

Why Prosody Matters: Surface Scope Bias in Russian Quantifier Scope
Svitlana Antonyuk-Yudina, Reed College and Stony Brook University

Although prosodic effects on quantifier scope ambiguity remain a poorly studied area, a growing body of literature suggests that the prosody speakers tacitly project onto quantificational sentences may strongly affect their judgments (Kitagawa and Fodor 2003). Thus, in Japanese, processing of inverse and embedded scope was found more difficult when a Major Phrase (MaP) boundary intervened between the two scope-taking elements (Hirotani 2004). Given ample syntactic evidence for the availability of inverse scope in Russian quantificational sentences that is due to a syntactic mechanism of Quantifier Raising (Bailyn 2004, Antonyuk 2006, Antonyuk-Yudina 2009, in progress), exemplified briefly in (1-3) below¹, we hypothesized that the frequent claims regarding the ‘surface-scope-only’ status of Russian SVO sentences (Ionin 2002, Grebenyova 2004, Stepanov and Stateva 2009) may be due to the prosody native speakers impose on such sentences that results in intuitions of the lack of scope ambiguity.

- (1) * $[Ee_i \text{ uborščica}]$ vošla v každuju_i komnatu
Her cleaning.lady_{NOM.FEM.} entered in every room_{ACC.FEM.}
‘Its_i cleaning lady entered every_i room’ (Bailyn 2004)
- (2) a. Kako_j-to student ljubit každogo professora (Antonyuk 2006)
Some student loves every professor
‘Some student loves every professor’ ✓(some > every), ✓(every > some)
b. Kako_j-to student ljubit Mašu i každogo professora
Some student loves Maša and every professor
‘Some student loves Maša and every professor’ ✓(some > every), * (every > some)
- (3) a. [Someone [from every city_i]] despises it_i (May 1977)
b. [Kako_j-to žitel’ [každogo iz gorodov_j]] prezirajet jego_j
[Some dweller]_{NOM} [every from cities]_{GEN} despises it_{ACC}
‘Someone from every city despises it’ (Antonyuk-Yudina, under revision)
c. LF: [_{TP}[každogo iz gorodov_j]_y] [_{TP}[kako_j-to žitel’ y]_x] [_{TP} x prezirajet jego_j]]

Specifically, we hypothesized that the prosody Russian speakers impose on doubly quantified sentences (prosodic grouping, the use of (contrastive) pitch accents) may be biasing them toward surface scope judgments, thus accounting for the rigid surface scope claims found in the literature.

¹ The example in (1) is ungrammatical due to a Weak Crossover violation, which results from the QP *každuju komnatu* undergoing covert Quantifier Raising (QR) at LF, which crosses a coindexed pronoun, well-known since Chomsky 1967 to be disallowed. In (2), QR is shown to obey the Coordinate Structure Constraint (Ross 1976), which consists in the QP in the object position being unable to undergo QR from one of the conjuncts of a coordinate structure. Finally, in (3), we see that Russian allows the Inverse Linking Construction, which is usually analyzed as requiring QR of the embedded quantifier to a position where it can obtain scope over the embedding QP while binding a pronoun in the position it does not c-command in surface syntax. At least since May 1977, QR is generally taken to be the mechanism that derives the LF structure shown in (3c).

To test this hypothesis, we conducted a production study in which 8 female native speakers of Russian read sentences with a quantificational subject and object in contexts compatible with either surface or inverse scope interpretation. The experiment involved 4 conditions: 1) surface scope, SVO structure; 2) surface scope, OSV structure; 3) inverse scope, SVO structure and 4) inverse scope, OSV structure. Each subject received a counterbalanced list of 6 target sentences per condition (24 target sentences per subject), with an equal number of filler sentences. Sample disambiguating contexts for two of the conditions that we will concentrate on here, each ending in a target sentence, are provided below:

(4) Experimental conditions: Surface, SVO: Когда рисуют мультфильмы, то каждый из мастеров рисует своего персонажа отдельно. В этот раз сделали исключение и пара лучших аниматоров сделали всю работу сообща: **Несколько аниматоров рисовали каждую героиню**. When cartoons are being drawn, each artist draws his own character separately. This time an exception was made and several of the best animators did the whole job together: **Several animators drew every heroine**.

Inverse, SVO: Последний Диснеевский мультфильм не зря считается шедевром, в каждую деталь вложено максимум труда, количество задействованных художников просто огромно: **Несколько аниматоров рисовали каждую героиню**. The last Disney cartoon is considered a masterpiece for good reasons, each detail has been given maximum attention, the total number of artists used is huge: **Several animators drew every heroine**.

