# The emergence of inhibitory links in the developing lexicon: Insights from bilingual participants

Gonzalo Garcia-Castro, Serene Siow, Irina Lepadatu, Nicola A. Gillen, Daniela S. Avila-Varela, Núria Sebastian-Galles & Kim Plunkett

Introduction

Inhibitory links between mental representations are a key developmental milestone in language acquisition. [1]

ANIMALS   CLOTHES   ANIMALS
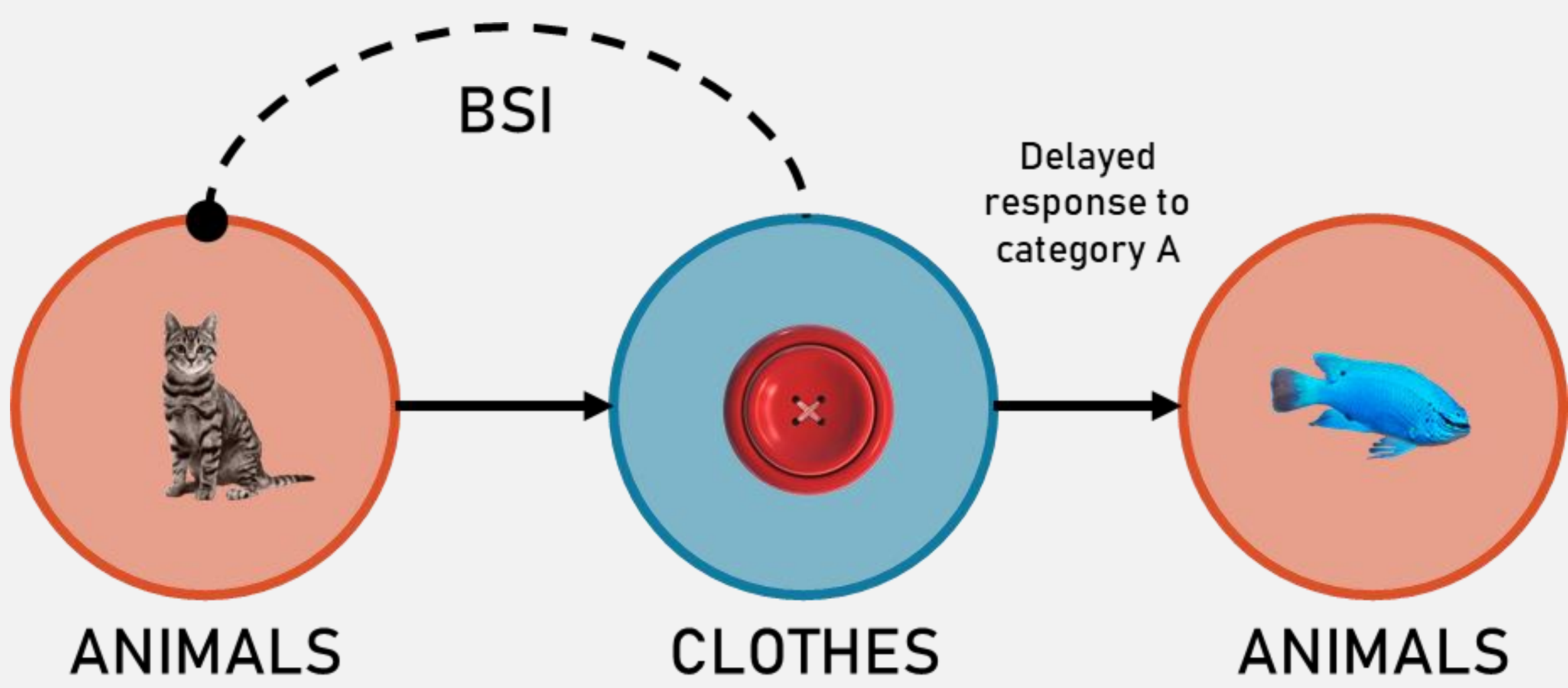
Backward Semantic Inhibition (BSI)

After switching attention from semantic category A (*cat*, **animals**) to category B (*button*), returning to A (*fish*) is inhibited. [2]

Emerges between 18 and 24 months [3].

It was proposed that a **sufficiently large vocabulary size** is required for strong semantic categories to form, and trigger **inhibition between categories** [4].

But previous studies are based on **monolingual samples**.

