

# (76) LANGUAGE ENTROPY VERSUS LANGUAGE EXPOSURE AS FACTORS SUPPORTING MULTILINGUAL LANGUAGE DEVELOPMENT

{ANDREW CHENG, FARZANA ALI, & HENNY YEUNG} SIMON FRASER UNIVERSITY SRC D 2023 BIENNIAL MEETING, SALT LAKE CITY

## BACKGROUND

- Child bilingualism quantified as a spectrum of exposure to dominant language exposure (e.g., 0-100%)
- "Language entropy" [1] measures the diversity of language use
- Consider: "Environmental entropy" as a measure of the diversity of child language exposure
- Does entropy correlate with overall language exposure, language acquisition, or executive function in children?
  - H1: Environmental entropy and overall language exposure will not be the same
  - H2: Increased entropy may correlate with better executive function [2, 3] and pragmatic awareness [4, 5]

## METHODS

- 54 bilingual children from English-majority regions of USA (n=10) and Canada (n=44)
- Parents filled out a questionnaire about language exposure; children played games designed to measure pragmatic awareness and executive function

Please enter the family members who talk to your child at least once a week

Family Member	Language Spoken	Proportion Spoken	Hours Spent
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

**Proportion Spoken**

- 1 = English only
- 2-3 = Mostly English
- 4 = Half English/Half other language(s)
- 5-6 = Mostly other language(s)
- 7 = Other language(s) only

Lower entropy  
Higher entropy  
Lower entropy

Figure 4: Schema of parent questionnaire

- Likert scale rating (1-7) of exposure to non-English language, converted to "entropy score" (0-1/low-high), weighted by hours spent w/ child per week
- "Family entropy" calculated for family members; "non-family entropy" calculated for school, day-care, etc.; total score = "environmental entropy"

