Exploring Cross-Language Interactions & Inhibitory Control in Preschool-Aged Spanish-Speaking English Language Learners

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Background

Evidence suggests that adult and child bilinguals activate their two languages in parallel. Cognates, or words that are similar across two languages (e.g., *elephant/elefante* in English and Spanish), facilitate cross-language interactions (e.g., Sánchez-Casas & García-Albea, 2005).

This parallel activation can be thought of as competition between the two languages. It has been argued that bilinguals resolve cross-linguistic competition via **inhibitory control**, a facet of executive function (e.g., Green, 1998). Indeed, increased skills in inhibitory control have been linked to decreased cross-language interactions:

- *Inhibitory control* negatively predicted the degree to which adult bilinguals demonstrated a cognate advantage (Linck, Hoshino & Kroll, 2008)
- In older bilinguals, increased errors on an inhibitory control task were linked to decreased language control (Gollan, Sandoval & Salmon, 2011)

Though extant research points to advantages in inhibitory control in bilingual children relative to monolingual children (e.g., Barac & Bialystok, 2012), work on *individual differences in inhibitory control* in child bilinguals is limited.

In this exploratory, retrospective study we ask:

What is the relationship between inhibitory control and cross-language interactions in preschool-aged Spanish-speaking English language learners?

Methods

Participants

Participants included 27 preschool-aged Spanish-speaking English Language Learners preschoolers (12 males) recruited for a larger community-based intervention study.

Age in months (SD)	% Spanish Heard (SD)	% Spanish Used (SD)	Leiter-R avg* (SD)	Mat. Ed in years (SD)
59.33 (SD = 5.53)	73.69 (SD = 20.15)	71.41 (SD = 19.47)	11.46 (SD = 1.94)	9.71 (SD = 3.33)

Measures

Cognate advantage:
- Participants completed *the Peabody Picture Vocabulary Test-Third Edition* (Dunn & Dunn, 1997), a receptive English vocabulary measure that has been used to test for cognate effects and cross-language interactions in Spanish-English bilinguals (e.g., Kelley & Kohnert, 2012)
- Accuracy rates were calculated separately for cognate and non-cognate test items (Potapova, Blumenfeld & Pruitt-Lord, 2015)
- Cognate advantage = Cognate Accuracy – Non-cognate accuracy

Inhibitory Control:
- On a different day, participants completed a *Metalinguistic Probe* (Finestack & Bangert, 2015)
- Subtest 1: a novel label learning task in which participants were taught novel labels for familiar objects (e.g., a carrot was re-labeled a "gok")
  - Possible score range = 0 - 16
- Subtest 2: required participants to switch labels for two known objects (e.g., the sun and the moon)
  - Possible score range = 0 - 8
- *As both require the preschoolers to inhibit the target's known label*, these tasks may require the use of inhibitory control

Across measures, outliers were defined as participants who scored two standard deviations above or below the group means (n = 3).