For **monolinguals**, the # of acquired **concepts** should be equal to the # of **words** they know

For **bilinguals** we can differentiate between [5]:
– **Total vocabulary**: # of acquired words
– **Conceptual vocabulary**: # of concepts for which a word has been acquired

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Is BSI driven by the growth of total or conceptual vocabulary?

Monolingual
1 concept, 1 label
→ "gato"

Bilingual
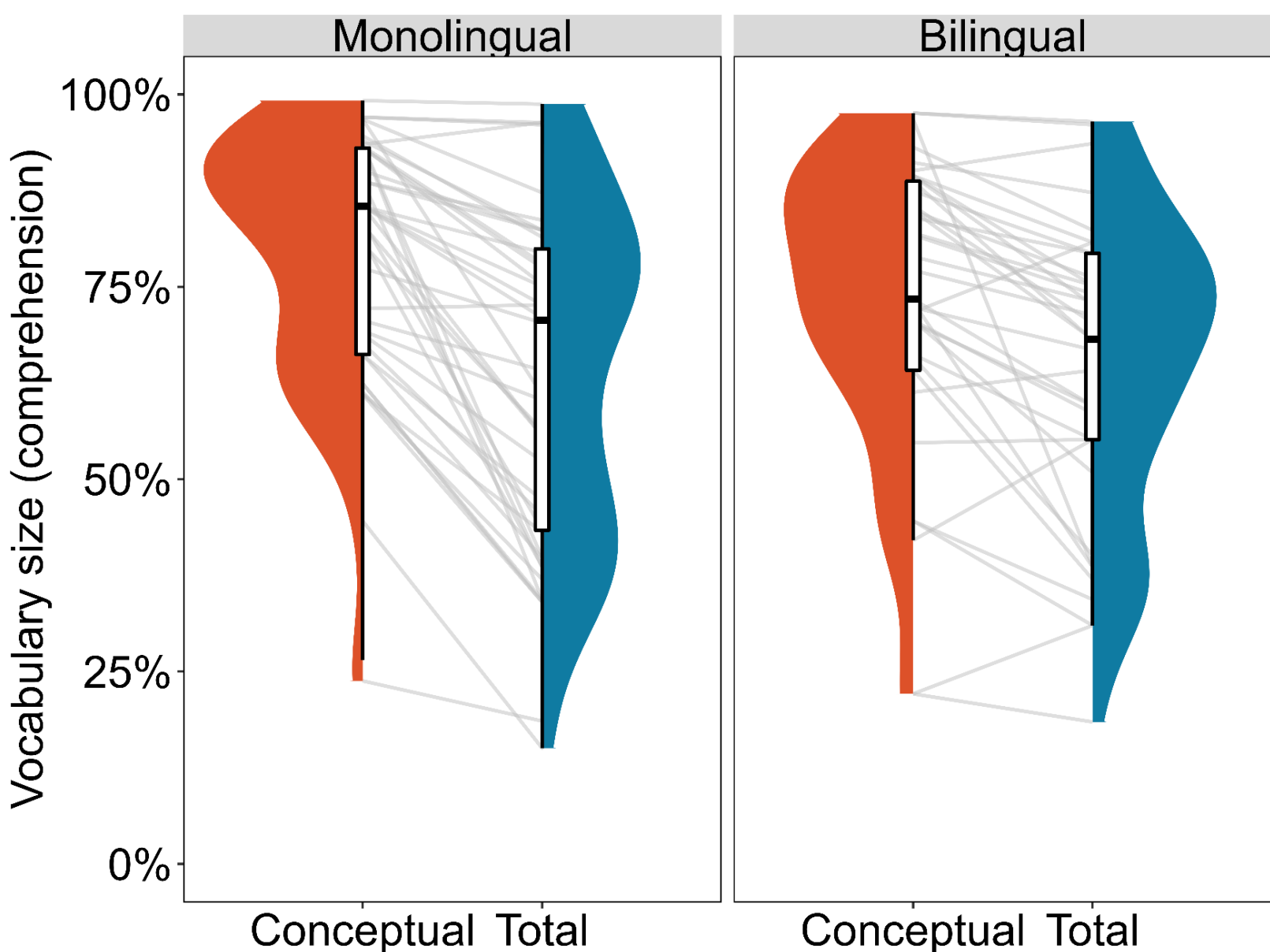1 concept, 2 labels
→ "gato"
→ "cat"

