Cross-Language Influences Across Scripts - Evidence from a Visual Lexical Decision Task with Arabic-Hebrew Bilinguals and Arabic Learners.

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Are cross-language influences present during visual processing among different-script bilinguals?

Does phonological overlap (in the absence of meaning overlap) facilitate/interfere with processing?

How early in learning do these influences emerge?

- Cross language influences (CLI) typically observed in visual lexical-decision tasks of same-script bilinguals (Dijkstra 2005; Degani & Tokowicz 2010). Less is known about CLI in **different-script bilinguals** (Miwa et al., 2014).

  - Cognates (form & meaning overlap) typically lead to *facilitation*.

  - False cognates (FC, form overlap with no meaning overlap) typically lead to *interference* for same-script bilinguals.

- Could orthography serve to cue language membership and **prevent or modulate** CLI?

  ➤ Evidence for cognate facilitation & FC interference among different-script (Arabic-Hebrew) bilinguals (Degani et al., 2018; Prior et al., 2017), but semantics was explicitly tapped with a semantic relatedness task. Would similar effects emerge in a **lexical decision** task?

- Some evidence that pure phonological overlap leads to **facilitation** in lexical decisions among different-script bilinguals (Peleg et al., in press – Hebrew non-words sounding like Spoken Arabic were easier to reject than typical Hebrew non-words not sounding like Arabic).

Current Study

Participants

30 Arabic-Hebrew bilinguals

30 native Hebrew speakers with no knowledge of Arabic (control)

43 native Hebrew speakers who learned Arabic vocabulary
　　see learning paradigm

	Arabic-Hebrew bilinguals	Native Hebrew Control	Native Hebrew Learners of Arabic
Number of participants	30	30	43
Age (in years)*	21.50 (2.76)	26.38 (4.48)	24.93 (3.85)
Maternal Education (SES)	13.17 (4.25)	14.67 (3.04)	13.93 (3.53)
Education (in years)	14.63 (2.09)	13.87 (1.57)	13.65 (1.96)
Hebrew Proficiency*	8.15 (1.18)	9.68 (0.48)	9.48 (0.62)
Hebrew Use*	6.27 (1.46)	7.82 (1.37)	7.73 (1.31)
Arabic Proficiency	9.42 (0.69)	-	-
Arabic Use~	5.92 (2.01)	-	-
English Proficiency	6.94 (1.61)	7.41 (0.99)	7.10 (1.26)
English Use	5.68 (2.00)	6.31 (1.61)	6.30 (1.61)

Note: * Marks a significant difference between the Arabic-Hebrew group and the native Hebrew groups. The two native Hebrew groups did not differ on any of the measures. Standard deviations appear in parenthesis.

Method

Stimuli & Procedure

	Cognate	False Cognate	Control
Presented form	עין /ʕajin/	סוס /ṣuːṣ/	חתול /xatul/
Hebrew meaning	Eye	Horse	Cat
Arabic meaning	Eye	Chick	N/A

84 Hebrew **words** and 84 orthographically legal **non-words** (matched on length, bigram & trigram Hebrew frequency (12 million word corpus from articles in Hebrew newspaper Haaretz, see Peleg et al., in press).

Hebrew words included:
- 14 Hebrew-Arabic **cognates**
- 14 Hebrew-Arabic **false-cognates** (FC)
- 42 **unambiguous control** Hebrew words.
- 14 filler ambiguous Hebrew words (homonyms) (e.g., 'mapa' meaning both a tablecloth and a map).