Prosodic realizations of target sentences were excised from contexts, evaluated for the degree of disambiguation and categorized as *surface scope only*, *inverse scope only*, or *non-disambiguated* (compatible with both interpretations). The sentences were analyzed within the autosegmental-metrical framework (Pierrehumbert 1980), using ToBI labeling conventions, to determine which prosodic features correlate with surface, inverse and ambiguous scope. Roughly 25% of the data were also coded by a coder not associated with the study, to ensure intercoder reliability of our data labeling. Below we present a few prosodic contours of our target sentences.

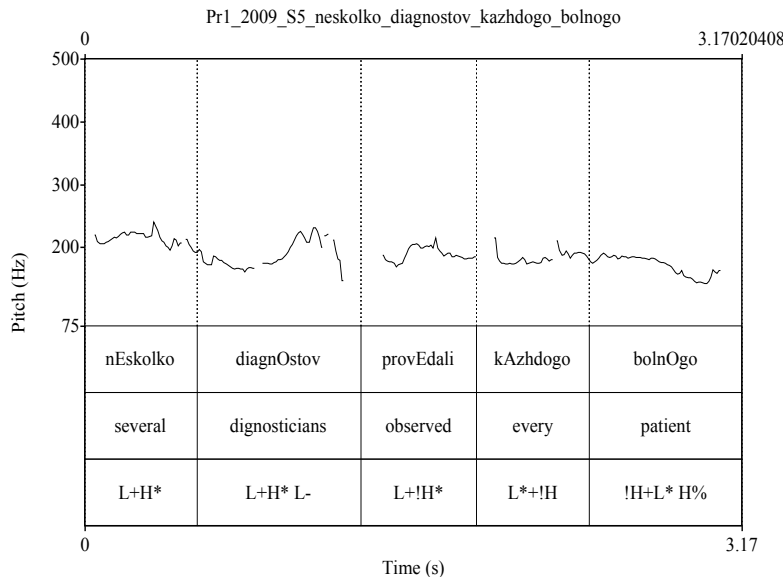


Fig.1 Surface scope only realization presented in the surface scope-biasing context.

In Figure 1 above we have a target sentence realized with surface scope only prosody. Given that this sentence was embedded in a surface scope-biasing context, the speaker has successfully disambiguated the sentence. The features of the prosody that appear to be inducing the surface

scope only interpretation are the presence of an intermediate break, in this case a L-, and a perceptually very strong, contrastively-sounding pitch accent on the object determiner.

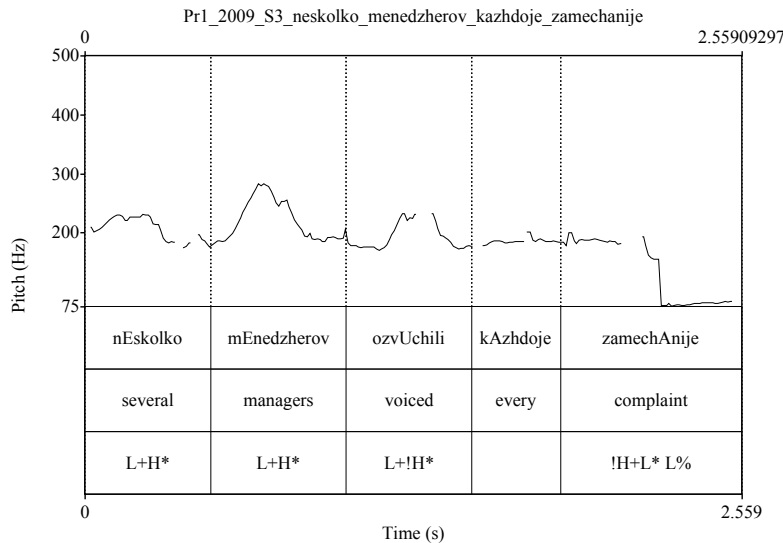


Fig.2 Inverse-scope realization presented in inverse-scope biasing context.

In Figure 2 we see the prosodic realization of a sentence produced with inverse scope prosody in an inverse scope-biasing context. The sentence is produced very evenly with downstepped pitch accents and crucially with the object determiner realized without the pitch accent, which appears to be especially conducive to the perception of inverse scope interpretation. What is interesting about this realization is that unlike the previous contour, this one is still somewhat compatible with the other, surface scope. Very few sentences produced in the inverse scope context were produced with prosody that clearly excluded surface scope interpretation.

