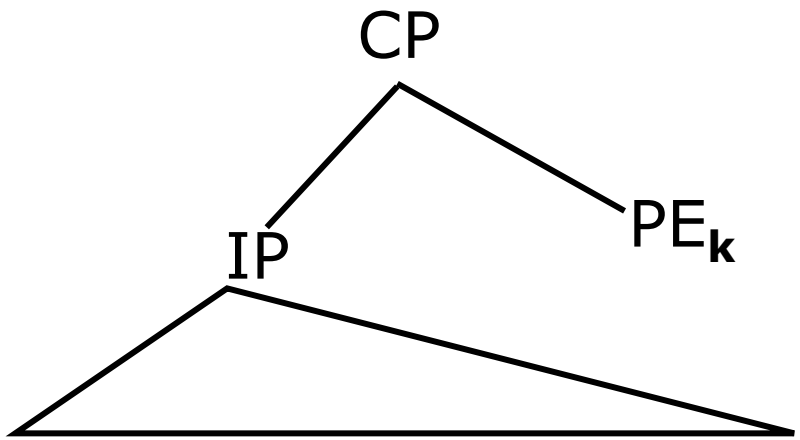
SOV language. Fronted internally headed RC (Branchini, 2014)



RC in LIS

SUBJECT

SUBJECT RC

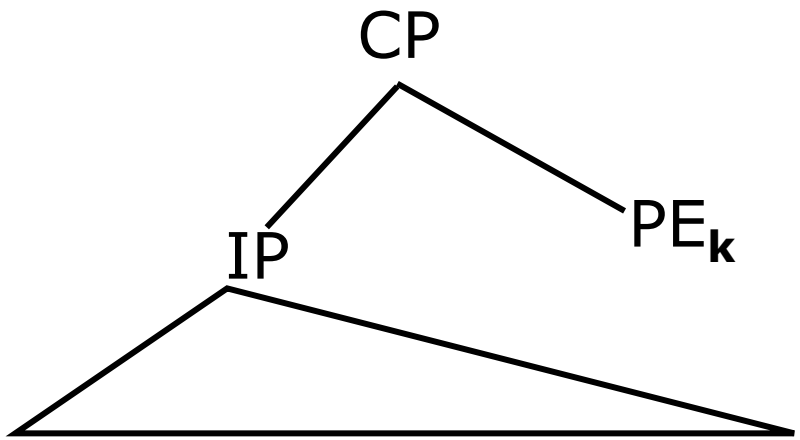


GIRAFFE$_k$ COW$_j$ CL$_j$ $_k$LICK$_j$

RC in LIS

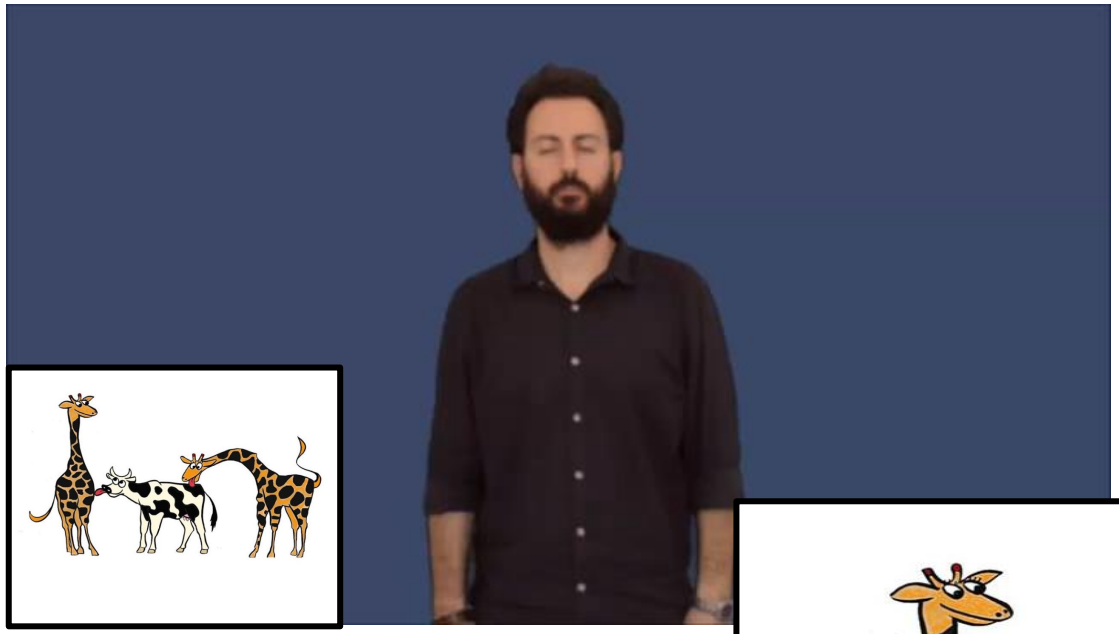
OBJECT

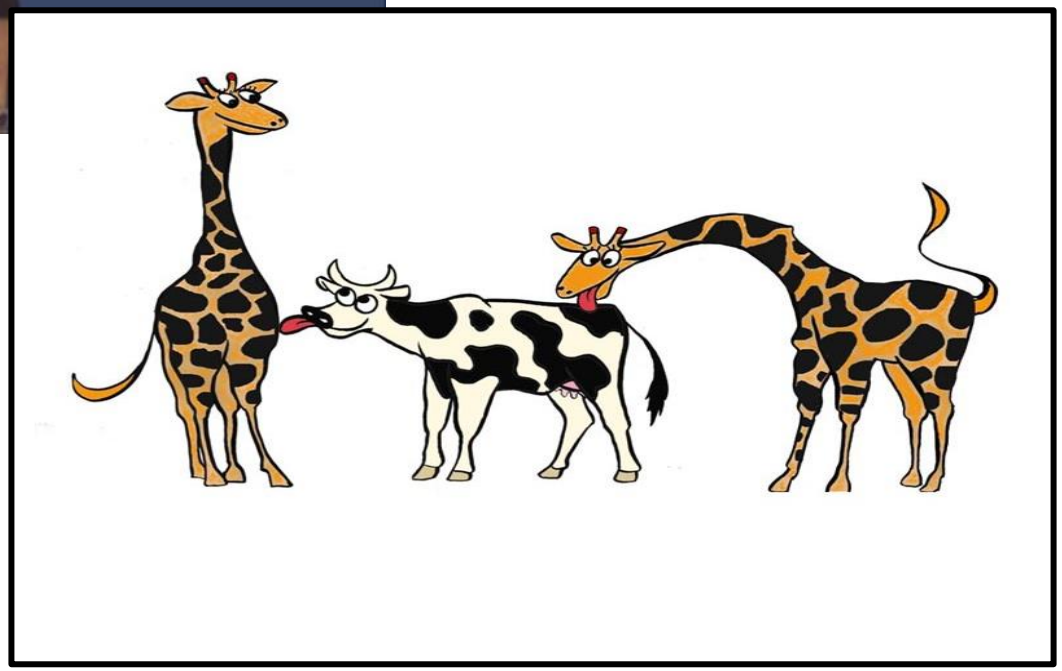
OBJECT RC

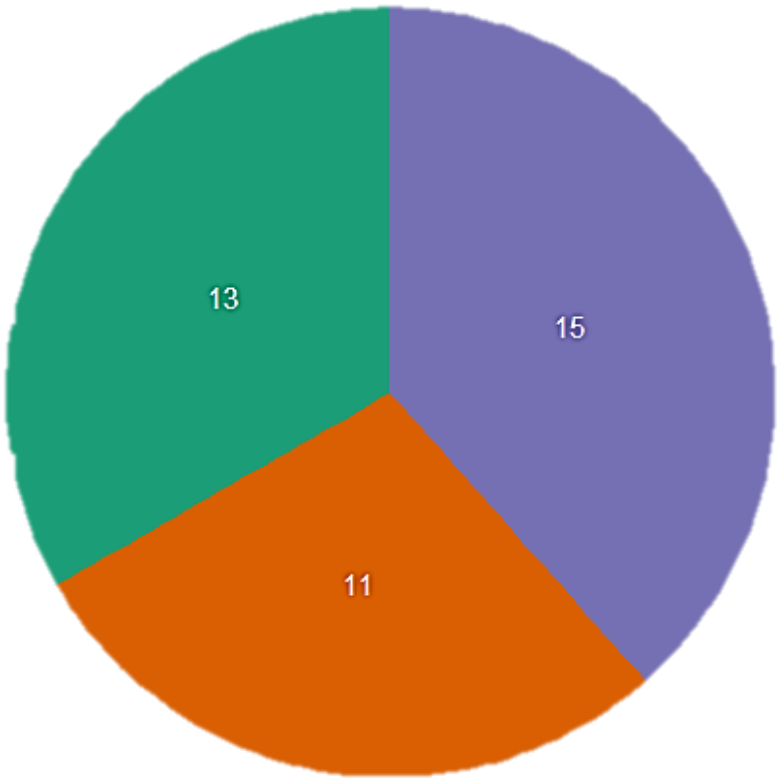


GIRAFFE$_k$ CL$_k$ COW$_j$ $_J$LICK$_k$