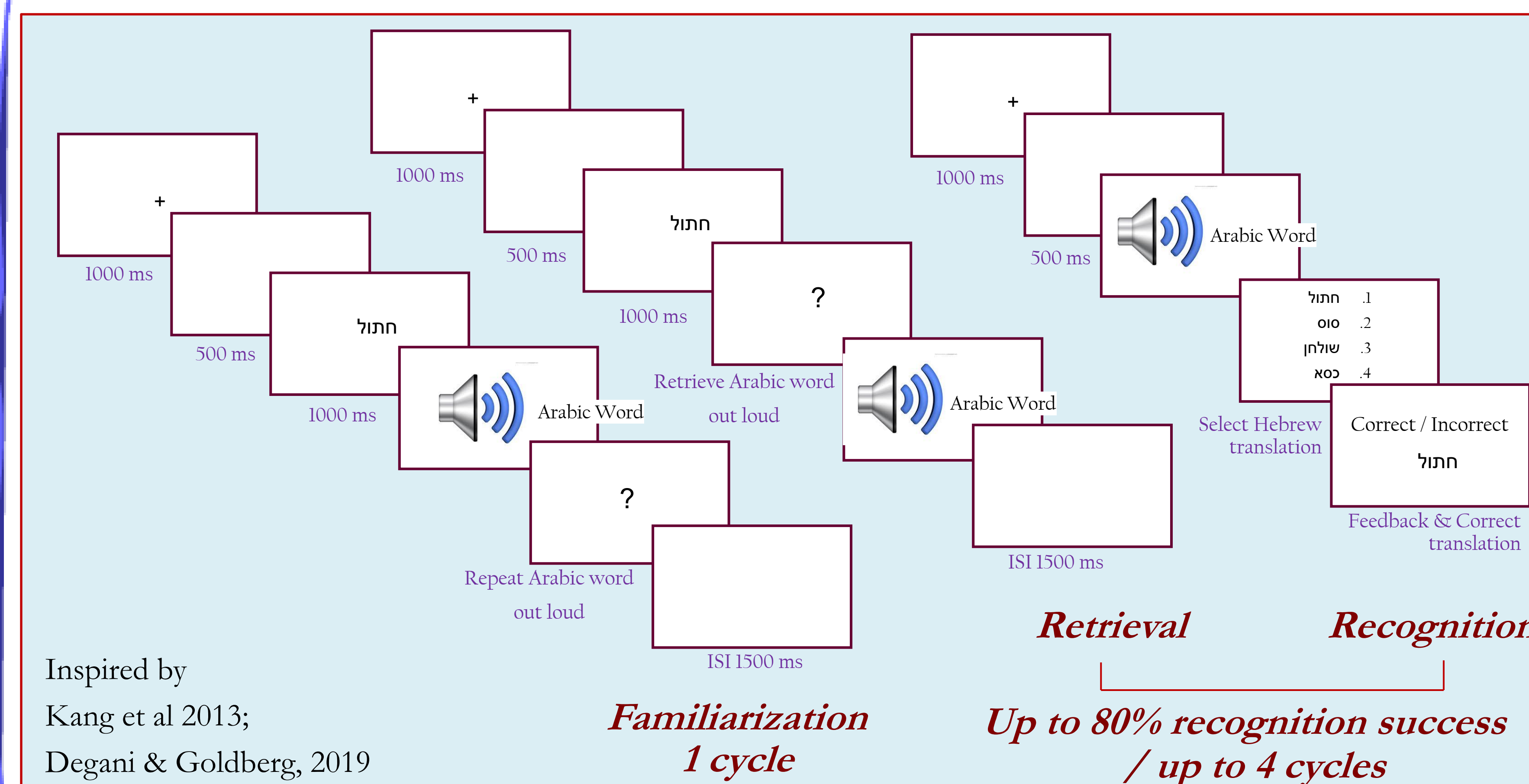500ms → סוס → Hebrew letter string → Until yes/no