Quantifier scope in heritage bilinguals: a comparative experimental study

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Background: Quantifiers can enter into ambiguous relations with each other, giving rise to scope ambiguities, as demonstrated below.

(1) Every pirate fed a shark. (Every – A)
   a. Surface scope (∀ > ∃): For every pirate, there is a shark that he fed.
   b. Inverse scope (∃ > ∀): There is a shark such that every pirate fed it.

(2) A pirate fed every shark. (A – Every)
   a. Surface scope (∃ > ∀): There is a pirate such that he fed every shark.
   b. Inverse scope (∀ > ∃): For every shark, there is a pirate that fed it.

English exhibits such scope ambiguities, but "scope rigid" languages do not. Scontras et al. (2017) investigated English-dominant heritage speakers of Mandarin and found that their Mandarin grammar is like native Mandarin: it resists inverse scope in doubly quantified sentences. This suggests that there is no transfer from the dominant (L2) to the heritage (L1) grammar in the domain of scope. Moreover, the English grammar of such speakers was also shown to be scope rigid. This seems to present a puzzle: why would the scope system of the weaker language not only be retained, but even transferred to the dominant language? As noted by Scontras et al., their results are compatible with two hypotheses that underlie the grammatical system (in the domain of quantifier scope in particular) of heritage speakers. Under Hypothesis (1), the heritage grammar, by virtue of being acquired first, is preserved and transferred to the L2 even though the L2 is dominant. Under Hypothesis (2), regardless of the temporal order of acquisition, the simpler (defined as not allowing ambiguities) of the two grammars is the one that is preserved and carried over to the other language. A population that could tease apart these two hypotheses is heritage speakers of English (i.e. weaker L1 English) who are dominant in a scope rigid language. Hypothesis (1) would predict the scope ambiguity of their weaker but first acquired English to be preserved; while under Hypothesis (2) their English would become scope rigid. In three experiments, the current study tests these predictions on monolingual Hungarian speakers, and English-Hungarian bilinguals whose heritage language is either English or Hungarian. Our findings support Hypothesis (2).

Experiment 1 offers empirical confirmation of the widely assumed scope rigidity of Hungarian (É. Kiss, 2002). Seventy-seven native monolingual speakers of Hungarian participated in a web-based experiment. Participants listened to a doubly quantified sentence of the type shown in (1-2) and saw a disambiguating (surface vs. inverse) picture. Each participant saw eight sentences in either their surface or inverse reading. They were asked to rate on a 7-point scale how accurately the sentence they heard described the picture. Two factors were manipulated: Word Order (Every – A vs. A – Every) and Scope Interpretation (surface vs. inverse). We must bear in mind that under the Every – A condition (1) the inverse scope reading entails the surface scope reading. Therefore evidence demonstrating the availability of inverse scope hinges more upon the Inverse Scope condition under the A – Every Word Order (e.g. 2b).