Procedure







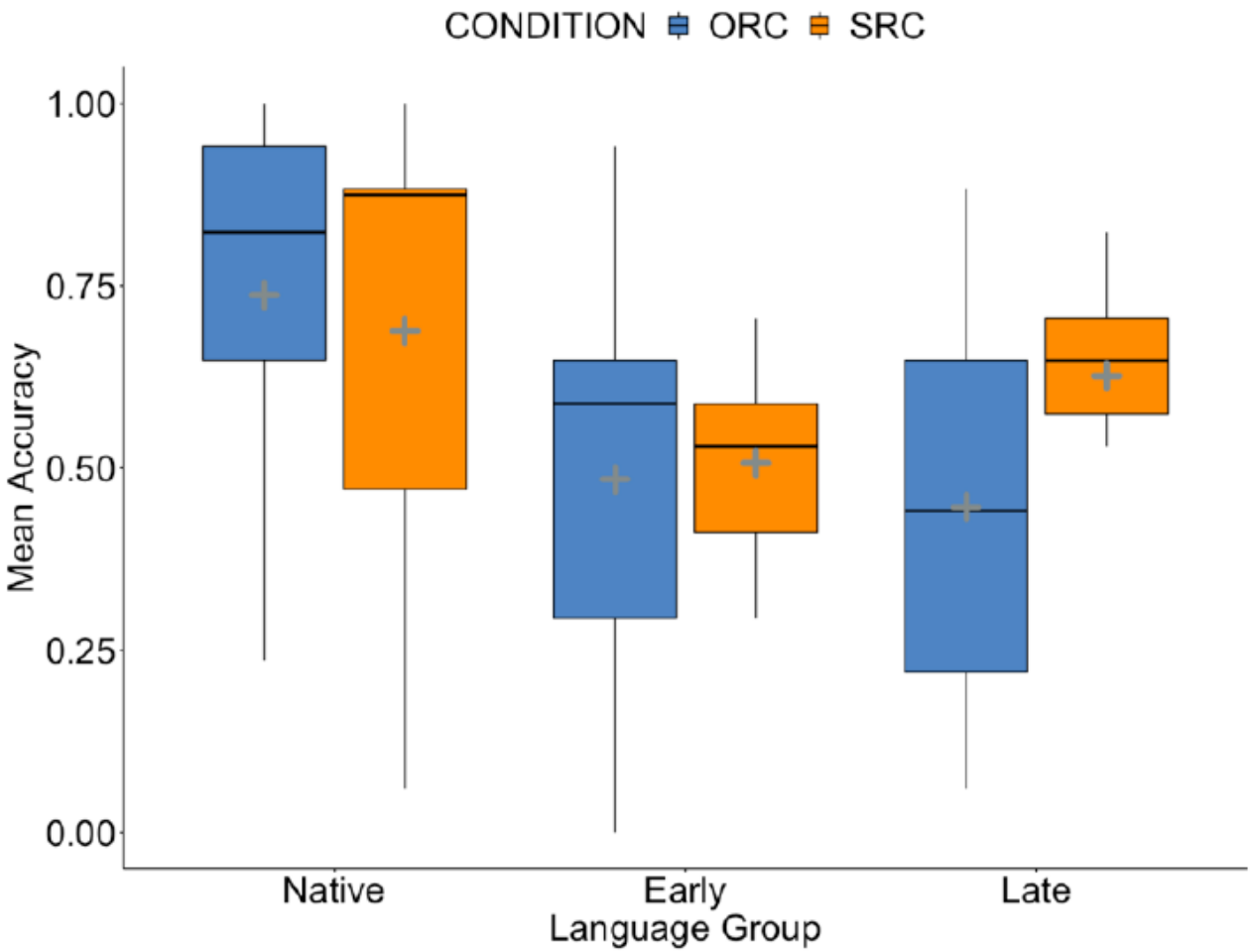
Group
Early
Late
Native

N=39

RC Task

Participants

19 F; 20 M
Mean age=46years
(SD=9 years)



Results

SUBJECT ADVANTAGE
Late signers: ORC < SRC (p=0.0001)

AGE OF EXPOSURE
Native performed better than Early signers in ORC (p=0.001) and SRC (p=0.02)
Native performed better than Late signers in ORC (p=0.0003)

RC in LSF

SUBJECT RC

