

# Native versus heritage processing of subextraction in Russian

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October 29, 2013

## 1. Introduction

Recent work by Sorace<sup>1</sup>, Serratrice<sup>2</sup>, Müller & Hulk<sup>3</sup>, and Montrul<sup>4</sup> draws attention to an emerging pattern of data in which the language abilities of bilingual speaker groups, in comparison to monolingual groups, are less robust in domains where syntax interfaces with other cognitive systems (e.g., discourse pragmatics) than in narrow syntax.<sup>5</sup> Building on subsequent work by Polinsky<sup>6</sup> and Montrul<sup>7</sup>, which argues for an extension of this analysis to heritage speakers as a subset of bilinguals, we examine growing evidence that while heritage speakers may display native-like abilities in narrow syntax, they display greater instability where other cognitive domains are involved.

In reference to this distinction between linguistic systems, we will use a number of key terms. *Grammar*, *grammaticality*, and *grammar-internal* will encompass the scope of narrow syntax. Meanwhile, domains outside of narrow syntax—particularly discourse, for the purposes of this study—are said to be *extra-grammatical* or *grammar-external*.

We will explore a number of reasons heritage speakers might display weaker abilities in grammar-external domains. First, it is possible that grammar-internal knowledge is sufficiently acquired during exposure to the heritage language while grammar-external knowledge is not. One explanation for such a separation in knowledge acquisition is that grammar learning is privileged, allowing heritage speakers to efficiently acquire the requisite grammatical knowledge for determining the acceptability of an utterance before learning the appropriate extra-grammatical constraints. We shall refer to this as the *nativism* argument. A second explanation is that developing cognitive capabilities only allow tracking of grammar-internal information at an early stage of development and cannot accommodate grammar-external information during the window of heritage L1 acquisition (the *data-driven* argument). A third possibility is that grammar-internal and grammar-external knowledge are both sufficiently acquired, but heritage speakers in particular have difficulty connecting the two systems (the *Interface Hypothesis*<sup>8</sup>).

The current paper presents experimental data in support of this divergence of heritage speaker performance in grammar-external domains, and examines the data's implications for the *nativism*, *data-driven*, and *Interface Hypothesis* arguments.

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## 2. Background

Typical *heritage* speakers are second-generation immigrants who have a weaker command of their home language than of the dominant language of their community. They may be *simultaneous* bilinguals, who grew up speaking the minority language at home and the dominant language in school and elsewhere, or *sequential* bilinguals, who were monolingual in the minority language until moving to a community where it was necessary to become bilingual in the dominant language. The term *native* speaker, meanwhile, will refer to anyone who—whether mono-, bi-, or multi-lingual—is dominant in L1 and did not experience an interruption in its acquisition.

Our experiment was originally designed to explore the processing of gender mismatch in heritage versus native speakers of Russian. We hoped to discover something about heritage grammars and how grammatical gender is acquired and structured for these two groups. Instead, we discovered that one of our initial assumptions in designing the experiment was unfounded. In our design, we chose a subextraction construction that allowed us to create space between the adjective and noun in the agreement mismatch. This ensured that participants would process the gender of the noun and the agreement independently rather than listen for matching phonological segments. We assumed this construction would provide a controlled framework for manipulating gender agreement, but instead found a different baseline acceptance between speaker groups of the subextraction itself: both heritage and native speakers rated the ungrammatical sentences unacceptable, but heritage speaker acceptance of the grammatical sentences was significantly higher than native acceptance. We claim, as we shall further justify, that the reason for this native dispreference for the grammatical subextraction items is due to extra-grammatical factors, and that the high acceptability ratings of heritage speakers illustrate a lack of functional knowledge about grammar-external constraints.