Participants

Tested longitudinally in Barcelona (Spain)
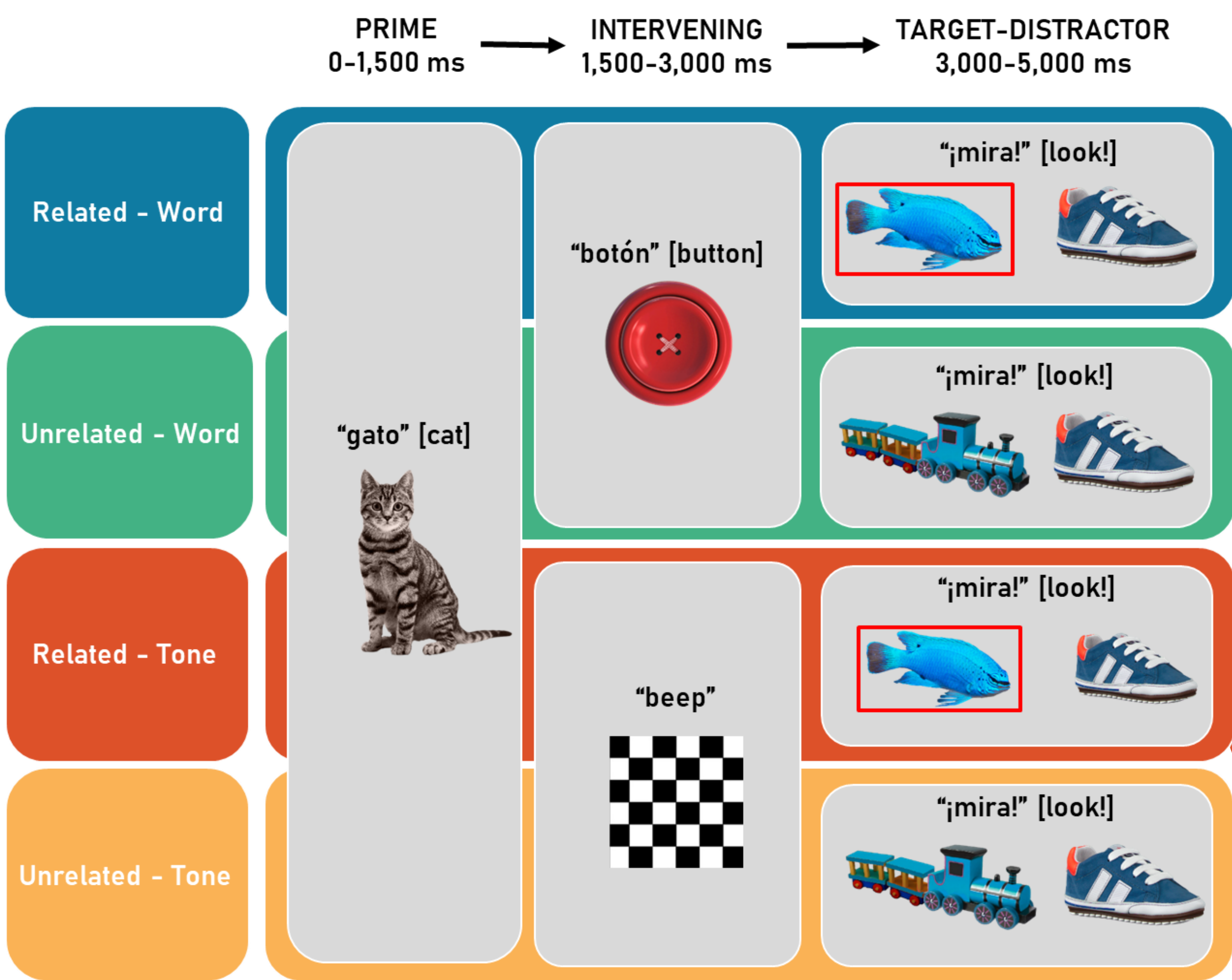
Bilingual if >80% L2 exposure

Vocabulary size computed from the **% words** participants were reported to *understand* from a vocabulary checklist.

Language profile	21 months	25 months	30 months
Bilingual	14	22	5
Monolingual	15	19	18
N	—	29	41	23

Only valid participants are shown.

Design

PRIME 0–1,500 ms → INTERVENING 1,500–3,000 ms → TARGET-DISTRACTOR 3,000–5,000 ms

Target fixations measured using an eye-tracker

Related – Word
Unrelated – Word
Related – Tone
Unrelated – Tone

"gato" [cat]

"botón" [button]   "¡mira!" [look!]
"¡mira!" [look!]
"beep"   "¡mira!" [look!]
"¡mira!" [look!]

