The acquisition of adjunct control and working memory

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Adjunct control

John called Bill after ____ leaving the store.

Chomsky (1981)

Adjunct control

John called Bill after PRO leaving the store.

Chomsky (1981)

Acquisition of adjunct control

John called Bill after PRO leaving the store.

Adult grammar: Controller is local c-commanding DP = subject (John)

4-7 year olds: Subject control (John)
Object control (Bill)
Sentence internal (John or Bill)
Free reference (anyone)

Why?

Goodluck (1981), Hsu, Cairns, & Fiengo (1985), McDaniel, Cairns, & Hsu (1991), Cairns, McDaniel, Hsu, & Rapp (1994), Broihier & Wexler (1995), Goodluck (2001), Adler (2006), Gerard et al (2017, 2018), Gerard (2022)

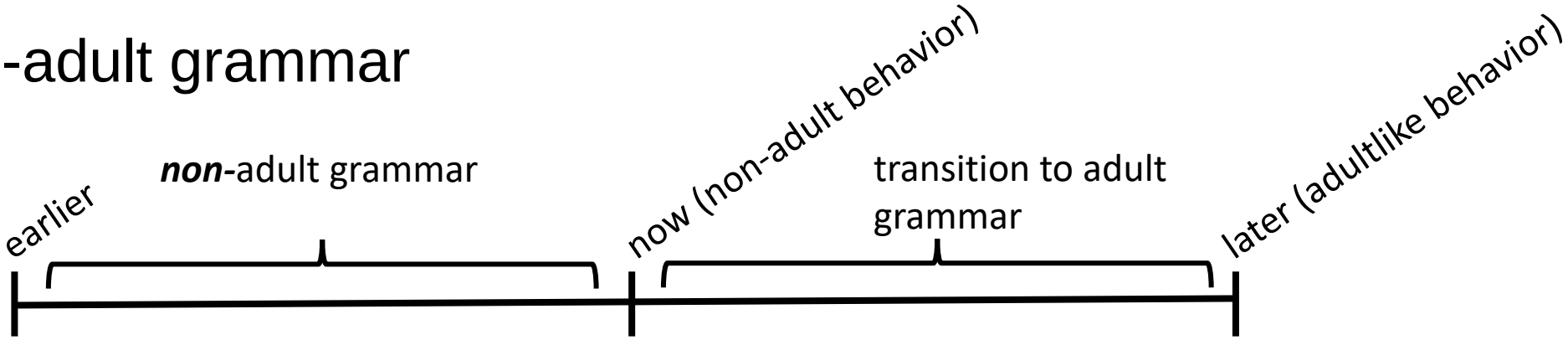
First, what about Non-obligatory Control (NOC)?

- Adult grammar allows:
  - obligatory control (preferred): controller is local c-commander
  - non-obligatory control: controller is determined by pragmatics
- Examples:
  - The security guard stopped the woman$_i$ [before PRO$_i$ boarding the plane]. (Green 2018: 73)
  - Potatoes are tastier after boiling them. (Ackema & Schoorlemmer 1995:182)
- Question “Why do children give responses in violation of adult grammar?” is moot. They don’t!
- Still question of why children’s response patterns are non-adult-like in experiments
- Possible answer: Lack of knowledge about pragmatics.
- We put NOC possibility aside for now and return to it at the end.

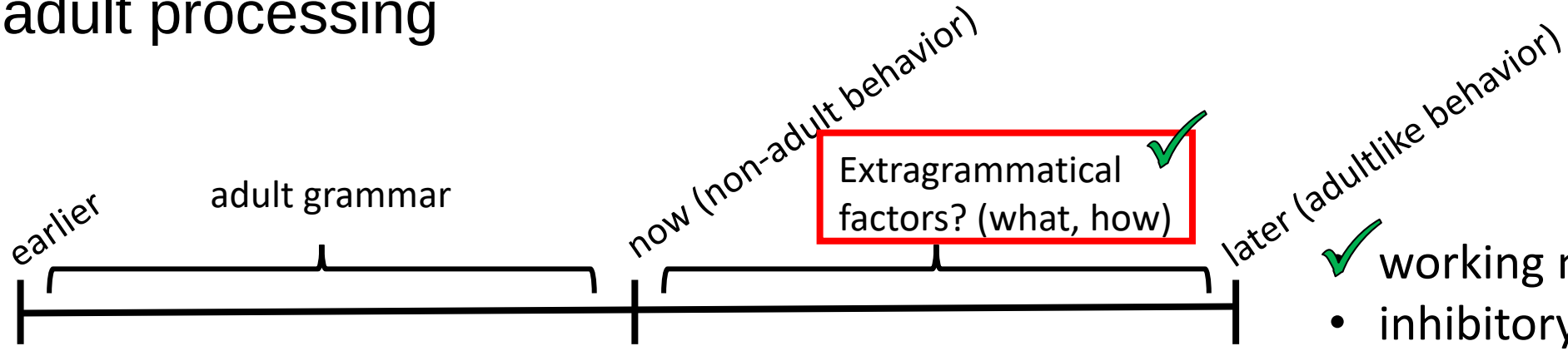
Current study

John called Bill after PRO leaving the store.