## RESULTS (ENVIRONMENTAL ENTROPY VS. LANGUAGE EXPOSURE)

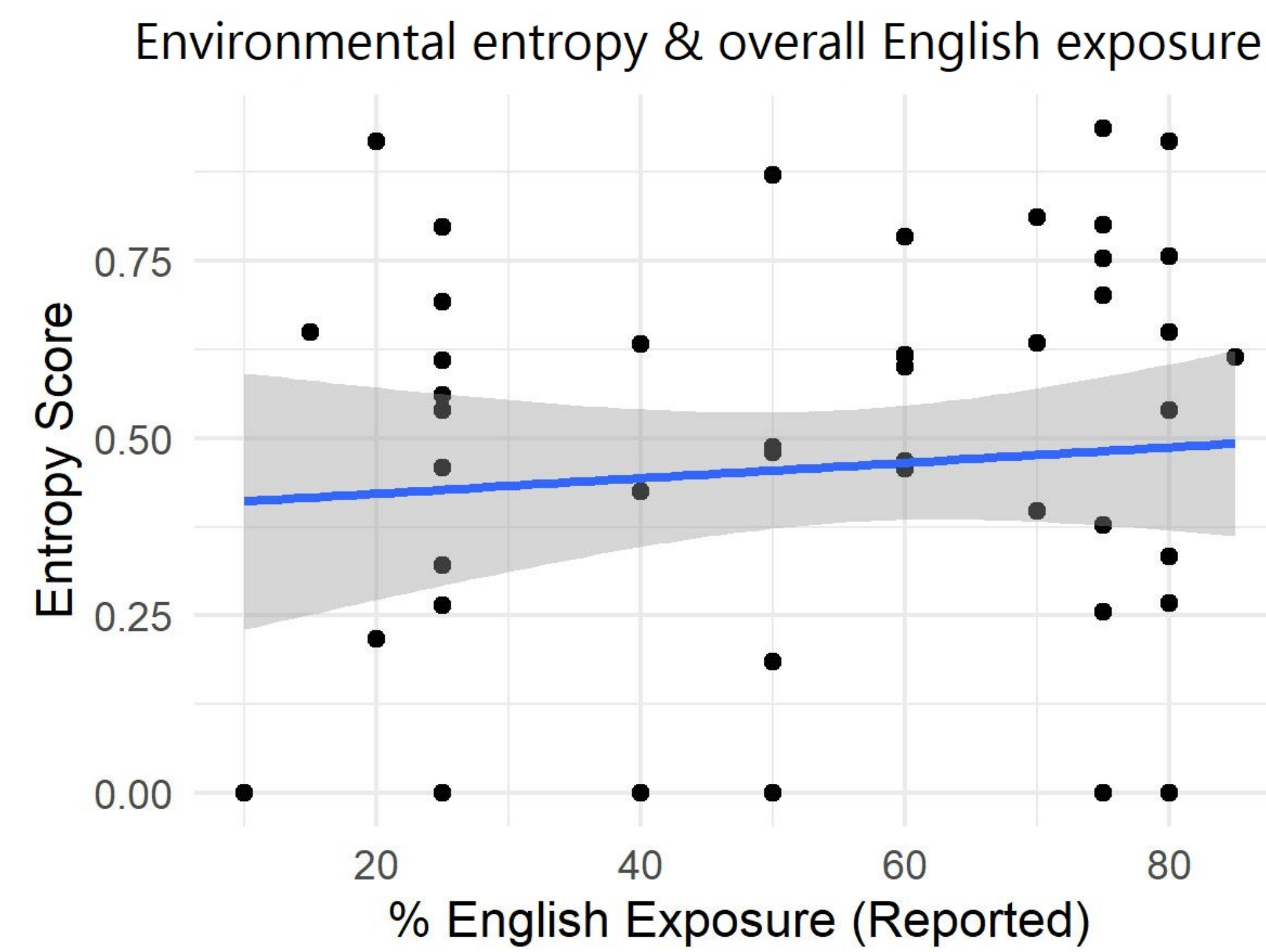


Figure 1: Entropy and percentage of English exposure are not significantly correlated.