Related - Word
Category shift
animals-clothes-animals
BSI expected

Related - Tone
No category shift
animals-X-animals
BSI not expected

Results

Bayesian multilevel logistic regression model in {brms} [6]

Growth Curve Analysis [7]

Conceptual vocabulary size model has slighly better predictive performance than total vocabulary model, given the data (LOO_{diff} = -2.5, SE = 1.9)

Intervening words decreased the probability of target looking, compared to **intervening tones** only in **low vocabulary participants**.

Predictions of the Conceptual Vocabulary model
Lines and error bands indicate posterior marginal means and 95% credible intervals

Related trials   Tone   Word

Low vocabulary (-1 SD)   Mean vocabulary (0 SD)   Large vocabulary (+1 SD)
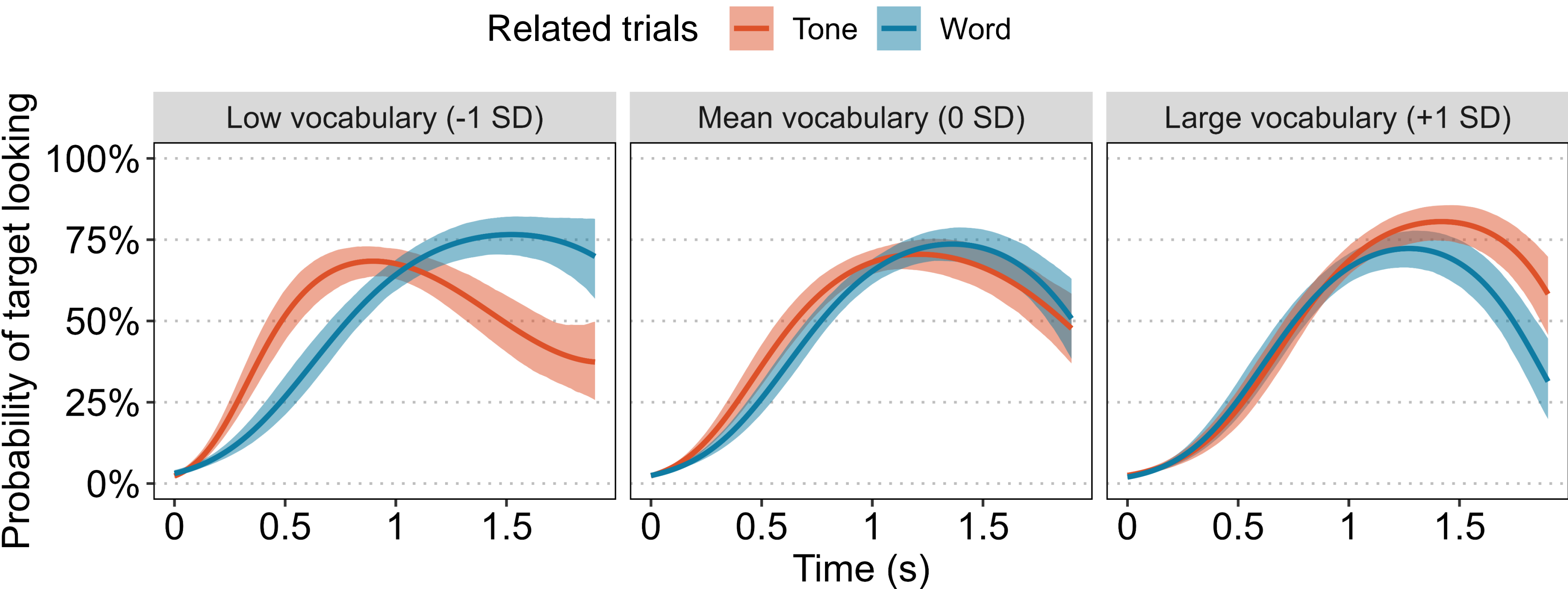
Conclusions

Inhibitory links between semantic categories more likely driven by **conceptual vocabulary** rather than total vocabulary size

Contrary to our predictions, **lower vocabulary sizes** are associated with **stronger BSI** effects

Future research will investigate the underlying mechanisms behind this unexpected effect

References

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[4] Chow, J., Aimola Davies, A. M., Fuentes, L. J., & Plunkett, K. (2019). The vocabulary spurt predicts the emergence of backward semantic inhibition in 18-month-old toddlers. Developmental science, 22(2), e12754.
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