response or up to 4000 ms
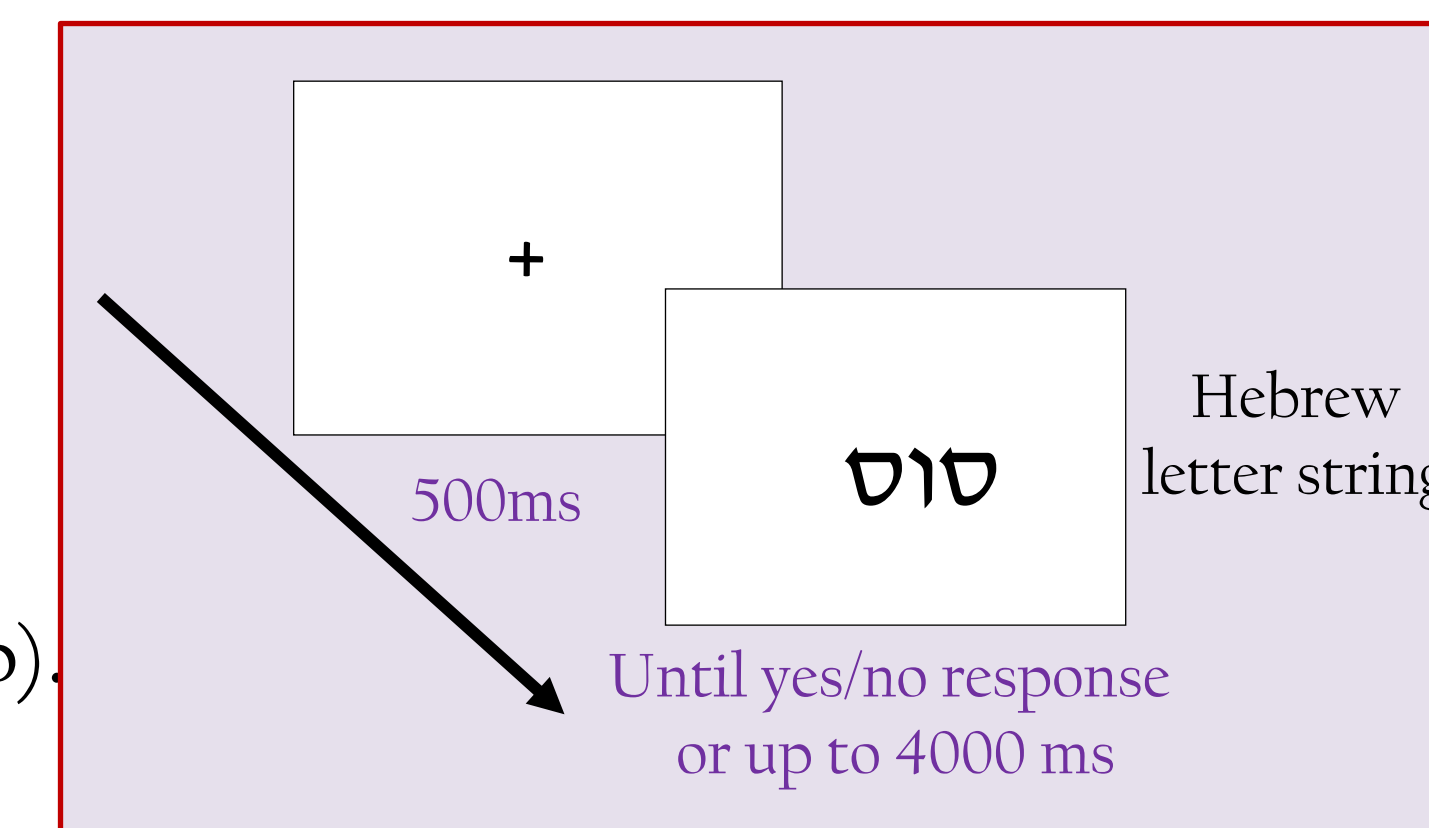
Stimuli Selection