HAVE-TO CHOOSE **GIRAFFE$_i$** [$_{RC}$ **PI$_i$** ___ $_i$LICK$_j$ COW$_j$]

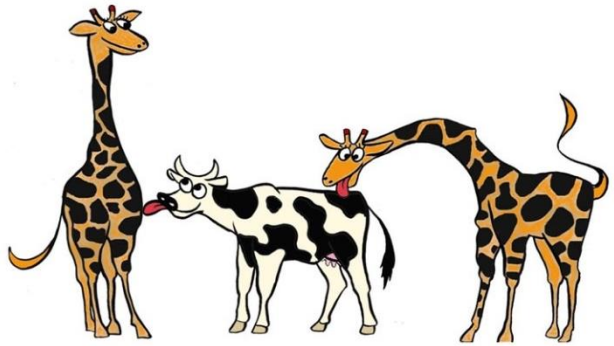
OBJECT RC

HAVE-TO CHOOSE **GIRAFFE$_i$** [$_{RC}$ **PI$_i$** COW$_j$ $_j$LICK$_i$ ___]

'(You) have to click the giraffe that licks the cow/ the cow licks.'

LSF

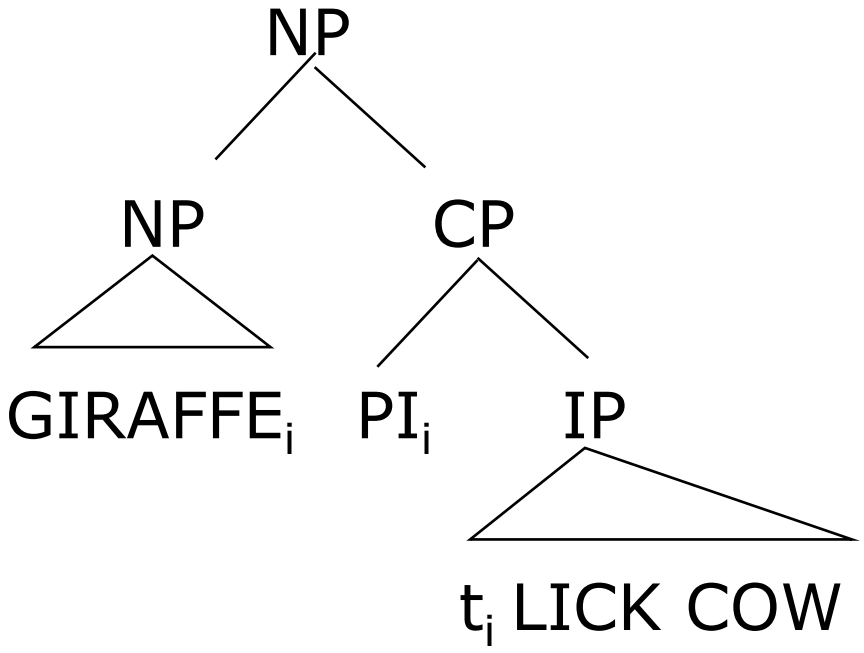
SVO language. Post nominal, externally headed RC (Hauser & Geraci, 2016)