1. Non-adult grammar



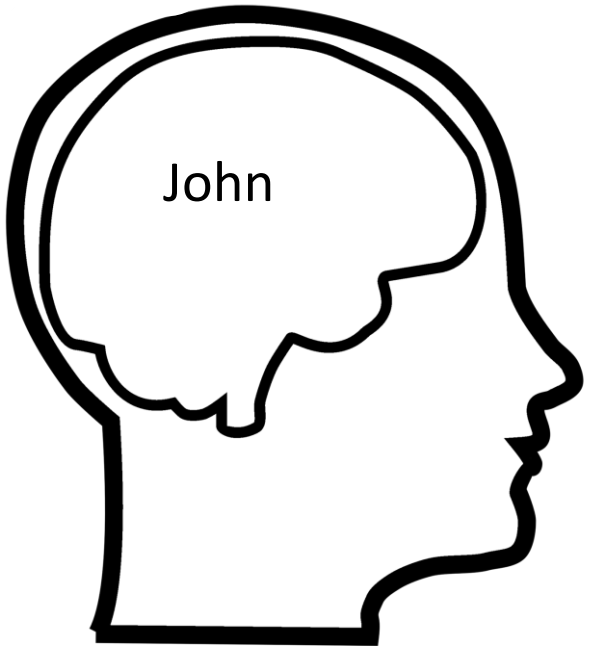
2. Non-adult processing



- working memory
- inhibitory control

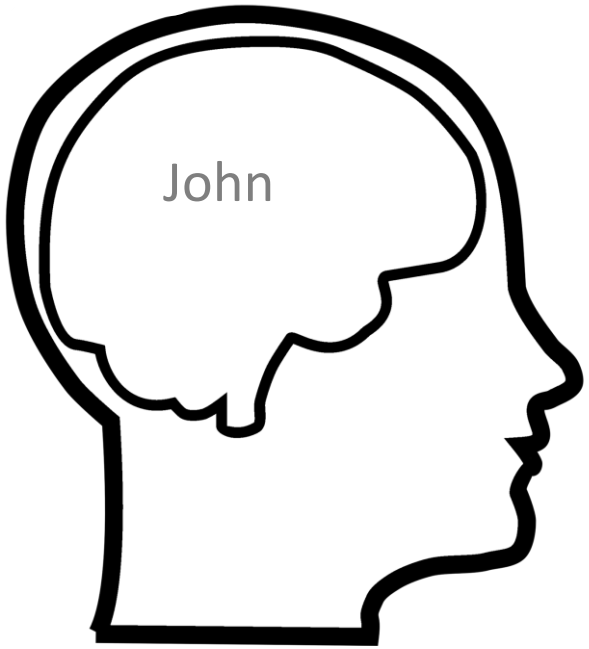
Adjunct control in real time

John



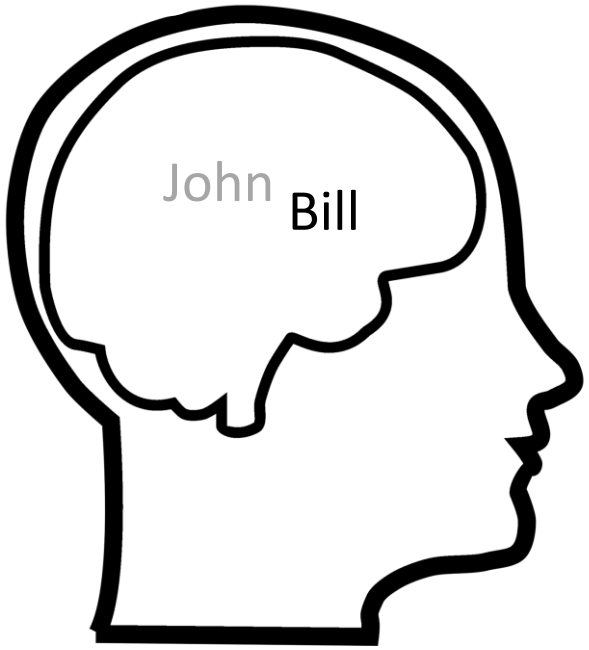
Adjunct control in real time

John called



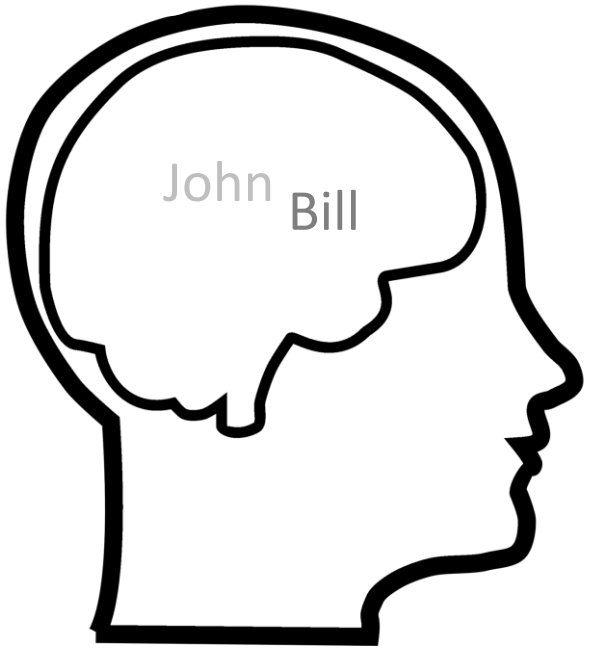
Adjunct control in real time

John called Bill



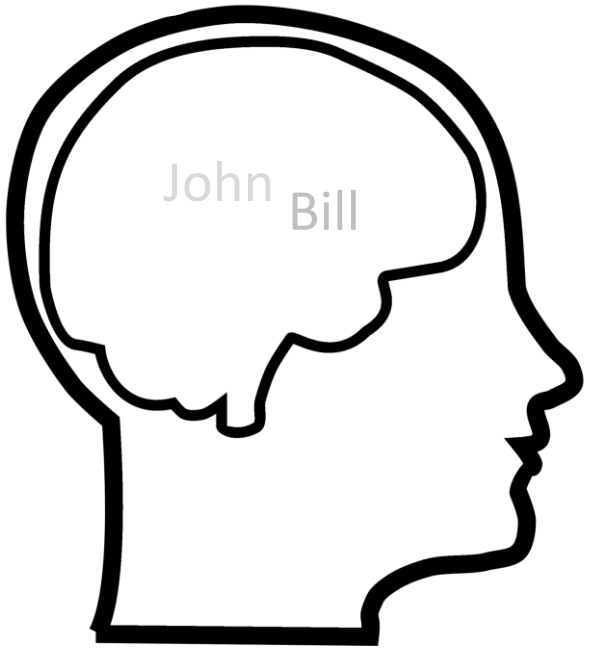
Adjunct control in real time

John called Bill after



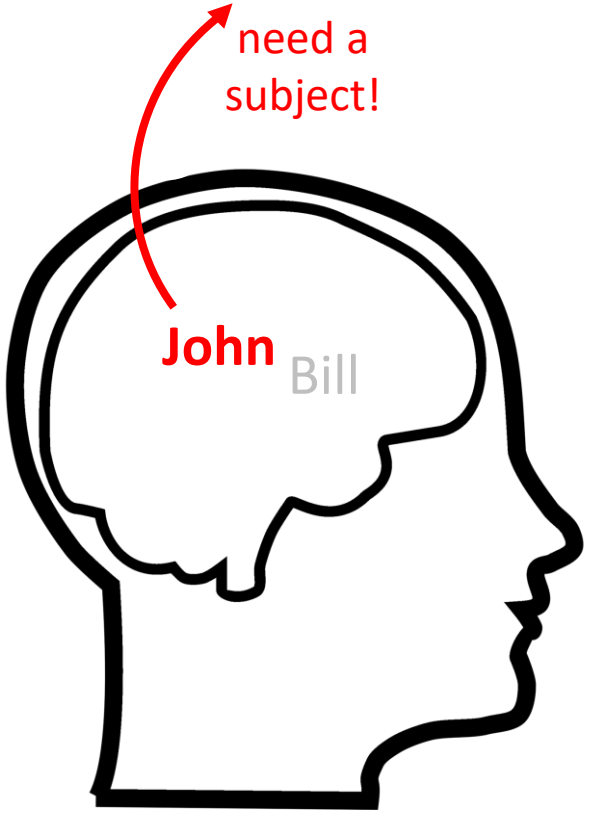
Adjunct control in real time

John called Bill after leaving



Adjunct control in real time

John called Bill after ___ leaving



Grammar: local c-commander = ‘John’

interpretation: John left

Adjunct control in real time

John called Bill after ___ leaving

need a subject!

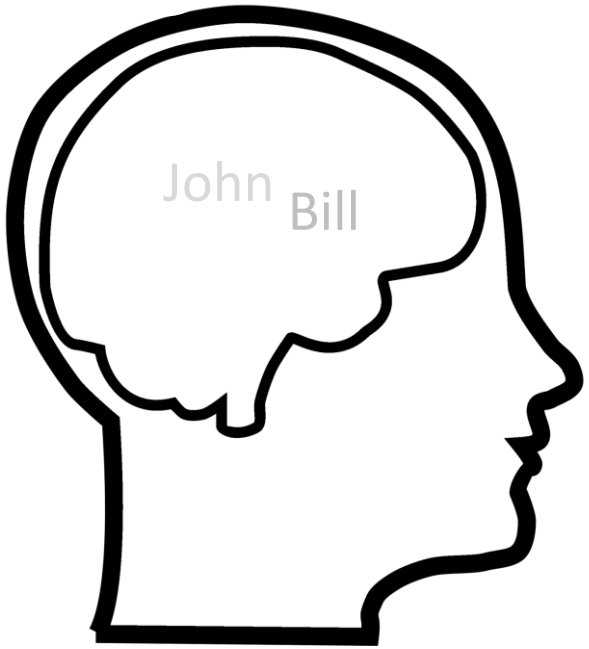
Grammar: local c-commander

More difficult contexts:

- Task demands
- Processing cost

interpretation: John left or Bill left (misretrieval)

Why?