Results

	Cognate Advantage (SD)	Metalinguistic Subtest 1 (SD)	Metalinguistic Subtest 2 (SD)	Metalinguistic Subtest 1 + 2 (SD)
All participants	7.33 (15.37)	12.22 (3.04)	2.63 (1.74)	14.85 (3.93)
Without outliers	4.80 (11.23)	12.08 (3.01)	2.54 (1.35)	14.63 (3.47)
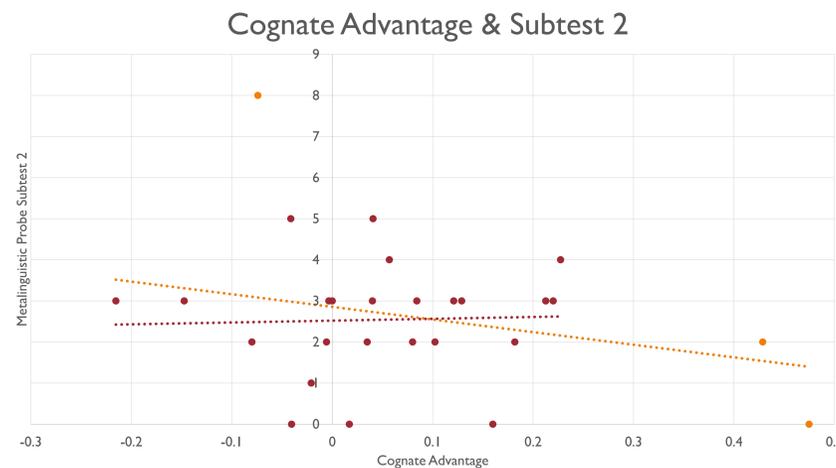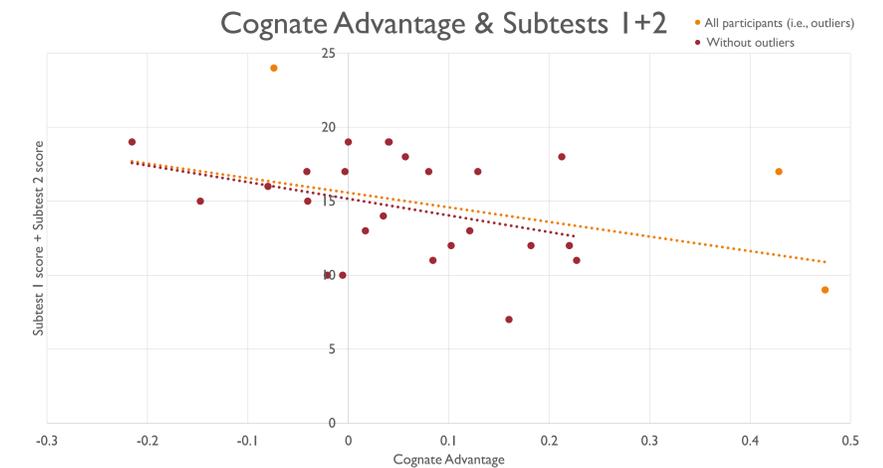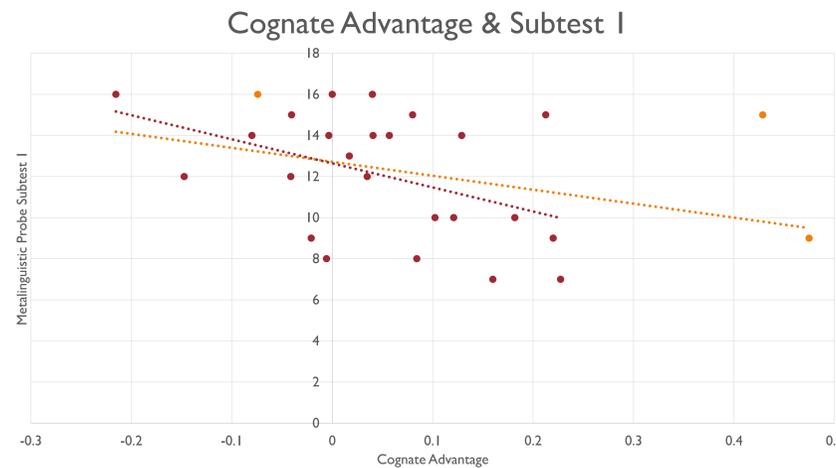
Cognate Advantage & Subtest 1

Cognate Advantage & Subtests 1+2

Cognate Advantage & Subtest 2

What is the relationship between inhibitory control and cross-language interactions in preschool-aged bilinguals?

Pearson Correlations, controlling for Spanish exposure

		Metalinguistic Subtest 1 (SD)	Metalinguistic Subtest 2 (SD)	Metalinguistic Subtest 1 + 2 (SD)
Cognate Advantage	All participants	-.376[†] p = .059	-.290 p = .151	-.419[*] p = .033
	Without outliers	-.456[*] p = .029	.009 p = .967	-.391[†] p = .065

[†]p<.1, [*]p<.05

Overall, a negative association was observed between cognate advantage magnitude and two linguistic tasks requiring inhibitory control. Once outliers were removed, the only association to reach significance was with Subtest 1.

Discussion

Results of this retrospective study are consistent with patterns of cross-language interactions and inhibitory control in bilingual adults. The present findings are modest, but mark an effort to consider individual differences in research on children exposed to two languages.

All but one association patterned in the expected direction: children who showed greater cognate effects (i.e., experienced more cross-language influence) also earned lower scores on two linguistic tasks requiring the suppression of familiar information.

However, with outliers removed, only one relationship reached significance. Bilingual preschoolers who demonstrated stronger cognate effects also tended to earn lower scores on the first subtest of the metalinguistic probe, even when statistically controlling for Spanish exposure.

Future Directions

This exploratory work motivates further investigations of cross-language interactions and inhibitory control in young children exposed to multiple languages.

This investigation, in preparation, will make two significant improvements to the present work: (1) cross-language interactions will be measured in a more sensitive and controlled manner; (2) inhibitory control will be measured with multiple *non-linguistic* tasks, to better control for the effect of language experience.

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