RC in LSF

SUBJECT

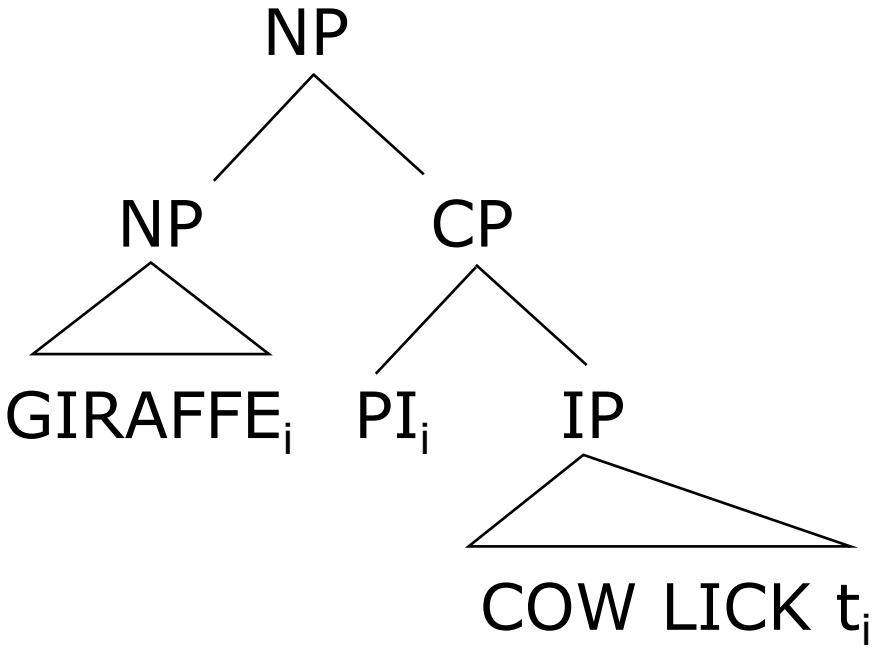
SUBJECT RC



RC in LSF

OBJECT

OBJECT RC



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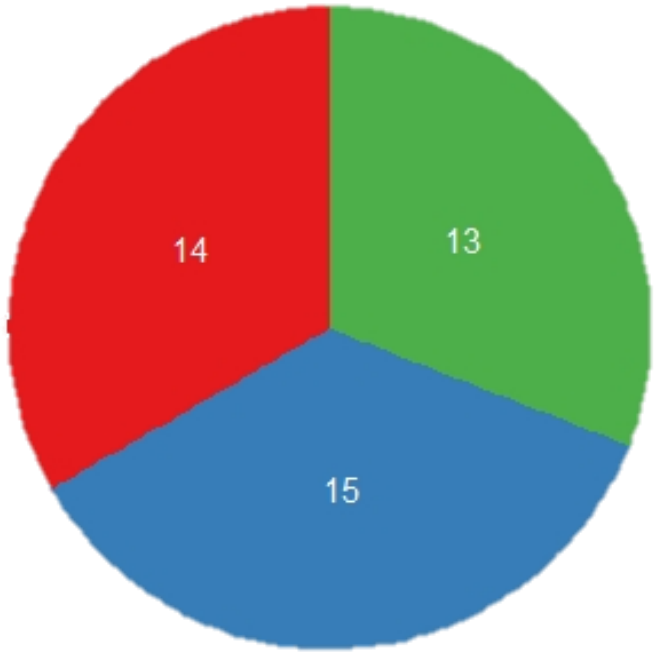
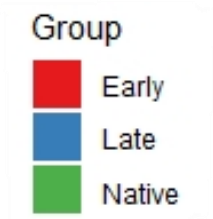
RC Task