Grammar: local c-commander = 'John'

interpretation: John left

Gerard et al (2017, 2018), Gerard (2022)

Hypotheses

H1: adult grammar, non-adult processing

→ Extragrammatical factors

- working memory?
- inhibitory control?

H2: non-adult grammar

- ~~working memory~~

John called Bill after PRO leaving the store. → John or Bill left

John called Bill after he left the store. → John or Bill left

Arosio et al (2012), Haendler et al (2015), Kidd (2013), Tan et al (2017)

Arnold et al (2018), Hsu et al (1985), McDaniel et al (1991), Cairns et al (1994), Sherman & Lust (1993)

Current study: method

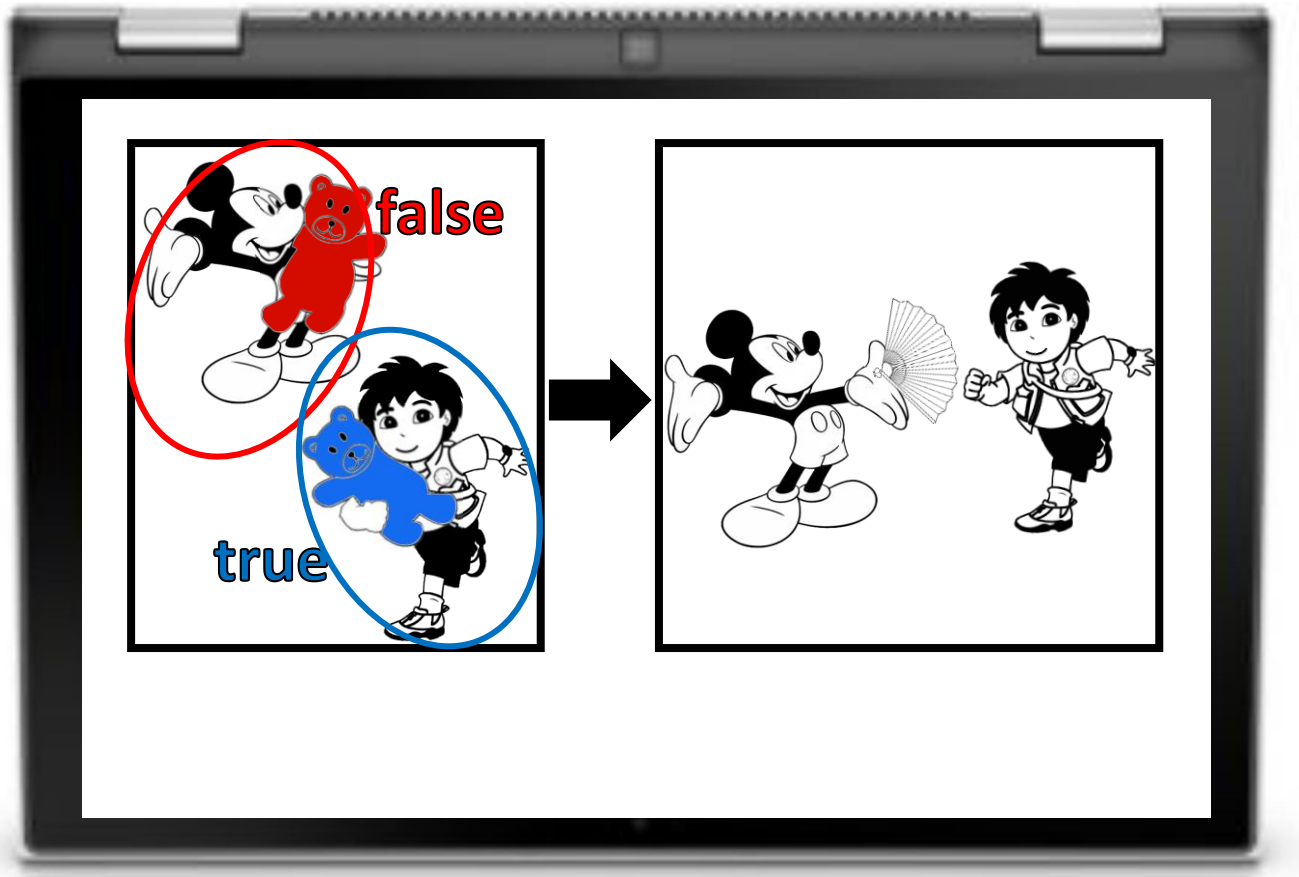
- Adjunct control vs ambiguous pronouns (TVJT)
  - John called Bill after PRO leaving the store
  - John called Bill after he left the store
- Working memory
- Inhibitory control

72 adults

81 children, 4;0-7;10, m=5;6

Truth value judgment task (TVJT)

Mickey fanned **Diego** after ___ hugging the blue bear



72 adults
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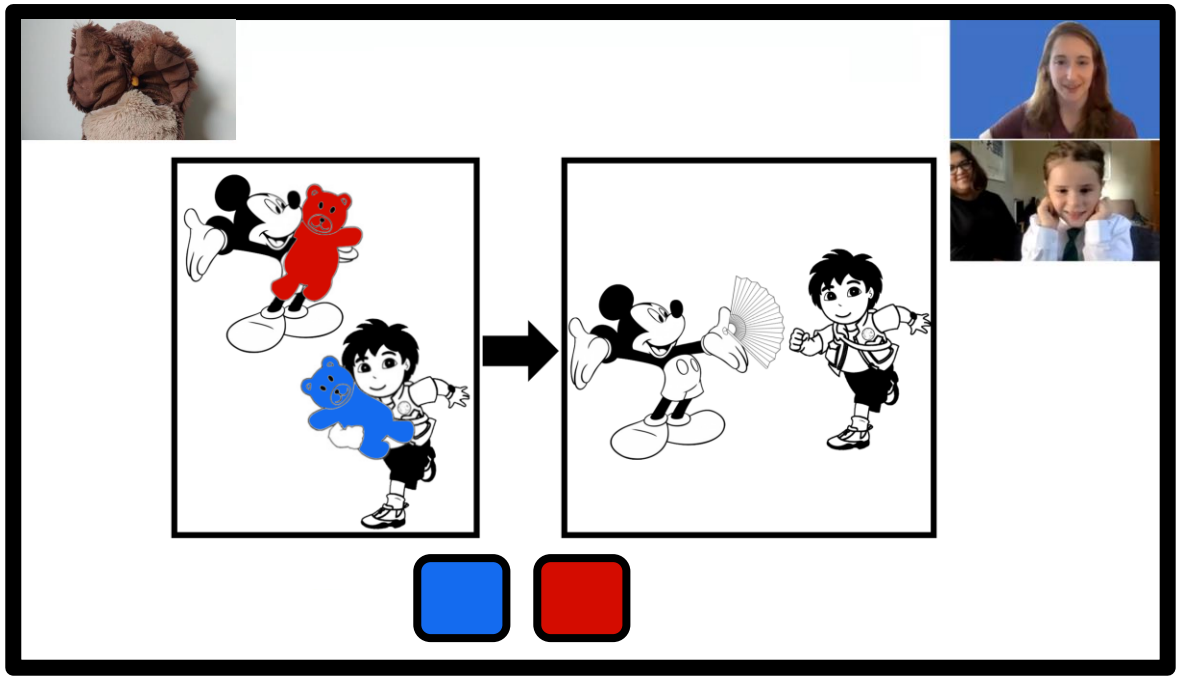
TVJT