In order to qualify these claims, we require an understanding of the syntactic construction we employed in the study. *Subextraction* is a type of constituent split in which part of an adjectival phrase (AP) or noun phrase (NP), for example, is extracted and separated from its complement. (1) shows subextraction involving the AP ‘strawberry jam’. Note that although the adjective ‘strawberry’ modifies the noun ‘jam,’ it does not appear adjacent to ‘jam’ but rather at the beginning of the sentence:

- (1) **Klubničnogo možno kupit' \_\_\_\_\_ varen'ja!**  
Strawberry<sub>ADJ</sub> possible to.buy jam  
'It is possible to buy STRAWBERRY jam!'<sup>9</sup>

There are numerous possibilities for what motivates the movement of these split phrases, but Pereltsvaig argues that native speakers of Russian expect subextraction to occur with the communication of information about contrastive topic or contrastive focus. Hence, she argues that for subextracted sentences to be acceptable, they must be uttered with distinct intonation patterns that associate with the implied contrastive meaning.<sup>10</sup> We will argue that since contrastive topic and focus are a part of information structure, which is itself a part of discourse, knowledge of grammar-external information may play a role in whether an utterance is judged to be acceptable.

### 3. The Experiment

As mentioned above, our analysis draws upon data from an experiment designed to test native and heritage Russian speakers' processing of gender mismatch. Ultimately, we would need to redesign the study to test specifically for acceptance of the subextraction construction, controlling for the extra-grammatical factors we wish to examine. However, for the purposes of the current paper we build our discussion around the initial data gathered, which we expect would only be strengthened by a redesign.

The stimuli sentences involved subextraction of the adjective and were recorded by a native speaker of Russian. There were fourteen items, each of which was repeated using four different nouns—one pair with palatalized consonant endings and another with unambiguous endings, each pair having one masculine and one feminine noun—for a total of fifty-six sentences. Splicing together halves of these sentences, we created fifty-six grammatical stimuli (adjective and noun gender agree) and fifty-six ungrammatical stimuli (genders disagree). Both grammatical and ungrammatical sentences were built via splicing in order to control for any audible inconsistency between adjoined sections of the audio files.

Stimuli items were presented in an online survey format, which we created using Experigen.<sup>ii</sup> Participants (forty-five native Russian speakers and fifteen Russian heritage speakers<sup>ii</sup>) listened to a random ordering of a subset of the stimuli sentences and were instructed to rate them on a five-point scale of acceptability as a sentence of Russian—1 being completely unacceptable, 5 being completely acceptable. Interspersed among the stimuli were thirty-two 'filler sentences' that did not involve subextraction, which later acted as a control group against which the subextraction ratings could be analyzed. After each sentence, participants were asked to answer *yes* or *no* to a comprehension question designed to confirm their understanding of the Russian. Responses to these questions were used merely to rule out data from unqualified sources.