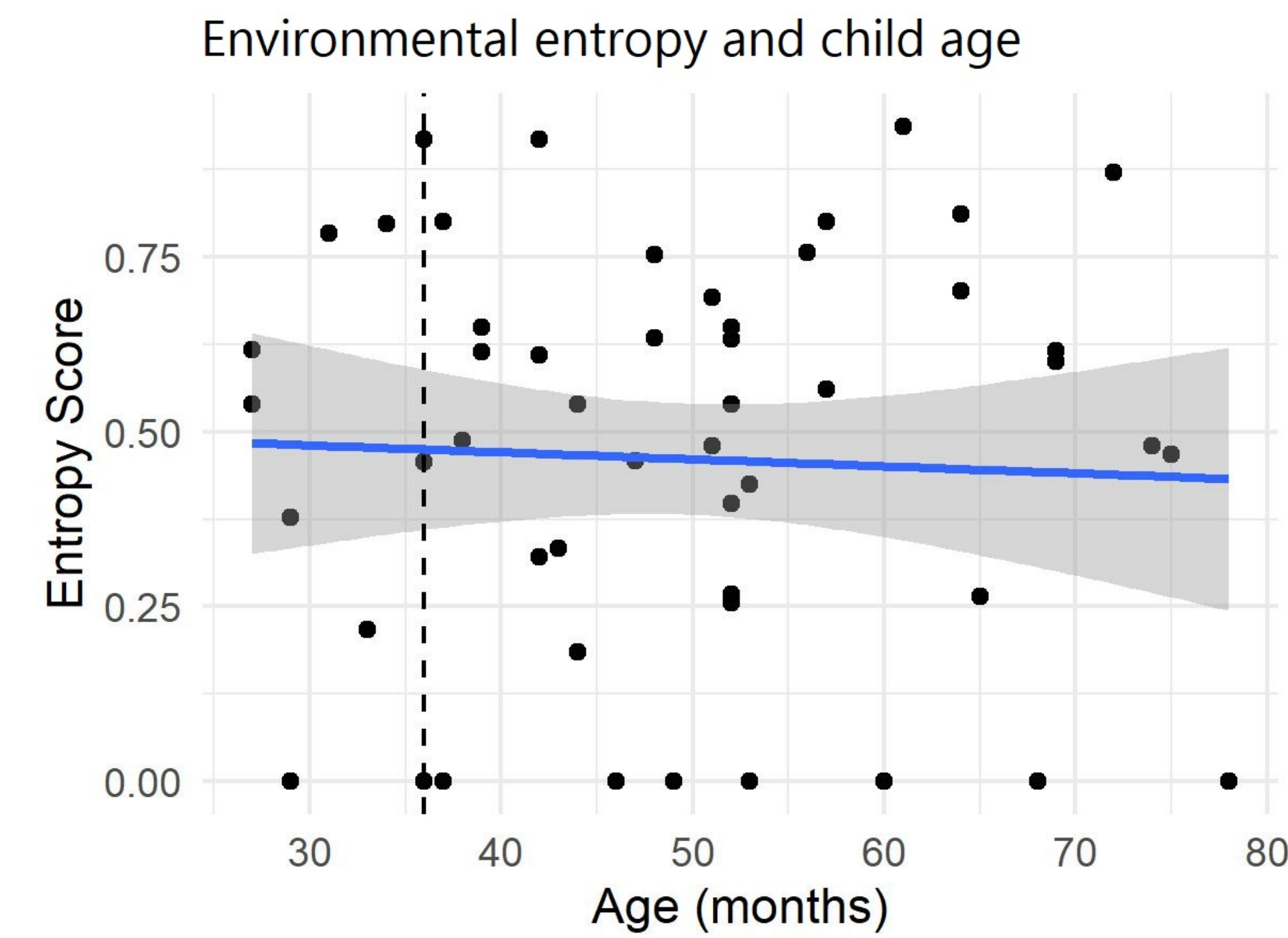


Figure 2: Entropy does not necessarily increase or decrease with child age.

## RESULTS (ENTROPY AND EXECUTIVE FUNCTION/PRAGMATICS)



Pragmatic awareness game played over Zoom [6].

Figure 5: Significant effect of child age on task accuracy.