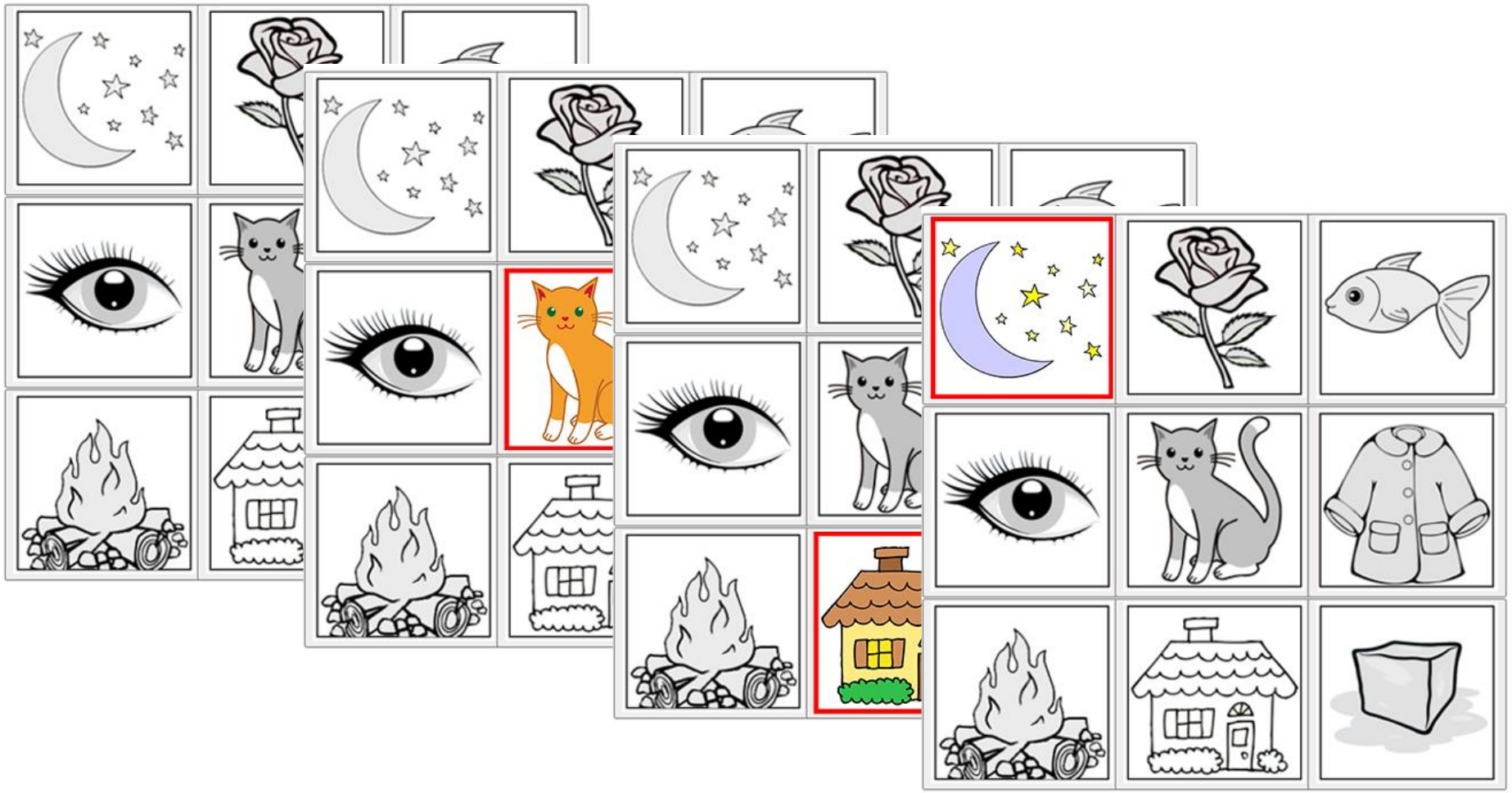
- Over Zoom (Lookit)
- 3 types of sentences:

1. Mickey fanned Diego after __ hugging the blue bear (adjunct control)
2. Mickey fanned Diego after he hugged the blue bear (ambiguous pronoun)
3. Dora fanned Diego after he hugged the blue bear (control)

Dependent variable: proportion subject interpretations

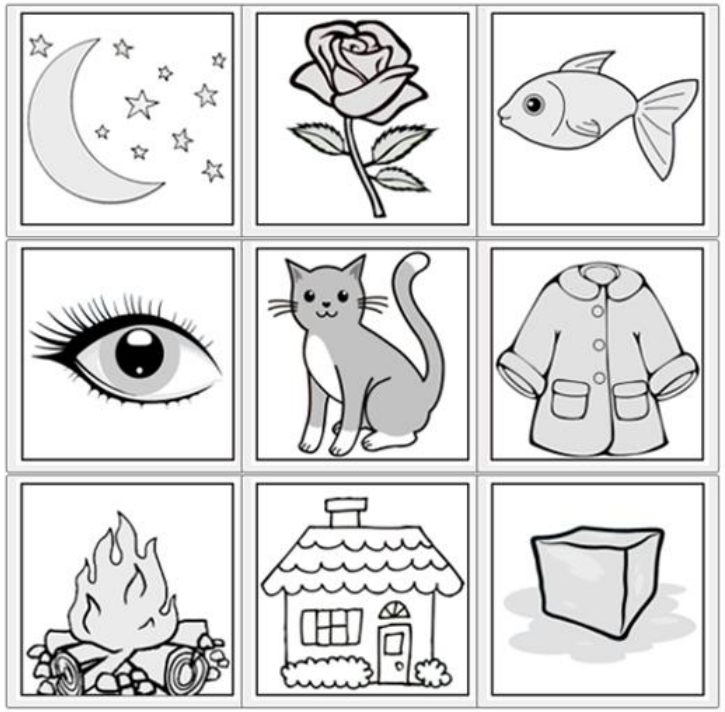
72 adults
81 children, 4;0-7;10, m=5;6

Working memory task (Backwards span)



Van de Weijer-Bergsma et al (2015)

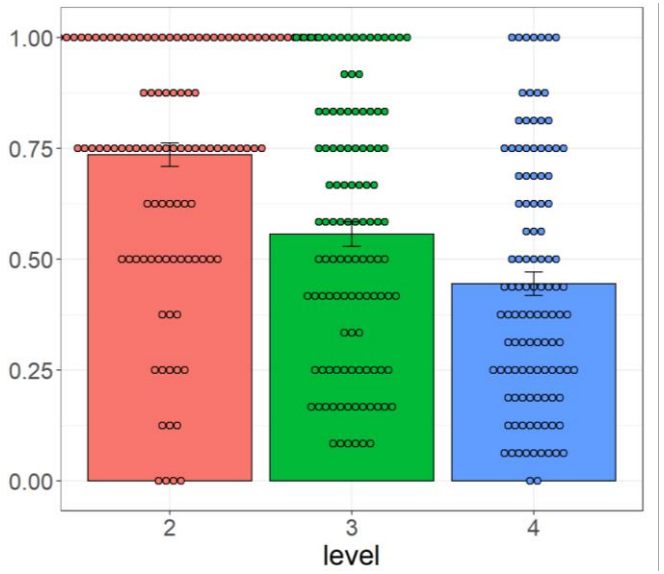
Working memory task (Backwards span)

