

Quantifier scope in heritage bilinguals: a comparative experimental study

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Proposal: In the domain of scope, the interaction of a dominant and a heritage grammar results in simplification across the board.

1 Background

- Quantification
- Heritage speakers
- Previous work: a puzzle

2 Experiments

- Monolingual Hungarian
- Heritage Hungarian
- Heritage English

3 Discussion

Background

Quantification across languages

Doubly quantified sentences exhibit scope ambiguities:

- (1) Every pirate fed a shark. (Every – A)
 - a. Surface scope ($\forall > \exists$): For every pirate, there is a shark that he fed.
 - b. Inverse scope ($\exists > \forall$): There is a shark such that every pirate fed it.
 - (2) A pirate fed every shark. (A – Every)
 - a. Surface scope ($\exists > \forall$): There is a pirate such that he fed every shark.
 - b. Inverse scope ($\forall > \exists$): For every shark, there is a pirate that fed it.
- Every – A sentences: inverse entails surface
 - A - Every sentence: good test case

Background

Quantification across languages

Different scope interpretations: generated via Quantifier Raising (QR) (May, 1977).

Inverse interpretations: available but dispreferred.

- grammaticality judgements
- reaction times

Background

Quantification across languages

Scope-rigid languages: no scope ambiguities, only surface reading.

Hungarian: different readings of (1) encoded by different sentences.

- | | | |
|-----|---|---------|
| (3) | Minden kalóz meg-etet-ett egy cápá-t. | surface |
| | every pirate PFV-feed.3SG-PST a/one shark-ACC | |
| (4) | Egy cápá-t etet-ett meg minden kalóz. | inverse |
| | a/one shark-ACC feed.3SG-PST PFV every pirate | |

Background

Heritage speakers

- Simultaneous/sequential bilinguals, native language (L1) is less dominant.
- Majority language (L2) only supplants L1 around school age (Benmamoun, et al., 2013a; b).
- Helpful in distinguishing areas of grammar susceptible to attrition from those that are not.

Background

Quantification in the context of heritage speakers

- Scope calculations bring together syntactic, semantic and pragmatic levels of representation → difficult, fragile.
- Heritage speakers have to employ a less dominant grammar → processing difficulty.
- Scope is worthy of investigation especially in heritage speakers.

Previous experimental work

Scontras, et al. (2017)

- English-dominant heritage speakers of Mandarin.
- Both their Mandarin and English grammar like native Mandarin: scope-rigid.
- **Puzzle:** scope system of weaker language retained + even transferred?

Hypothesis 1

The L1, by virtue of being acquired first, is preserved and transferred to the L2.

Hypothesis 2

The simpler (no ambiguities, no QR) of the two grammars is preserved and transferred.

The present study

- A population to tease these apart: heritage speakers of English who are dominant in a scope-rigid language.

Hypothesis 1

The L1, by virtue of being acquired first, is preserved and transferred to the L2.

Prediction: the scope ambiguity of their English is preserved.

Hypothesis 2

The simpler (no ambiguities, no QR) of the two grammars is preserved and transferred.

Prediction: their English becomes scope-rigid.

The present study

- Predictions tested on (the heritage languages of):
 - ▶ Experiment 1: monolingual Hungarian speakers
 - ▶ Experiment 2: English-dominant heritage speakers of Hungarian
 - ▶ Experiment 3: Hungarian-dominant heritage speakers of English

Hypothesis 2





The simpler (no ambiguities, no QR) of the two grammars is preserved and transferred.

Prediction: their English becomes scope-rigid.

Experimental design

- Participants presented with a doubly quantified sentence and a disambiguating (surface vs. inverse) picture.
- Rated on a 7-point scale how accurately the sentence described the picture.
 - ▶ 1=completely inappropriate and 7=completely appropriate
- Two factors manipulated:
 - ▶ Word Order: the linear configuration of quantifiers (Every - A vs. A - Every)
 - ▶ Scope Interpretation: the intended reading (Surface vs. Inverse)

Exeperimental design

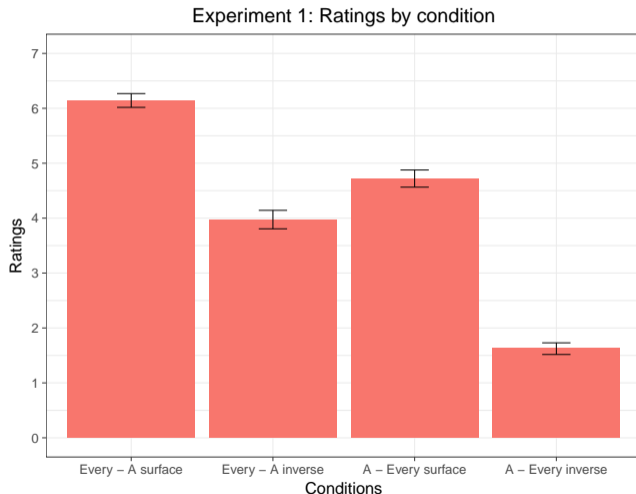
	Surface scope	Inverse scope
Every – A	 <p>Minden kalóz meg-etet-ett egy cápá-t. Every pirate fed a/one shark.</p>	 <p>Minden kalóz meg-etet-ett egy cápá-t. Every pirate fed a/one shark.</p>
A – Every	 <p>Egy kalóz meg-etet-ett minden cápá-t. A/One pirate fed every shark.</p>	 <p>Egy kalóz meg-etet-ett minden cápá-t. A/One pirate fed every shark.</p>

Experiment 1

Participants and predictions

- 77 native monolingual Hungarians.
- Prediction: if the theoretical assumption (i.a. É. Kiss, 2002) is correct, then Hungarian is scope-rigid:
 - ▶ Critical A - Every inverse condition: low ratings.