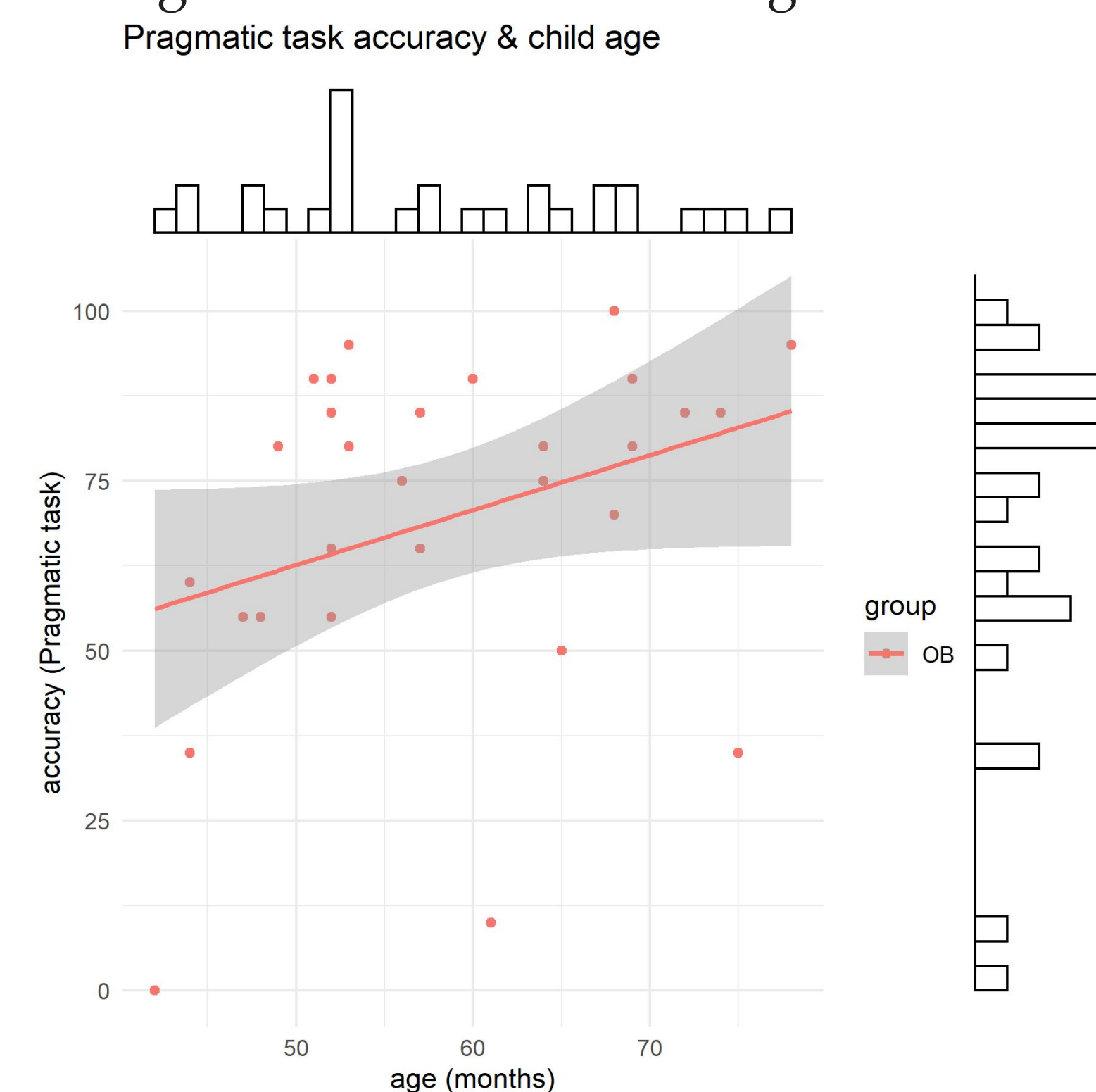
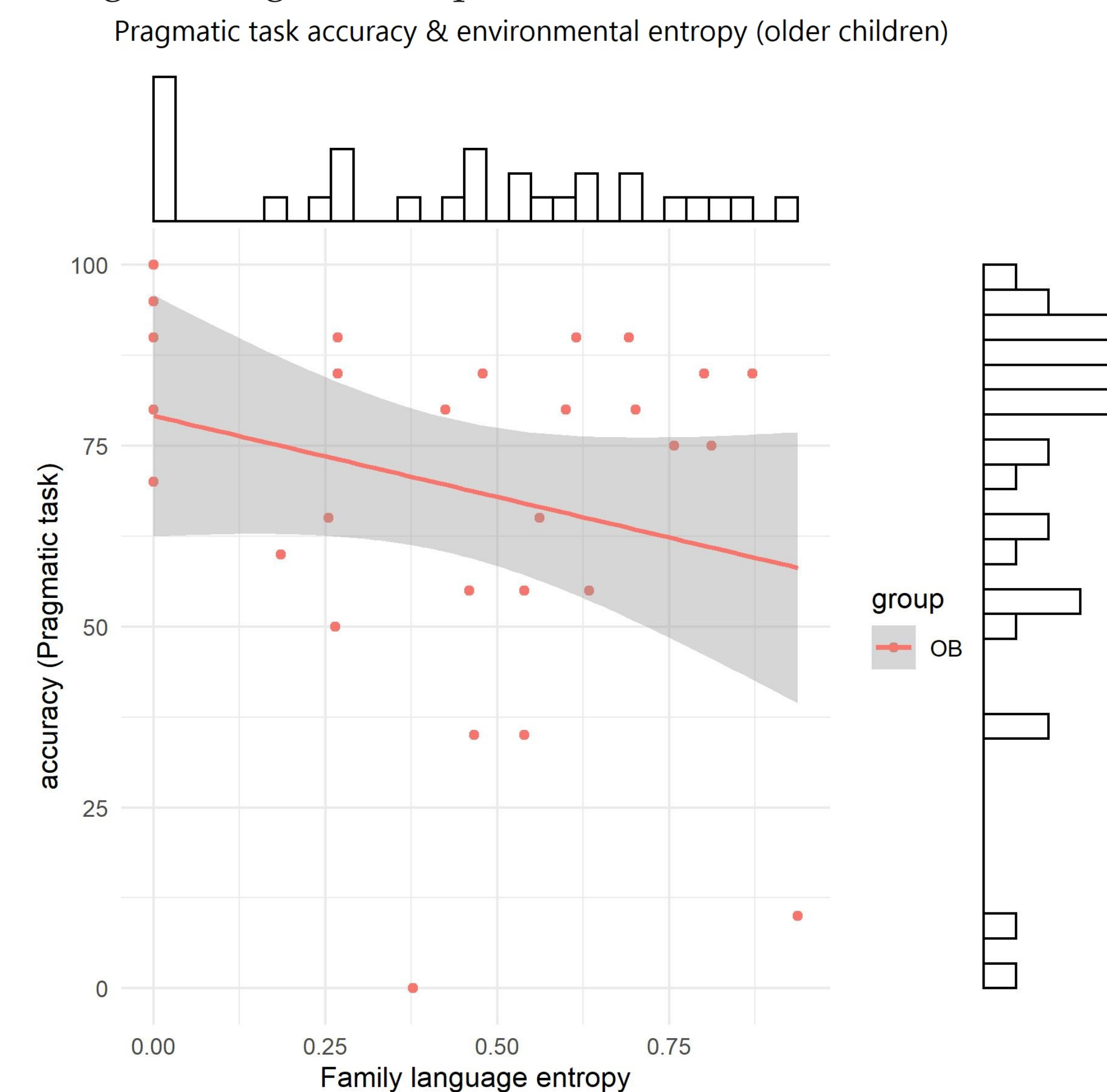