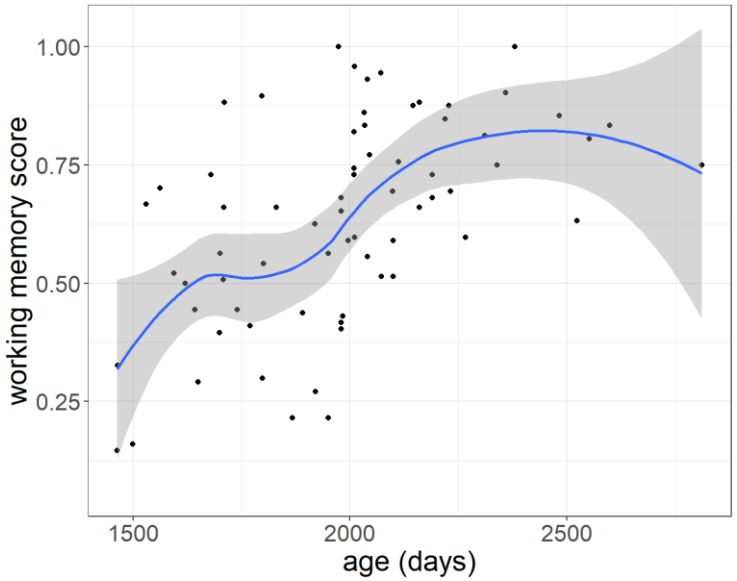


3 levels:
- 2 items (4 reps)
- 3 items (4 reps)
- 4 items (4 reps)

Scoring:

$$\frac{\text{average accuracy} + \text{average accuracy} + \text{average accuracy}}{3}$$



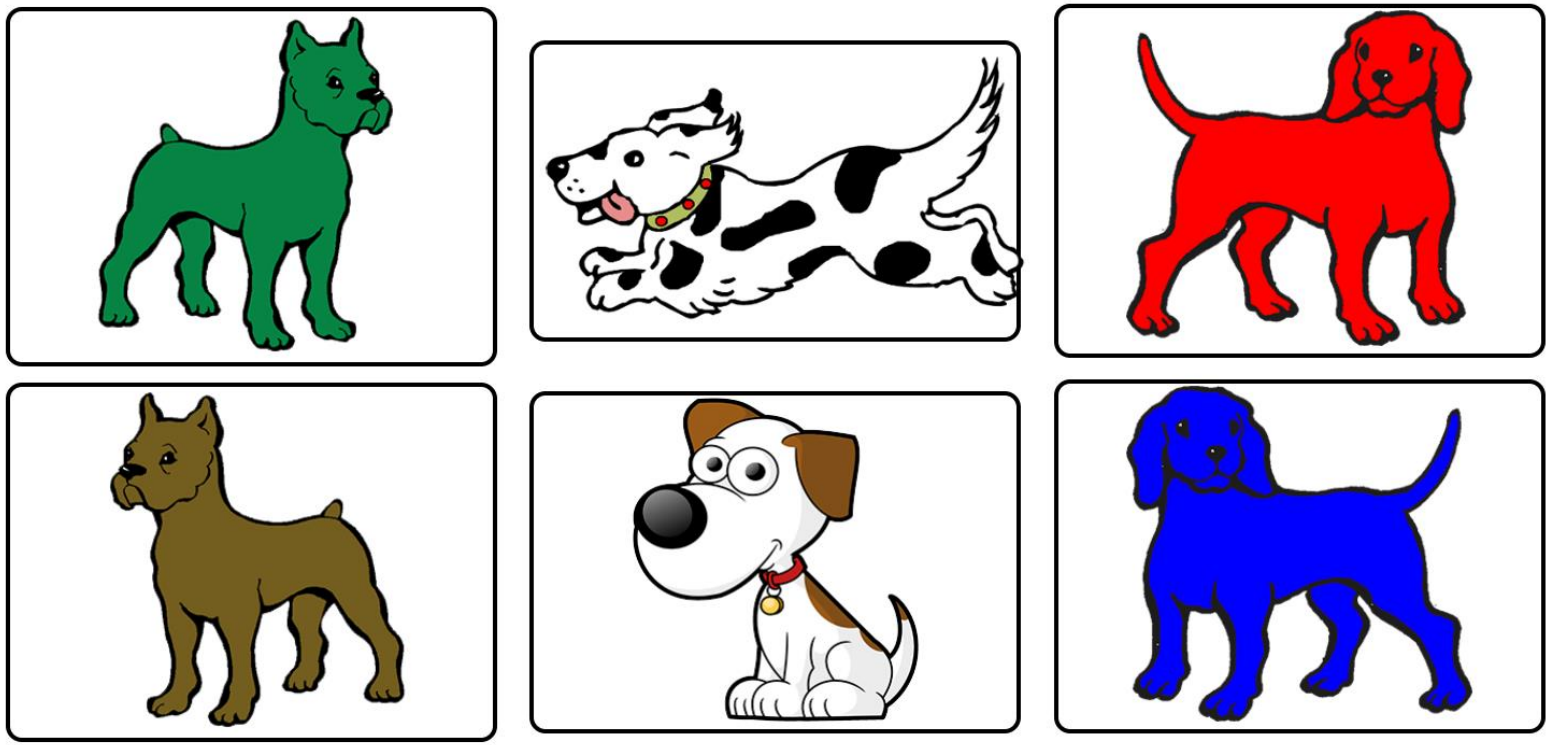


Van de Weijer-Bergsma et al (2015)