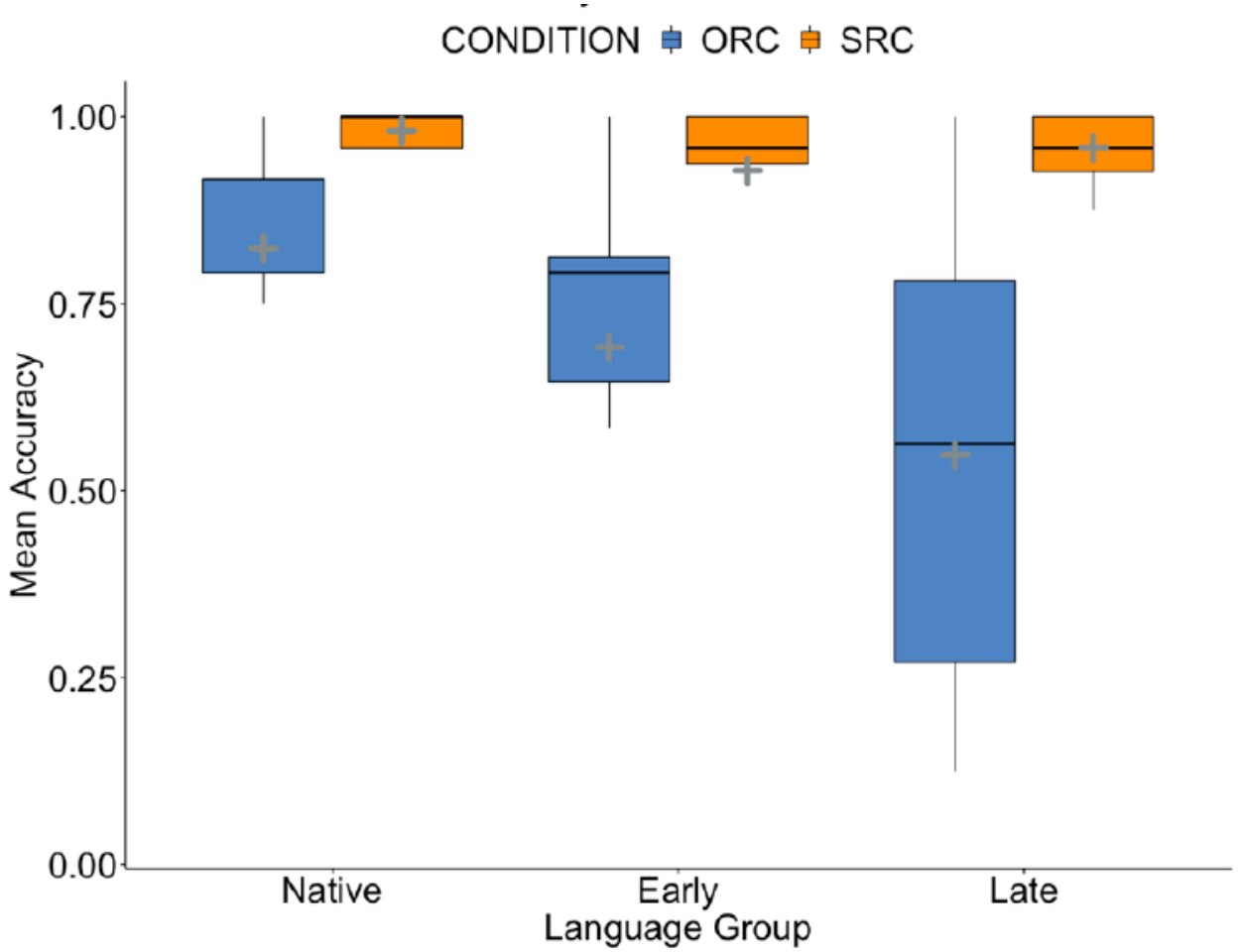
Participants

Mean age=37years
(SD=9.3years)





N=42



Results

SUBJECT ADVANTAGE
In all groups (all ps < 0.0001)

AGE OF EXPOSURE
Native performed better than Early signers in SRC (p=0.01)
Native performed better than Late signers in ORC (p=0.002)

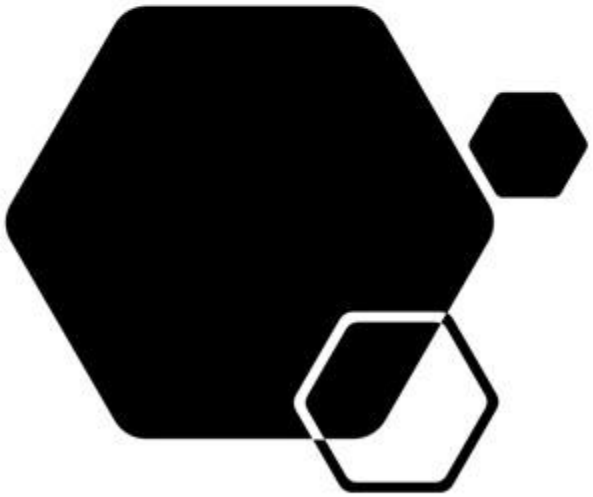
Discussion

- Do we observe subject/object asymmetries in sign language comprehension?
  - **YES**

SUBJECT ADVANTAGE IN INTERNALLY HEADED RCs

- there is a cost when the subject intervenes hierarchically between the object and its gap (cf. Friedmann et al. 2009)
- the gap that is not visible in overt syntax is created by covert movement of the RC head (cf. Cole, 1987)

Comprehension of WHICH questions



WHICH questions in LIS

SUBJECT QUESTIONS
O CL_o V S $WHICH_s$
$CLOWN_i$ CL_{-i} $_y$$SPRAY_i$ **$LION_y$ $WHICH_y$**?
Which lion sprays the clown?

OBJECT QUESTIONS
S V O $WHICH_o$
$CLOWN_i$ $_i$$SPRAY_y$ **$LION_y$ $WHICH_y$**?
Which lion does the clown spray?