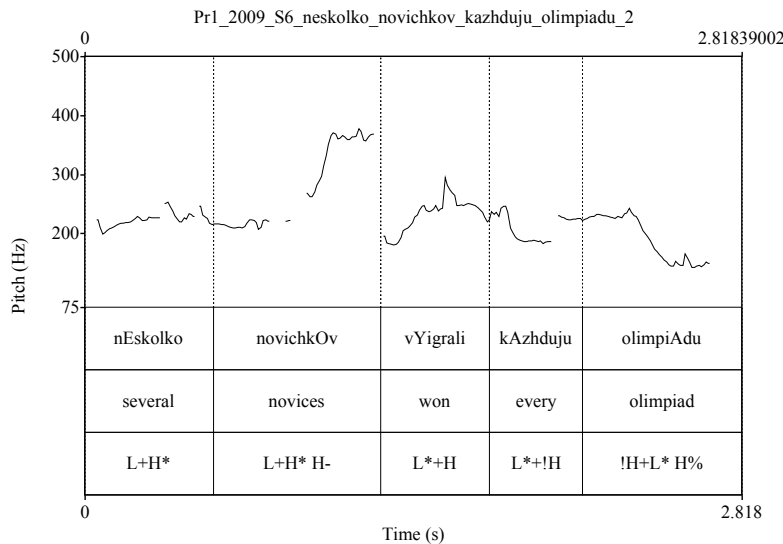


Fig.3 Surface scope only realization presented in inverse-scope biasing context.

In figure 3 we have the pitch contour of a sentence produced with surface scope only prosody in an inverse scope-biasing context, that is, an example of a sentence that is disambiguated, yet disambiguated incorrectly, which is a very common result in our production experiment. The main feature of this realization is the very salient prosodic break after the subject NP, H-, which sets the subject apart from the predicate. Perceptually, this type of prosody invites an interpretation on which the part of the sentence after the break is being interpreted as predicated of the subject that has wide scope.

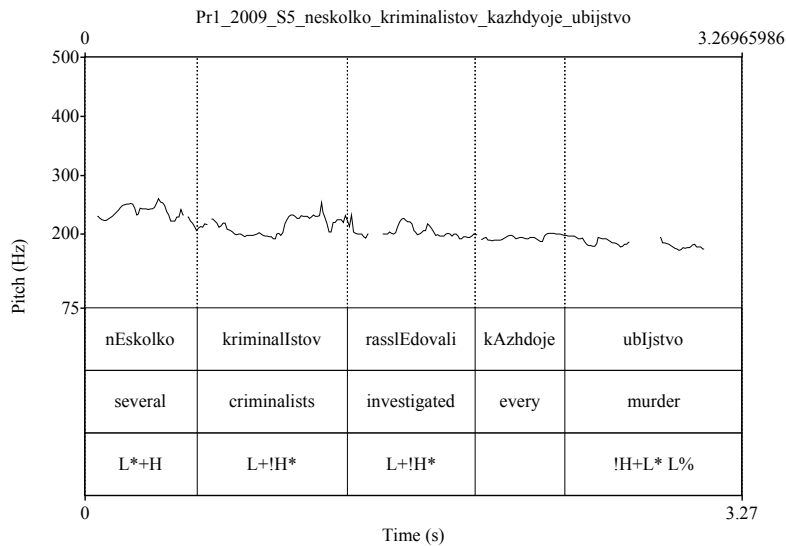


Fig.4 Inverse scope only realization presented in inverse-scope biasing context.

Finally, the strategy that was employed by the speakers to derive successful disambiguation in favor of inverse scope interpretation was a contrastively-sounding pitch accent on the subject determiner, with the predicate sounding somewhat distressed (Fig.4)

Overall, our analysis shows that sentences embedded in surface-scope-only contexts were disambiguated successfully in favor of surface scope most of the time (77%) while sentences where the context biased toward inverse scope were successfully disambiguated in favor of inverse scope in only 17% of cases, with almost 32% of sentences in inverse-scope-only contexts compatible with both scopal interpretations while the rest (51% of all realizations in this context) were produced with prosody that favored surface scope interpretation only. This supports the hypothesis that the prosody Russian speakers impose on quantificational sentences may indeed bias them against inverse scope interpretation. The analysis of target sentences' prosody shows that the prosodic features disallowing inverse scope interpretation are insertion of intermediate phrase (IP) boundaries, most commonly a H-, separating the subject QP from the predicate, and contrastive pitch accent on the object determiner. This corroborates previous findings (Hirotani 2004) and suggests the requirement of grouping the two QPs into the same Intermediate Phrase may be universal. The finding that a strong pitch accent, especially one that is understood as contrastive, precludes inverse scope is in line with our own empirical observation that sentences such as (5) below strongly prefer surface scope interpretation.

(5) Some student read EVERY book. (some > every), ??/*(every > some)

The results of our experiment thus support the main hypothesis, strongly suggesting that Russian prosody needs to be strictly controlled for when eliciting quantifier scope judgements.