- No difference in phonological form similarity between cognates (M=4.23, SD=0.61) and FC (M=4.36, SD=0.53), t<1. Based on norming with native Hebrew speakers, rating the similarity (1-5) of the aural form of the Arabic word and the phonological form of the visually presented Hebrew word.
- Words were matched across word type on Arabic length (in syllables), Hebrew length (in letters & syllables), Hebrew frequency (heTenTen 2014 via SketchEngine (Kilgarriff et al., 2014).

Vocabulary Learning Paradigm

Participants learned 54 Arabic words (14 cognates, 14 FC, 28 control) in one session (see below)

Tested in the Hebrew visual lexical-decision task immediately after learning
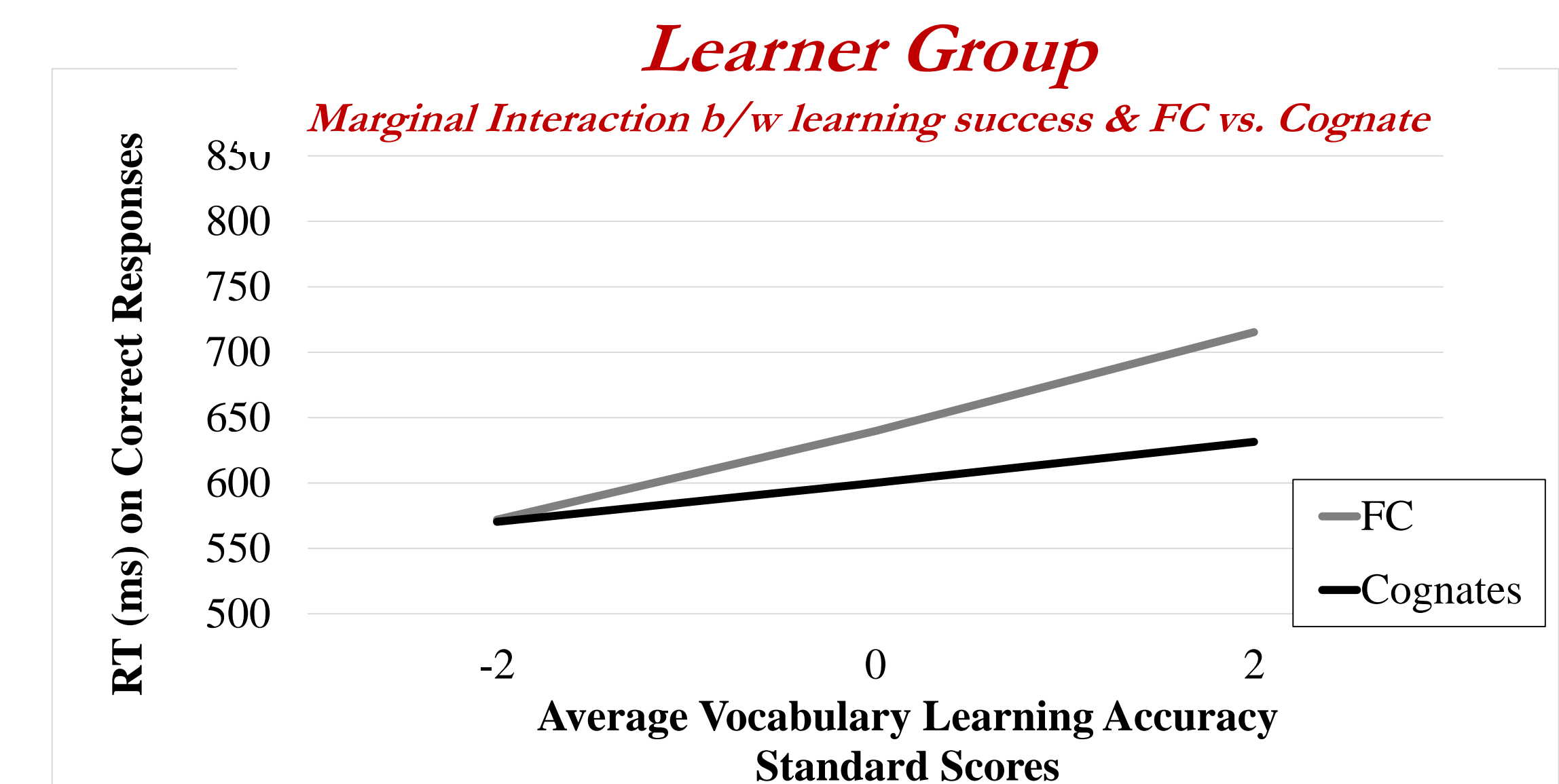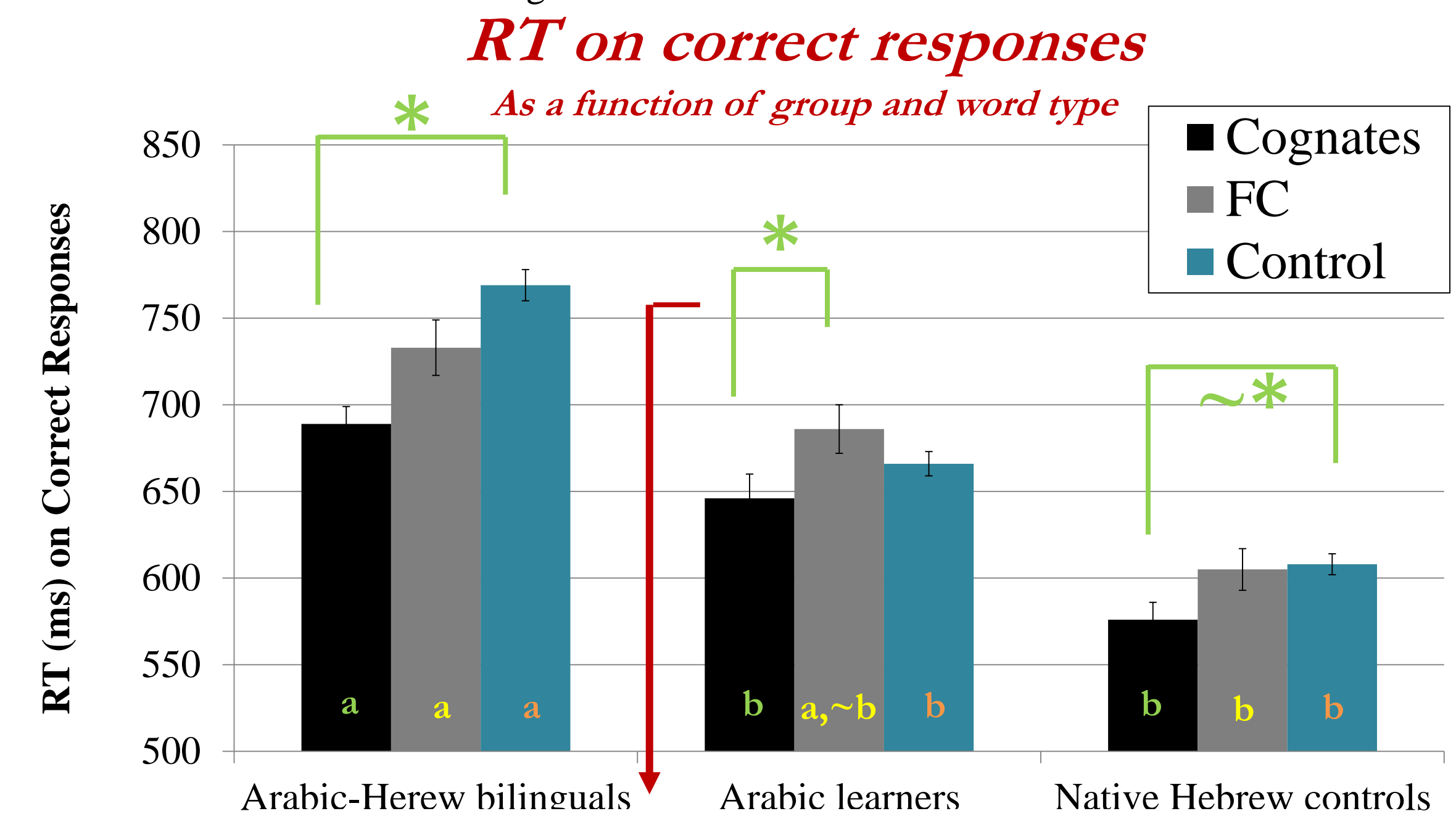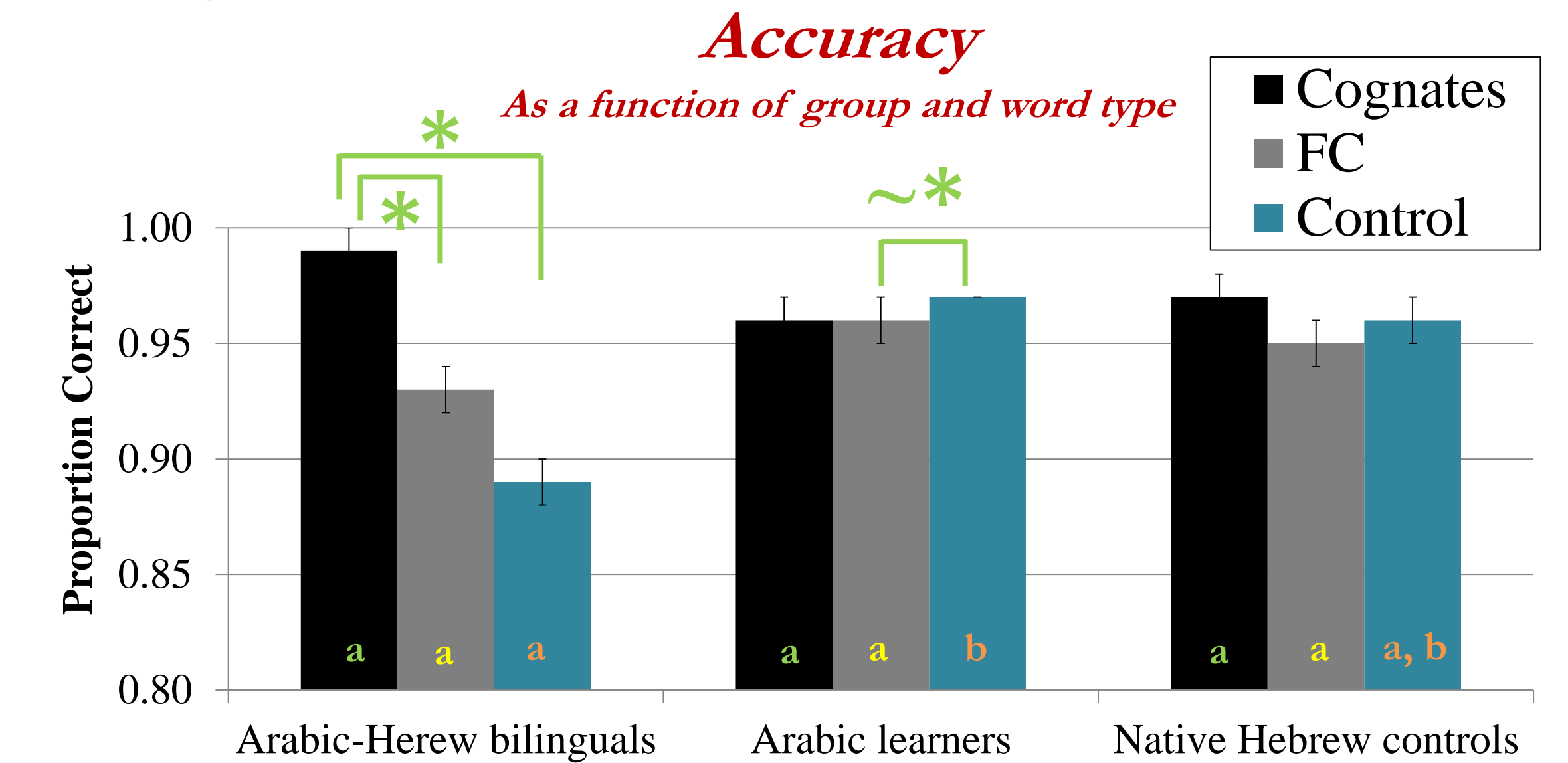

Inspired by
Kang et al 2013;
Degani & Goldberg, 2019

Familiarization 1 cycle **Retrieval** **Recognition** Up to 80% recognition success / up to 4 cycles

Results

Observed means with SE. Analyses were conducted using mixed models (logistic for accuracy) with Age, SES and Education as control fixed predictors & maximal random structure

Accuracy
As a function of group and word type

RT on correct responses
As a function of group and word type

Learner Group
Marginal Interaction b/w learning success & FC vs. Cognate

Summary & Discussion

- A cognate facilitation effect observed for Arabic-Hebrew bilinguals (as in previous studies using semantic decisions Degani et al., 2018; Prior et al., 2017), but not for learners.
- The false-cognate effect was weaker, and was in a direction of **facilitation** for bilinguals, but **interference** for learners.
- Successful learning of FC words was accompanied by a cost in RT for the phonological form in the L1. The fact that proficient bilinguals did not show this decrement suggest that meaning competition associated with FC is resolved or attenuated with increased proficiency

- *Phonological activation of the L1 during an L2 visual lexical-decision task, despite difference in orthography.*
- *Effects emerge early in learning, but the interplay of form and meaning overlap changes with proficiency & use.*

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