Experiment 1: Results



significant effects:

- Word Order ($p < .001$)
- Scope Interpretation ($p < .001$)
- interaction ($p < .05$)

A - Every inverse: 1.62

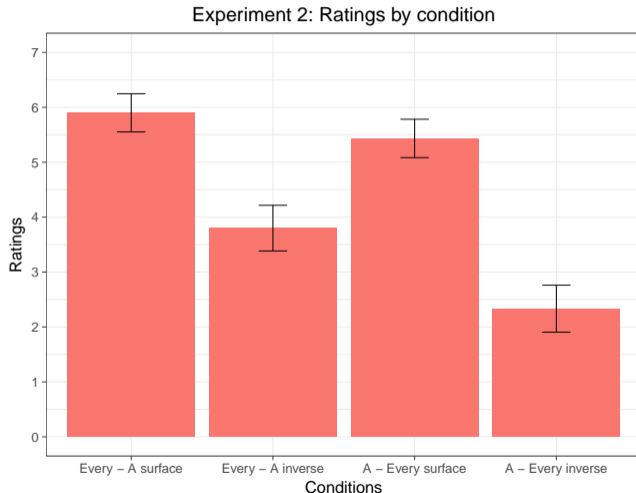
confirms scope-rigidity of Hungarian

Experiment 2

Participants and predictions

- 15 English-dominant heritage speakers of Hungarian.
- A priori:
 - ▶ Scope-rigidity immune to transfer → low ratings for the critical condition.
 - ▶ Scope calculation susceptible to transfer → higher ratings.
- Based on Scontras, et al. (2017): L1 immune to transfer from L2.

Experiment 2: Results



significant effects:

- Word Order ($p < .05$)
- Scope Interpretation ($p < .01$)

interaction n. s. ($p = .4$)

A - Every inverse: 2.33

replicates Scontras, et al.

- Heritage speakers less comfortable with their L1 heritage grammar → accept ungrammatical constructions to a greater extent (i.a. Benmamoun et al., 2013b).
- Scontras, et al.'s comparable heritage Mandarin rating: 2.79.

Experiment 3

Participants and predictions

- 8 Hungarian-dominant heritage speakers of English
- Materials in English, but otherwise identical to Experiments 1-2.

Hypothesis 1

The L1, by virtue of being acquired first, is preserved and transferred to the L2.

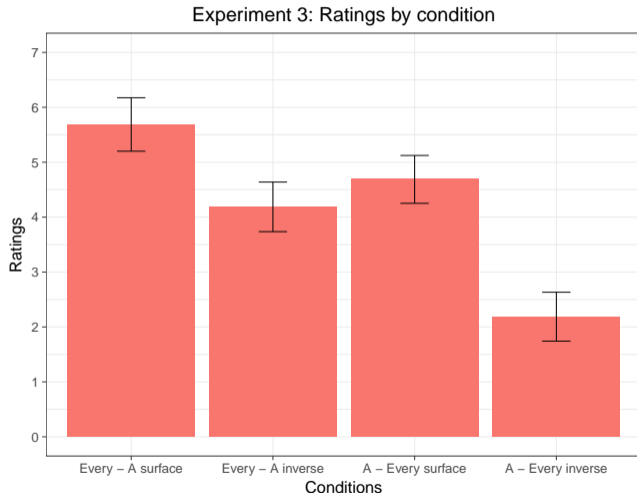
Prediction: the scope ambiguity of their English is preserved, i.e. higher A - Every inverse ratings.

Hypothesis 2

The simpler (no ambiguities, no QR) of the two grammars is preserved and transferred.

Prediction: their English becomes scope-rigid, i.e. low A - Every inverse ratings.

Experiment 3: results



significant effects:

- Word Order ($p < .05$)
- Scope Interpretation ($p < .001$)
- interaction ($p < .05$)

A - Every inverse: 2.18

supports Hypothesis 2

Experiment 3: results

- Materials identical to Scontras, et al. → comparison with their native English results.
- Rating for the critical condition: over 2 points below native English baseline.
- Data pattern similarly to native Hungarian.

Word Order	Scope Interpretation	Heritage English	Native English	Native Hungarian
Every - A	surface	5.68	6.5	6.14
A - Every	surface	4.68	5.6	4.72
Every - A	inverse	4.18	5.5	3.97
A - Every	inverse	2.18	4.46	1.62

Overall results



- A – Every inverse ratings: low across all three experiments.
- None of the three grammars (native and heritage Hungarian, heritage English) allow inverse scope.

Hypothesis 2

The simpler (no ambiguities, no QR) of the two grammars is preserved and transferred.

- Observed preference for isomorphism can be given a processing-related explanation.
- Calculation of inverse scope is independently known to be costly:

***Processing Scope Economy:** The human sentence processing mechanism prefers to compute a scope configuration with the simplest syntactic representation (or derivation). Computing a more complex configuration is possible but incurs a processing cost.*

Anderson (2004, p. 48)

- Heritage speakers have to employ a less dominant grammar → additional processing cost.
- Not surprising that a preference for simpler grammars is especially pronounced.
- They default to scope rigidity, regardless of whether it comes from L1 or L2.

Conclusion: In the domain of scope, the interaction of a dominant and a heritage grammar results in simplification across the board.

Thank you!

References

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