Inhibitory control

non-conflict

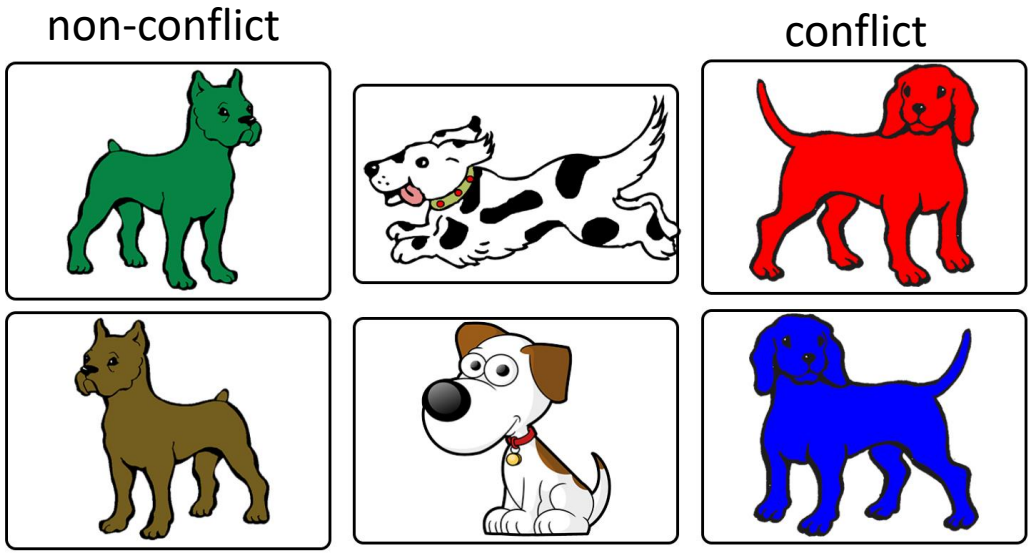
conflict

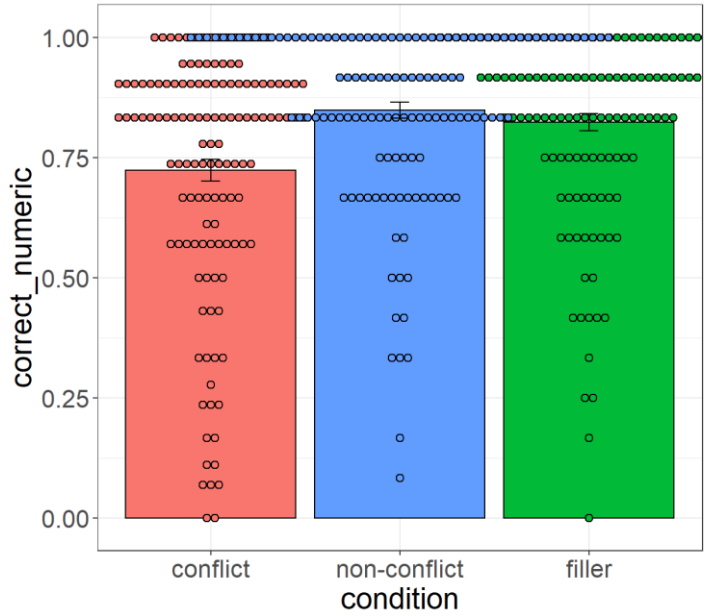


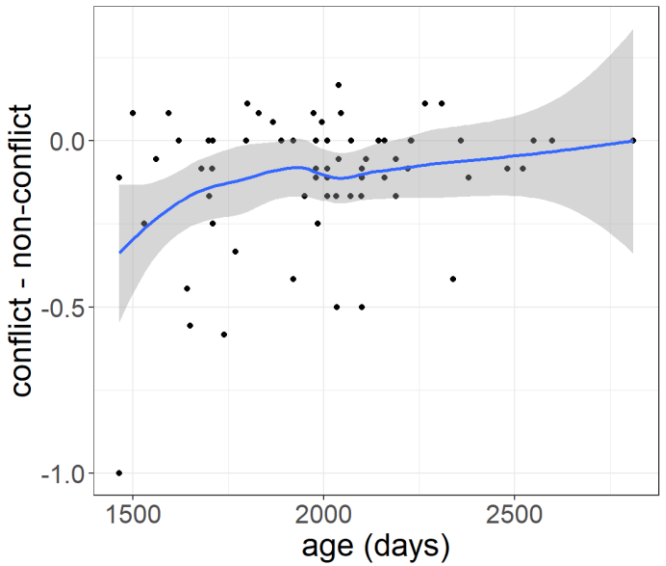
Find the dog!

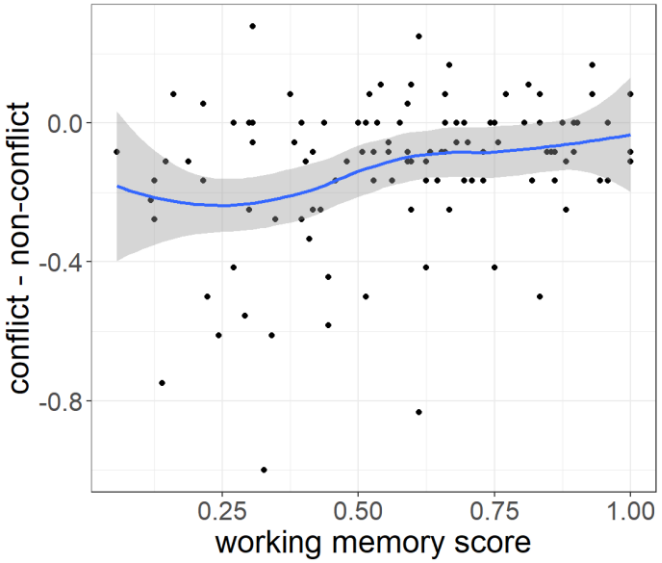
Huang & Hollister (2019)