Figure 6: Significant effect of entropy on task accuracy, though ceiling effect is present.



(Executive function measured using a version of the tapping task [7]. Logistic regression reveals no effect of entropy, but a significant effect of child age.)

## DISCUSSION

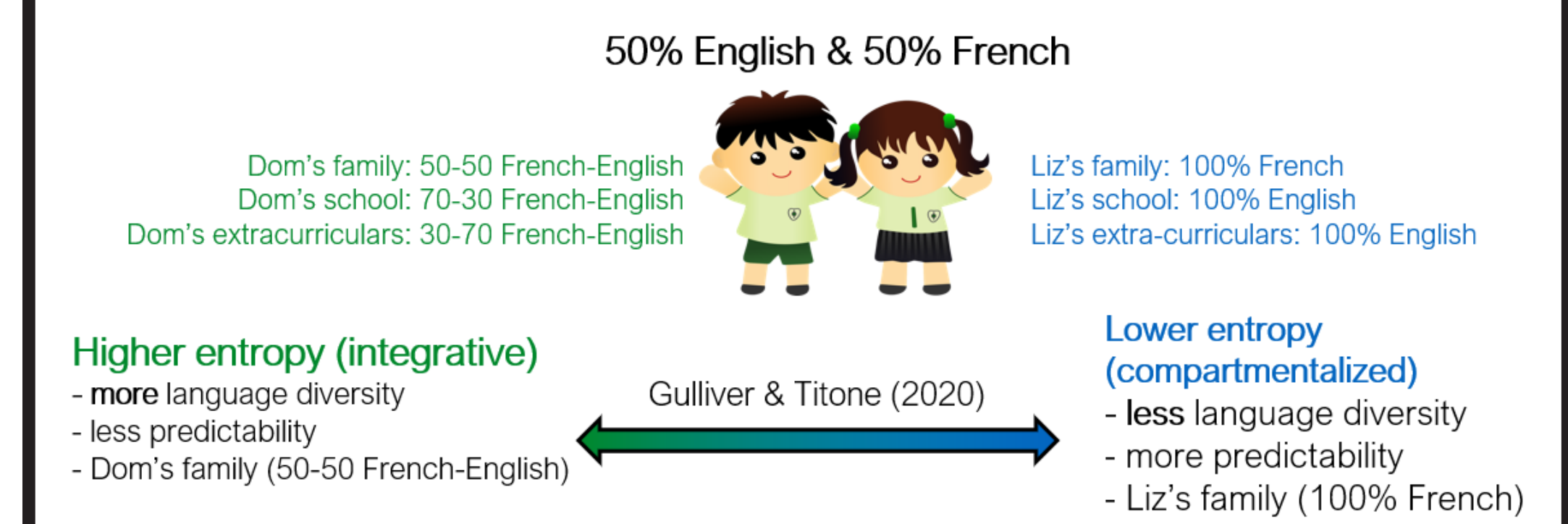


Figure 3: Two children with similar overall exposure to two languages may not actually have similar language environments.

- Environmental (language) entropy and overall language exposure **do not measure the same thing** (H1: as predicted).
- Entropy differs by generation of family member (grandparents and siblings tend to be low; parents tend to be high).
- Entropy did not influence Executive Function, but **child age and entropy affected pragmatic understanding** (H2: half-supported).
- Future directions: (1) Understand the influence of language entropy outside of the home (e.g., school and neighborhood); (2) Work toward more precise definition of "bilingual" for bilingualism dis/advantage research theorization.

## REFERENCES

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## CONTACT

langdev@sfu.ca or a\_cheng@sfu.ca