LIS

WH + corresponding NP: in the right periphery

WHICH questions in LIS

SUBJECT

OBJECT

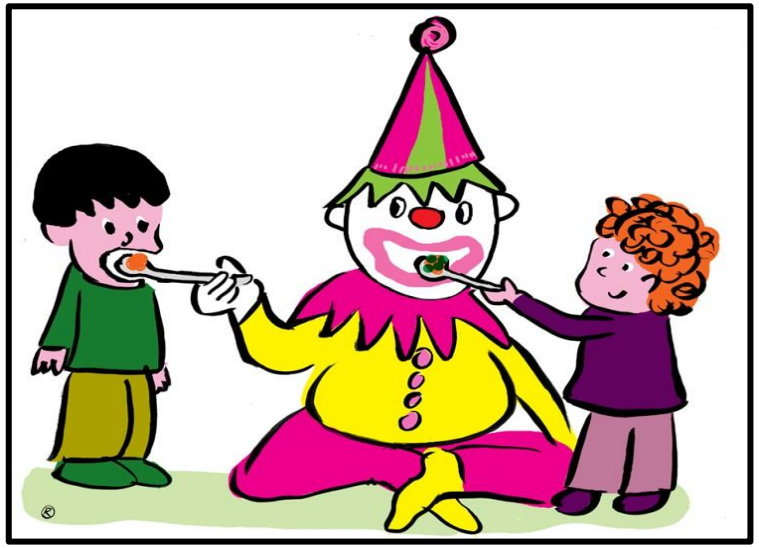
Procedure

CONTEXT: there are two lions and one clown

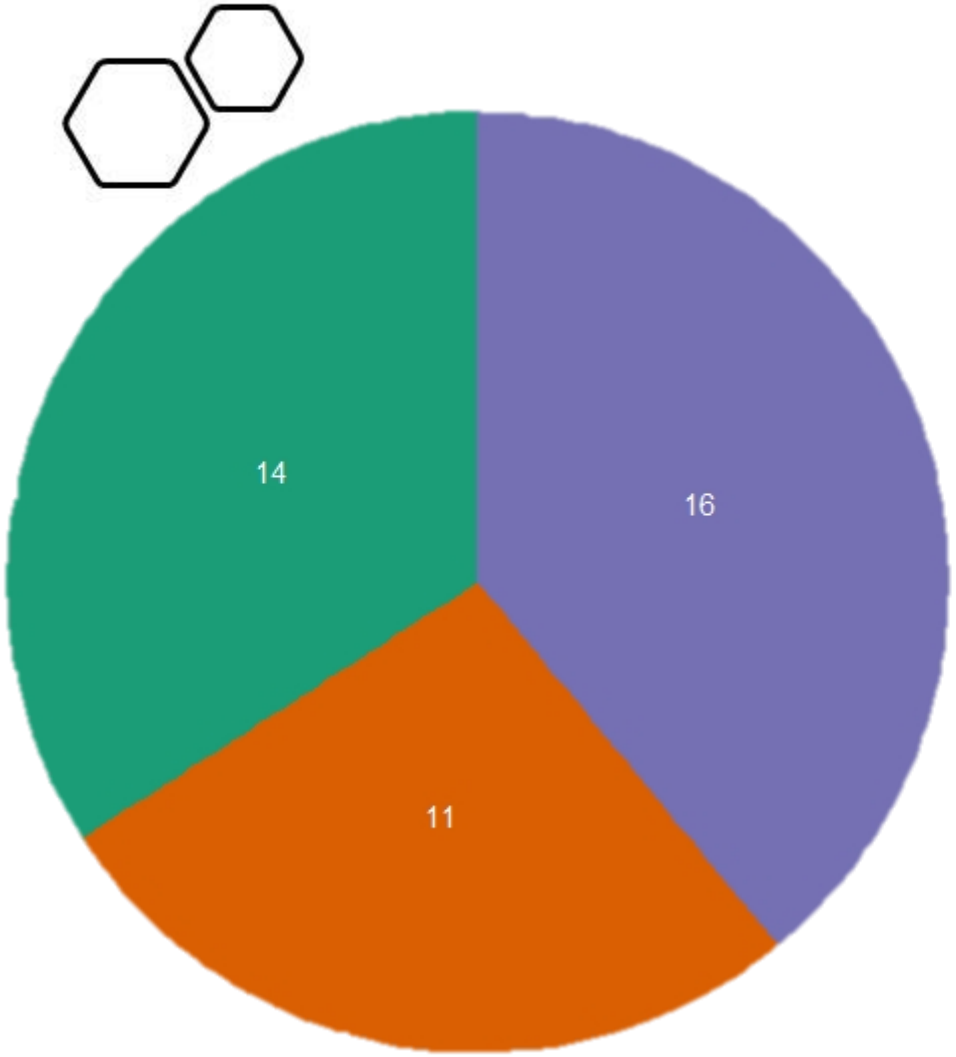
QUESTION

Materials

TARGET ITEMS:
- SUBJECT WHICH QUESTION
- OBJECT WHICH QUESTION



CONTROL ITEMS:
- SIMPLE QUESTION TARGETING THE MIDDLE CHARACTER (WHO HAS THE HAT?)
- SIMPLE QUESTION TARGETING ONE OF THE LATERAL CHARACTER (WHO HAS ORANGE HAIR?)