Inhibitory control





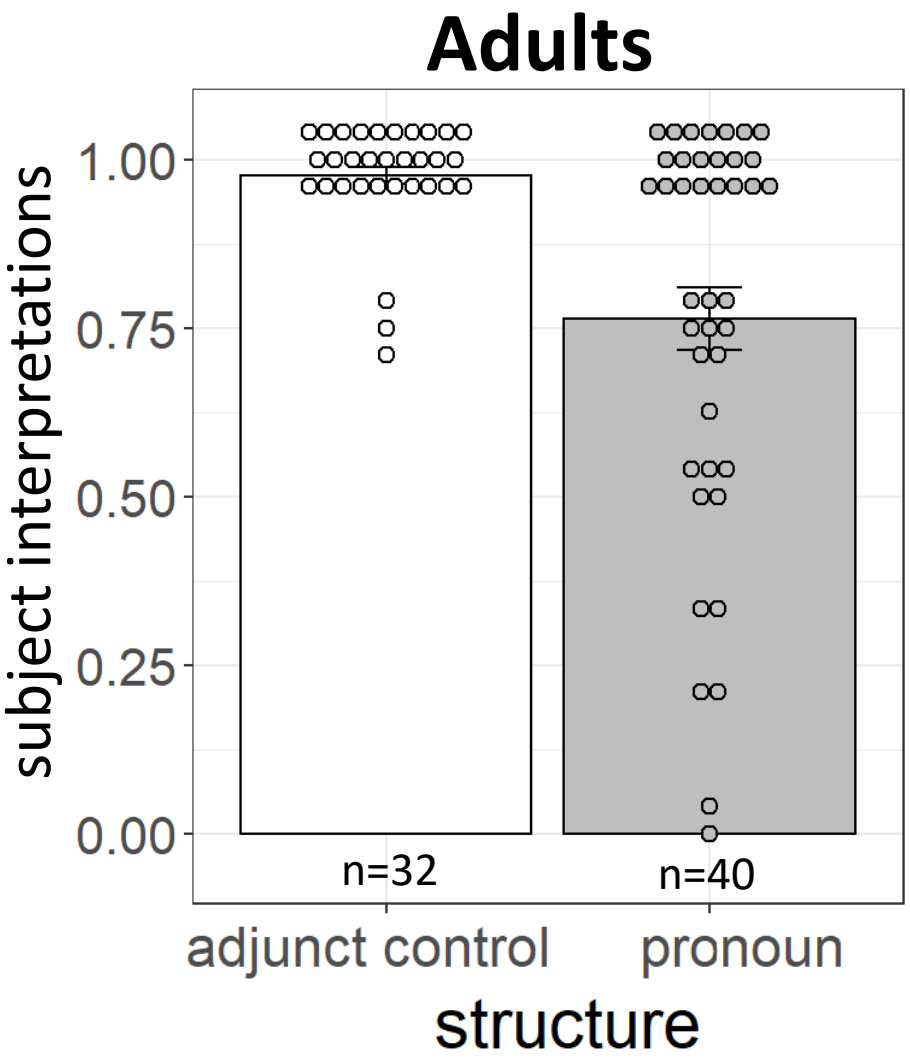


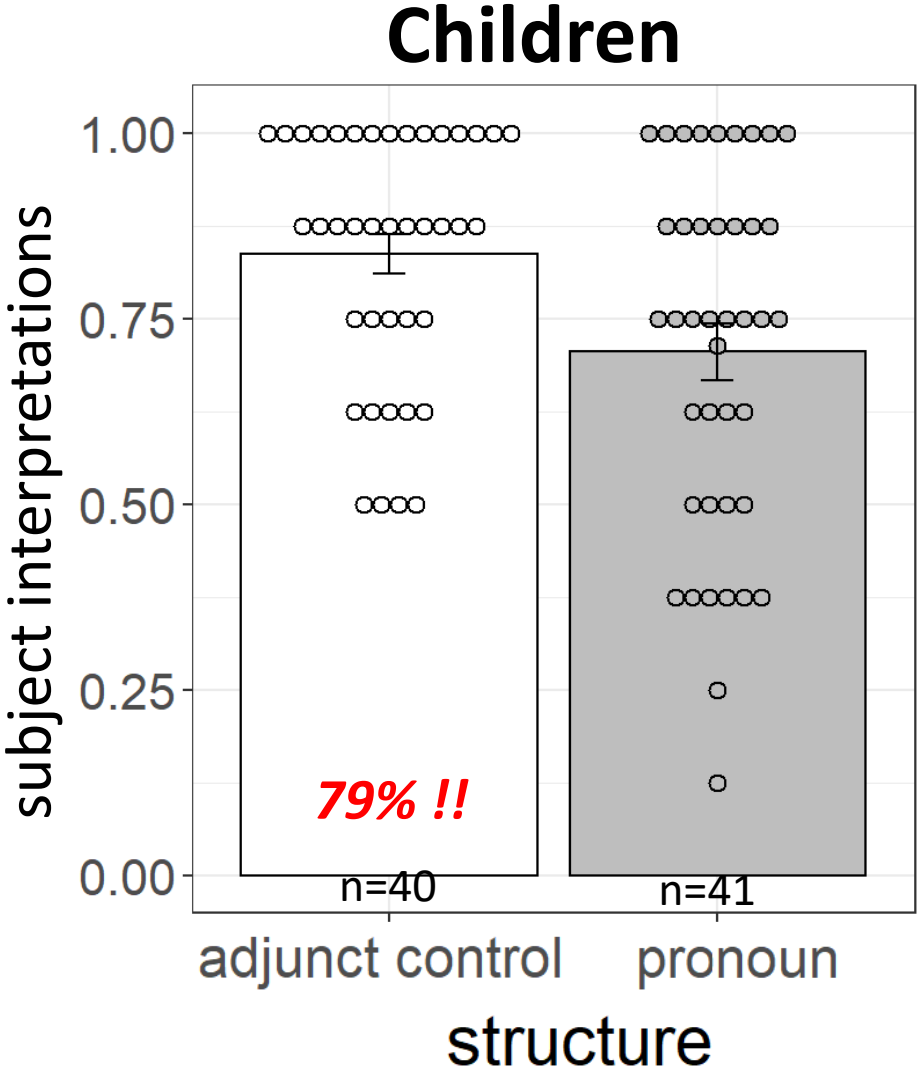


Huang & Hollister (2019)

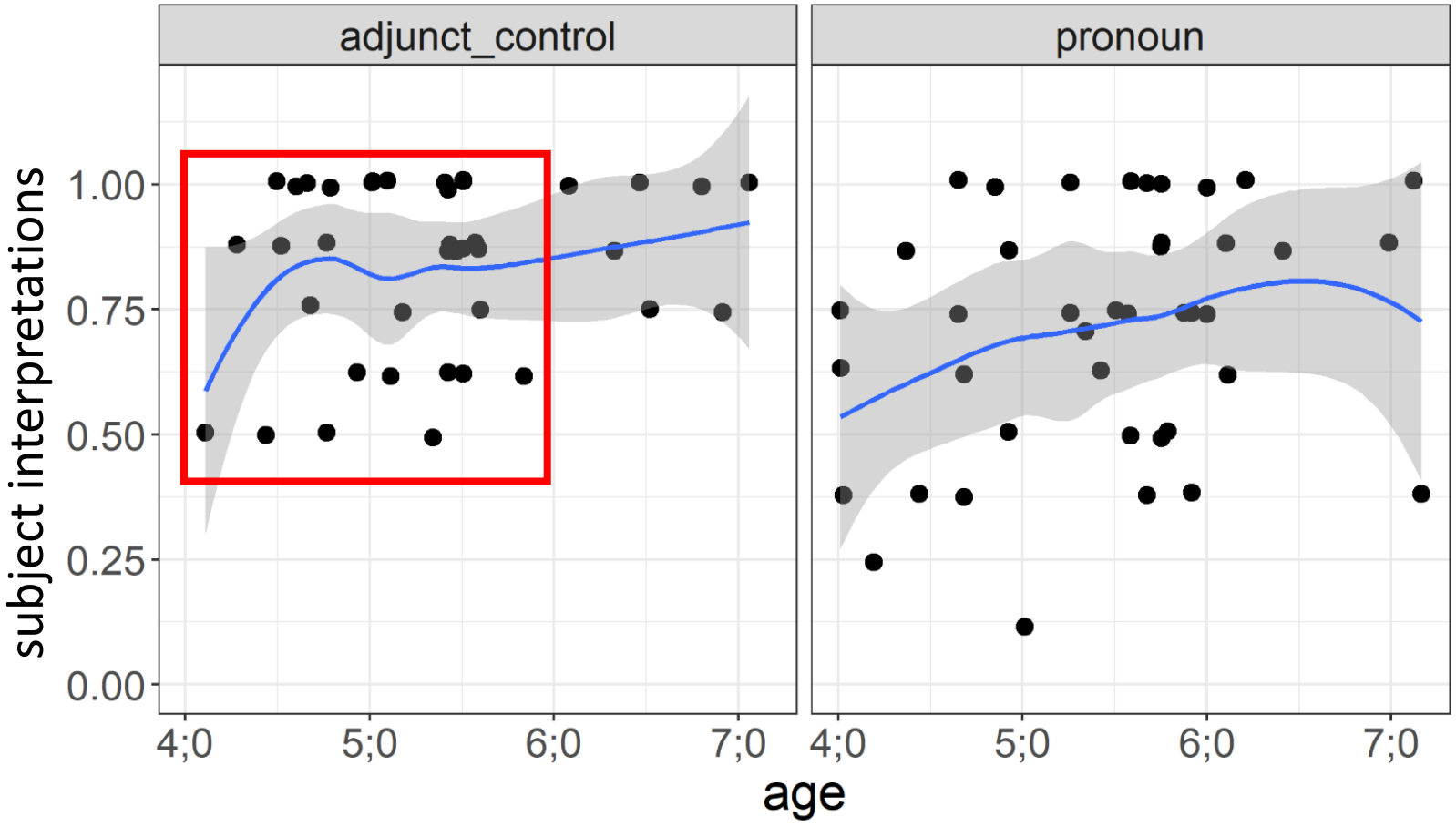
adjunct control: Mickey fanned Diego after hugging the blue bear
pronoun: Mickey fanned Diego after he hugged the blue bear