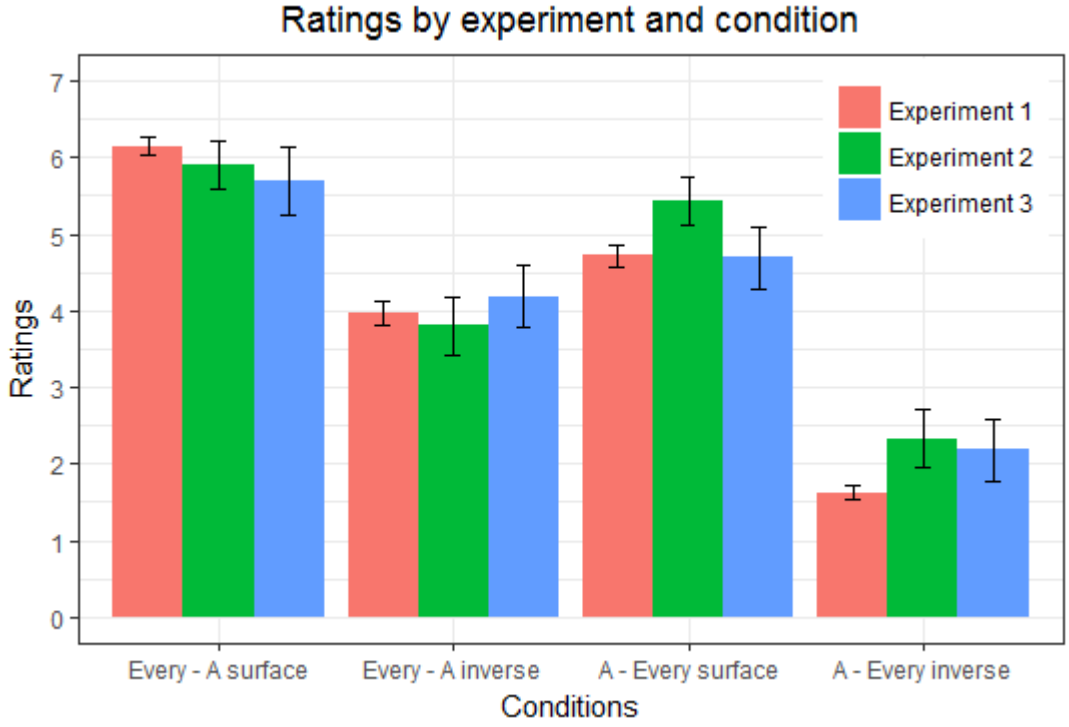
A mixed effects ordinal regression model with maximal random effects structure (random slopes and intercepts for participants and items) was fit, predicting ratings by Word Order and Scope Interpretation. Model comparisons show a significant main effect for Word Order ($p<.001$) and Scope Interpretation ($p<.001$), as well as their interaction ($p<.05$). A – Every sentences and inverse sentences received lower ratings; the critical A – Every inverse condition received the lowest rating. This provides empirical confirmation of the prohibition on inverse scope in Hungarian.

Experiment 2 Fifteen English-dominant heritage speakers of Hungarian were tested on Hungarian material identical to that used in Experiment 1. There was a significant main effect for Word Order ($p<.05$) and Scope Interpretation ($p<.01$). The overall pattern was very similar to Exp.1, even though the interaction was not significant ($p=.4$). These results therefore suggest that heritage Hungarian speakers retain scope rigidity in their weaker Hungarian, which replicates on a Hungarian-English population the Mandarin-English findings of Scontras et al.

Experiment 3 Eight Hungarian-dominant heritage speakers of English were tested on English material that is otherwise identical to Experiment 1 and 2. There was a significant main effect of Word Order ($p<.05$) and Scope Interpretation ($p<.001$), as well as their interaction ($p<.05$). Similarly to Exp.1-2, the critical A – Every inverse condition received the lowest rating.

Discussion The ratings for the A – Every inverse condition are low across all three experiments (see figure below), suggesting that none of the three grammars (native and heritage Hungarian, heritage English) allow inverse scope. (The slightly higher ratings in Exp.2-3 are likely due to the yes-bias of heritage speakers (Benmamoun et al., 2013)). Crucially, the heritage English speakers of Exp.3 also do not seem to accept scope ambiguities, which clearly supports Hypothesis (2). Hypotheses (1) would have predicted the preservation of scope ambiguities in heritage English due to it being acquired first. Hypothesis (2), on the other hand, predicts the simpler of the two grammars (in this case Hungarian) to be carried over, i.e. for heritage English to become scope rigid. Thus we see that the interaction of different scope systems in heritage speakers results not in general transfer always in one direction, but rather simplification across the board. These results are in line with Scontras et al.'s discussion of a few Japanese-dominant heritage English speakers.

The simpler grammar here is defined as not allowing ambiguities and thus keeping a one-to-one mapping between interpretations and surface structures. This observed preference for isomorphism can be given a processing-related explanation. Even monolingual English speakers, whose grammar allows scope ambiguities, are known to prefer surface interpretations. That is, the calculation of inverse scope is independently known to be costly, cf. e.g. the principle of Processing Scope Economy (Anderson, 2004). Additionally, heritage speakers already face processing difficulty through having to employ a less dominant grammar. Thus it is not surprising that a preference for simpler grammars is especially pronounced in the case of heritage speakers, to the extent that they default to scope rigidity across the board, regardless of whether that comes from their L1 or L2.



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