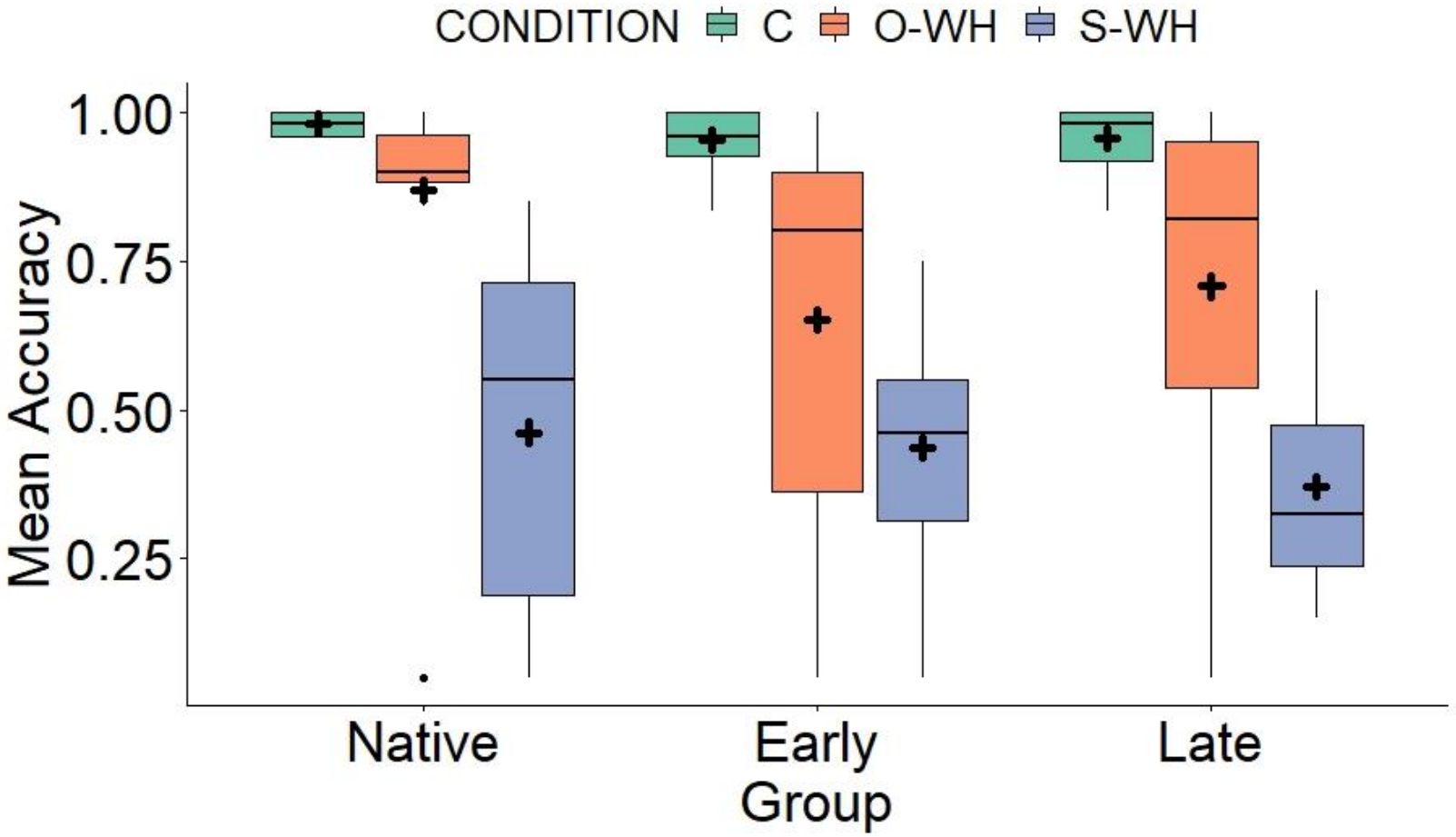
WH Task

Group
Early
Late
Native

N=41

Participants

20 F; 21 M
Mean age=47years
(SD=9 years)



Results

AGE OF EXPOSURE

Native performed better than Early signers in CONTROL (p=0.03) and in O-WH QUESTIONS (p=0.0001)

Native performed better than Late signers in O-WH QUESTIONS (p=0.001)

WHICH questions in LIS

SUBJECT QUESTIONS
O CL_o V S $WHICH_s$
$CLOWN_i$ CL_{-i} $_y SPRAY_i$ **$LION_y$ $WHICH_y$**?
Which lion sprays the clown?
"As for the clown, by which lion has he been sprayed?"

LIS
Canonical SUBJECT WHICH QUESTIONS: ambiguous!

GRAMMATICAL, BUT VERY HARD TO PROCESS!

WHICH questions in LSF

LSF

WH in situ

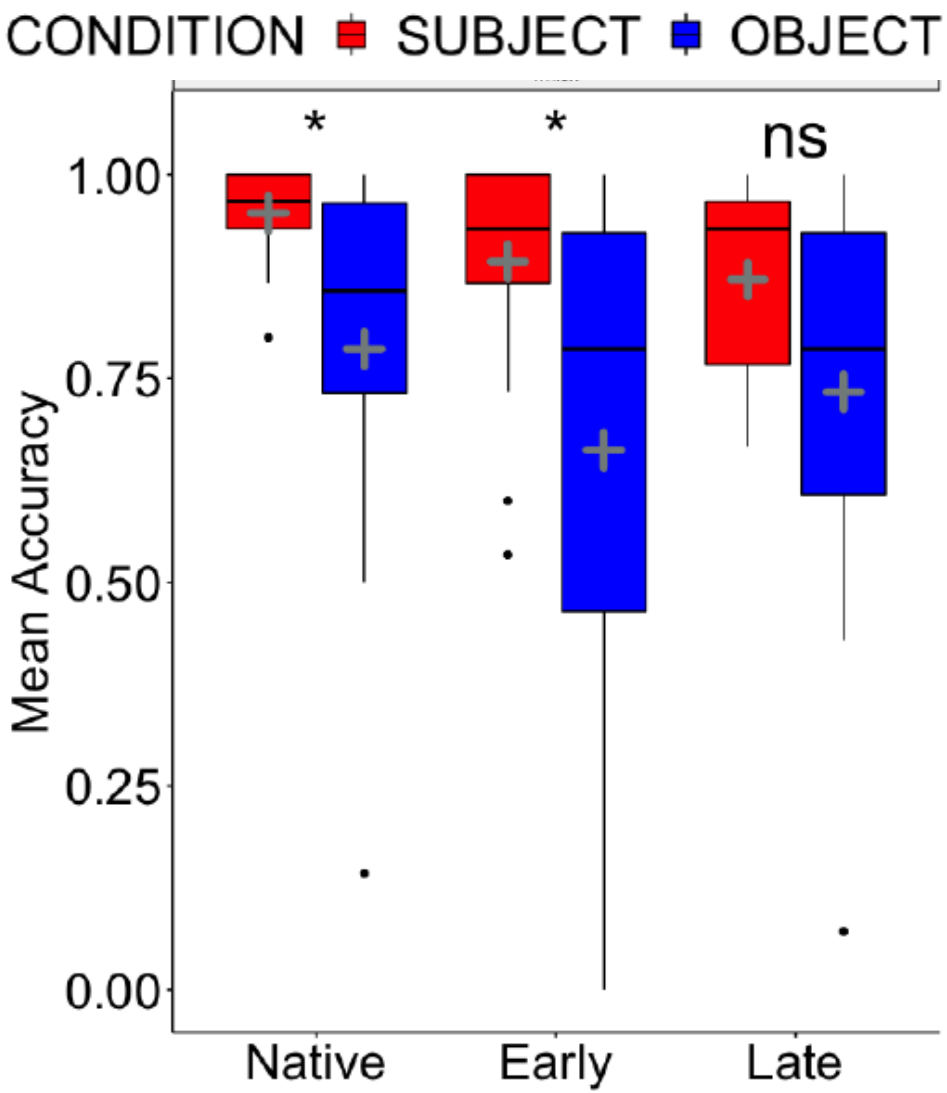
SUBJECT QUESTIONS
LION WHICH SPRAY CLOWN?
Which lion sprays the clown? `