Results: sentences



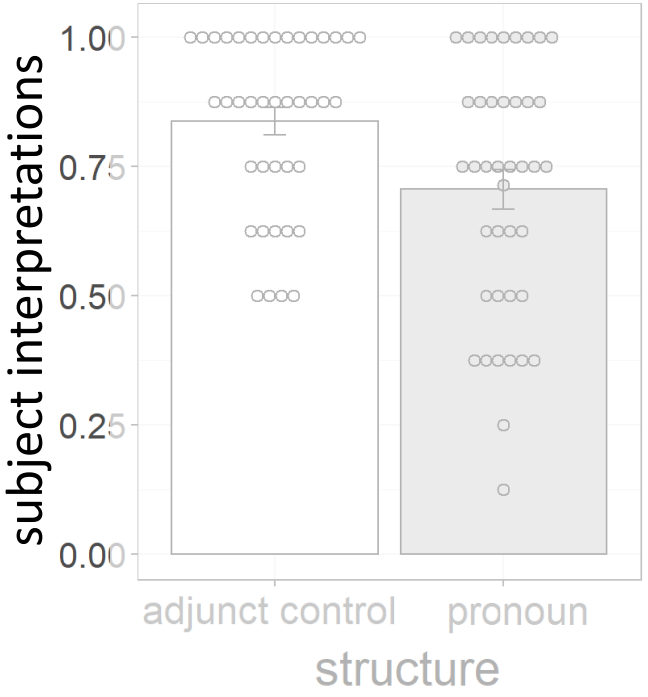


Results: sentences

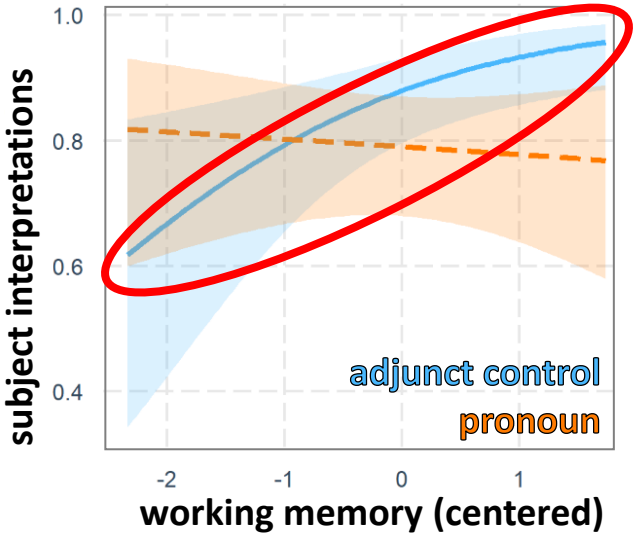


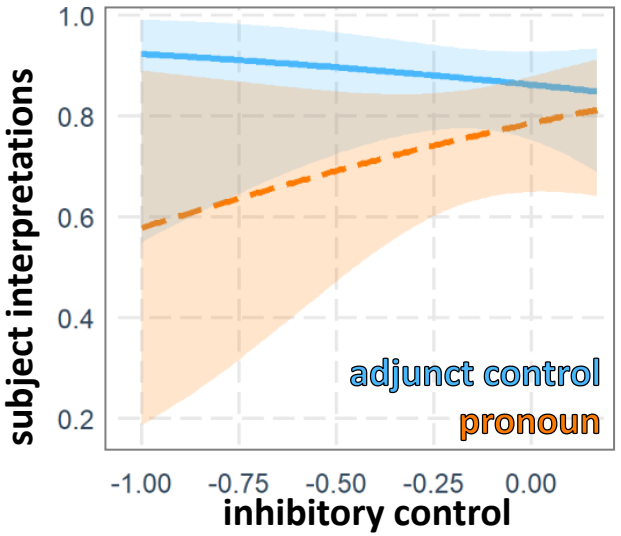
No correlation between age and proportion of subject interpretations on adjunct control.

Results



✓ Non-adult processing

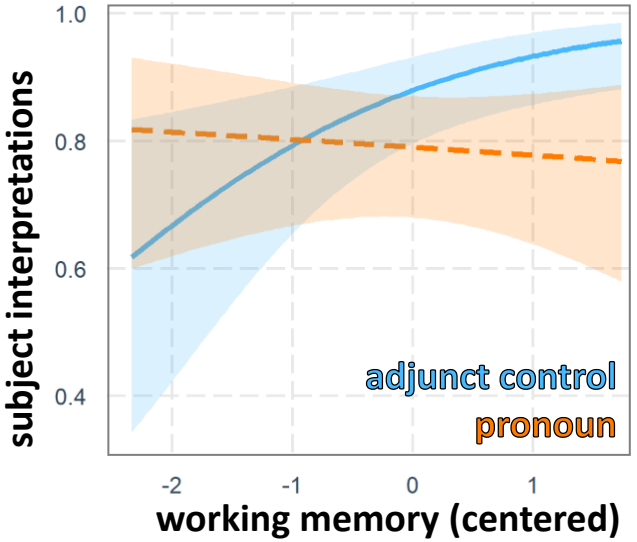




Conclusions

Grammar vs processing

John$_1$ called Bill$_2$ after PRO leaving the store.



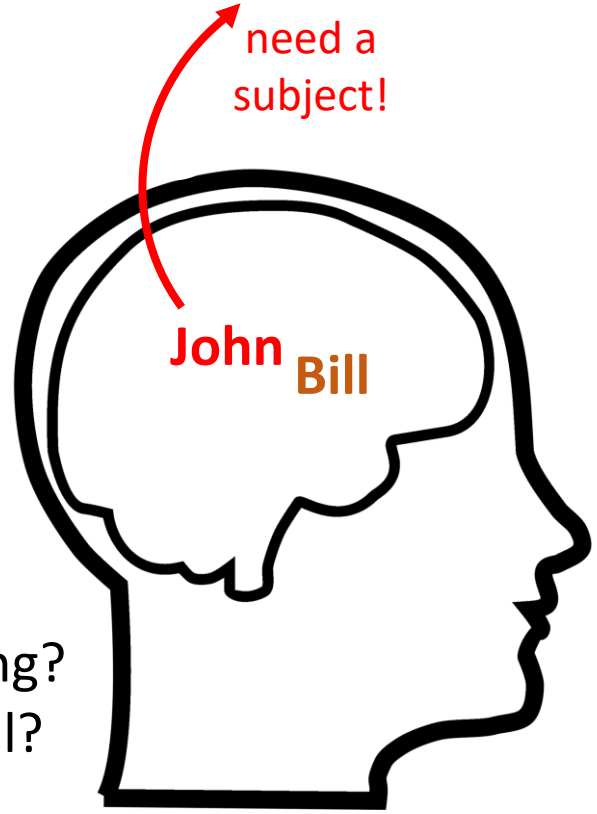
✓ H1: adult grammar, non-adult processing

??? H2: non-adult grammar **+ subject bias**

- What is the non-adult grammar?
- Why do children start with that grammar?
- Why do they have a subject bias?
- Why/how do working memory and task demands affect subject bias?
- Why does working memory not play the same role for pronouns?
- How do children acquire the adult grammar?

How: adjunct control in real time

John called Bill after ___ leaving



To retrieve subject:

- missing subject
- "leaving" as cue
- activate *John*
  - not *Bill*

→ John left

Next questions:

- working memory: what's developing?
- role of working memory in retrieval?

Gerard et al (2017), Parker et al (2015), Gordon et al (2001, 2004)

Back to non-obligatory control (NOC)

- Examples:
  - The security guard stopped the woman$_i$ [before PRO$_i$ boarding the plane].
  - Potatoes are tastier after boiling them.
- Questions for pragmatic account:
  - Superset problem: How do children constrain possibilities, especially with very sparse evidence?
  - How do children's parsers switch to preference for OC?
  - Why does decrease in task demands increase adult-like responses in children?
  - Why does higher working memory increase adult-like responses in children?

More plausible account

- Children start out assuming OC
- Non-adult-like responses on experiments are due to task demands and working memory limitations
- Later on, children start allowing NOC interpretations
- Could explain preference for OC over NOC across languages and speakers

Thank you!

- Ulster University Modern Languages and Linguistics
- Lookit
- ChildrenHelpingScience
- SciStarter
- Nuffield Research Placements
- Morgan Macleod

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