OBJECT QUESTIONS
CLOWN SPRAY **LION WHICH**?
Which lion does the clown spray?

WHICH questions in LSF

SUBJECT

OBJECT



Results

SUBJECT ADVANTAGE

In Native and Early learners (ps < 0.0001)

To sum up

Subject/object asymmetries in sign language comprehension: **YES**

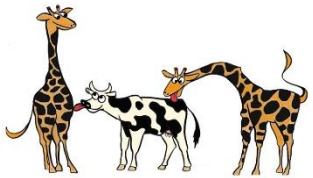
- In fronted internally headed RC (LIS)
- In post nominal externally heads RC (LSF)
- In which questions with WH in situ (LSF)

Age of first exposure effects in LIS and LSF: **YES**

Thanks to:
all participants and consultants

Valentina Aristodemo and
Charlotte Hauser (LSF team)

Naama Friedmann for sharing with us her three characters pictures



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AND THANK YOU FOR YOUR ATTENTION

QUESTIONS?

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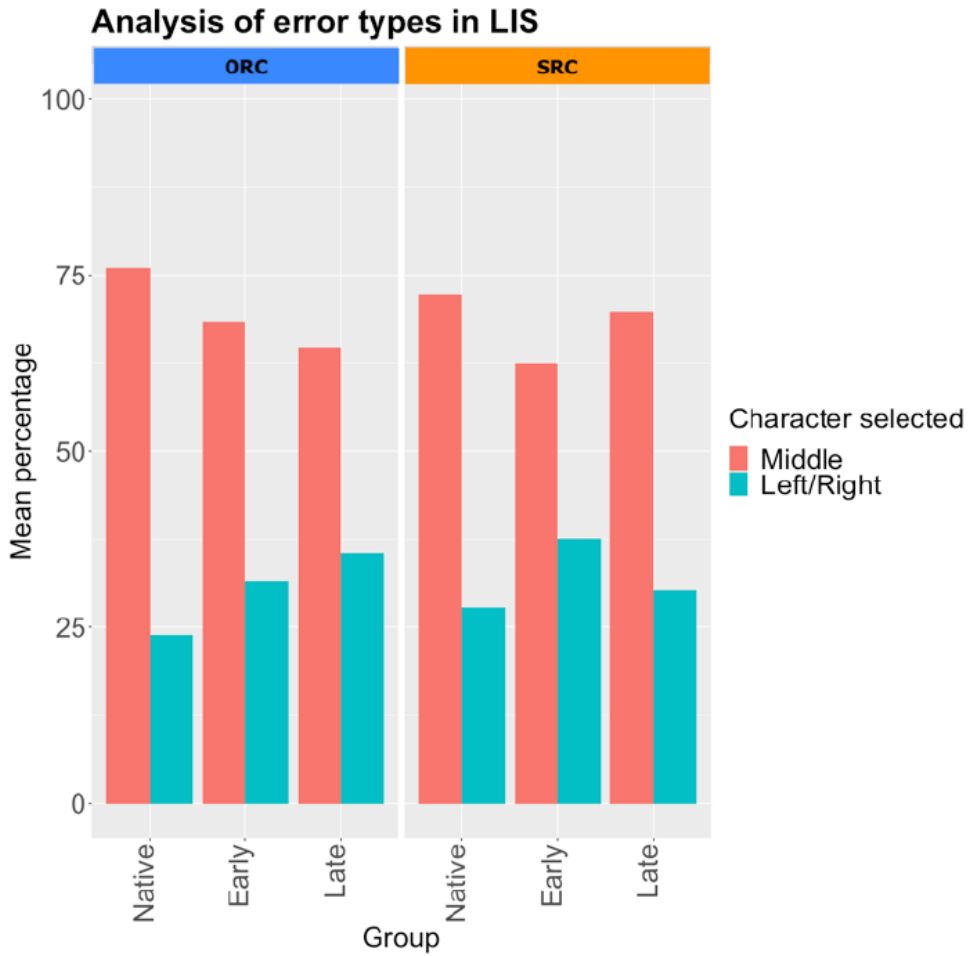
RC in LIS: error analysis



RC in LSF: error analysis