### 4. Results

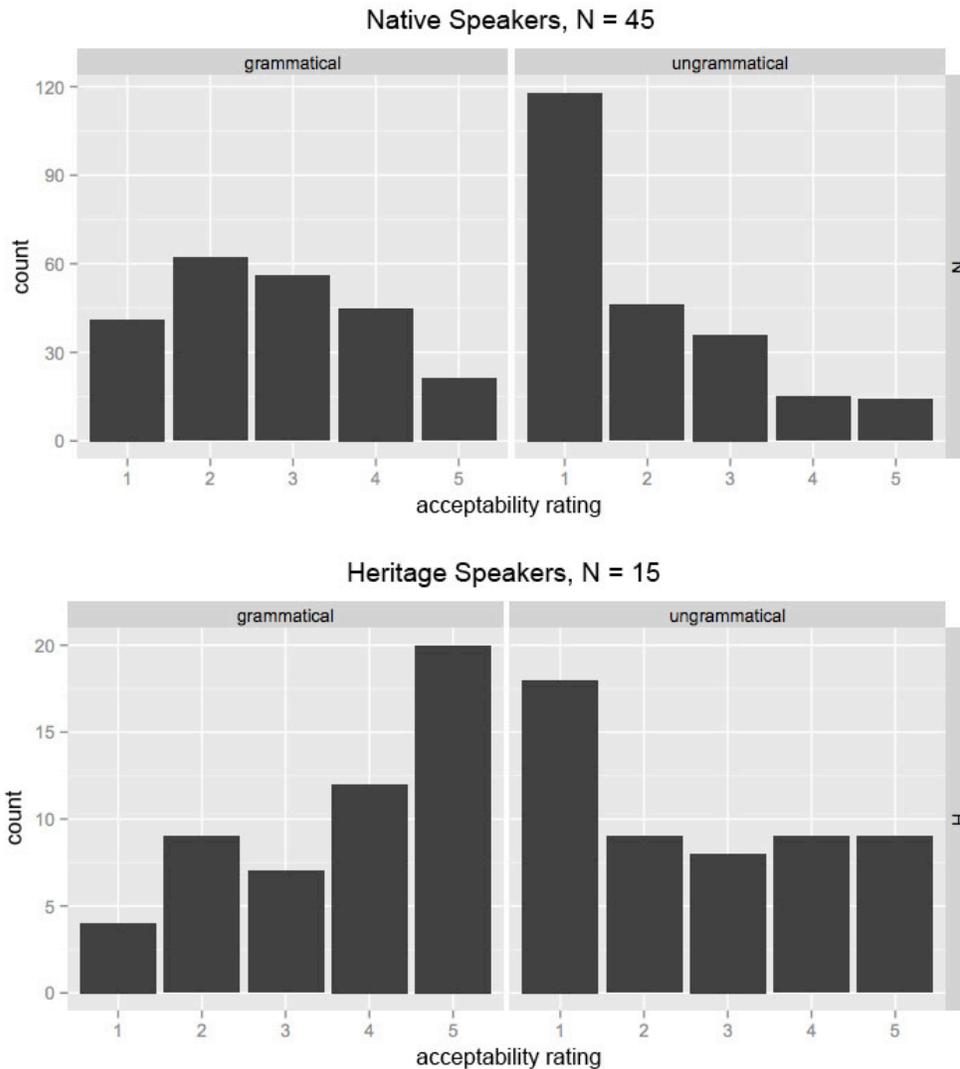
As the figures below demonstrate, heritage speakers rated the grammatical subextraction sentences much higher in acceptability than did native speakers, while both groups rated the ungrammatical sentences low. These results suggest that while both speaker groups find the grammatical sentences acceptable and the ungrammatical sentences unacceptable, native speakers exhibit a dispreference for the grammatical sentences that heritage speakers do not share. The implications of this finding will be discussed further in the next section.

The data was analyzed using the R language and environment. A 2x2 ANOVA (*group* \* *grammaticality*) of the responses to the subextraction stimuli revealed a significant effect of *group* ( $p < 0.01$ ) and a significant effect of *grammaticality* ( $p < 0.001$ ), with no interaction. An analysis on the responses to the filler stimuli revealed high acceptance ratings of the grammatical items for both speaker groups, which will be useful mostly to illustrate that native speakers are willing to rate grammatical, non-subextraction items highly acceptable.

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<sup>ii</sup> All of the heritage participants were dominant in English.

The figures below are histograms that show the five-point-scale acceptability judgment on the set of stimuli along the  $x$ -axis and the number of times that judgment was made across participants on the  $y$ -axis. The two speaker groups are represented in separate histograms, while each individual histogram is split between judgments on grammatical sentences and judgments on ungrammatical sentences.



## 5. Discussion

Our results show that both speaker groups were able to classify ungrammatical sentences as being unacceptable, while only the native group exhibited a dispreference for the grammatical sentences. We suggest that this dispreference is due to the grammar-external information reflected in the subextraction, and that this ultimately supports the hypothesis that heritage speakers lack native-like ability in grammar-external domains (i.e., they lack the native speaker ability in this case to identify extra-grammatically unacceptable constructions). The argument we will make is that, first, native

speakers indeed disprefer the grammatical subextraction sentences because of the extra-grammatical factors they involve. Second, heritage speakers rate the grammatical sentences high because they truly consider them acceptable. Finally, we suggest that these two facts imply that the heritage group must lack the functional knowledge of extra-grammatical factors that causes the native group to judge the sentences to be less than acceptable.

### 5.1 Reason for the native dispreference

We will first justify the claim that the native speaker dispreference for the grammatical subextraction sentences is due to extra-grammatical factors. In order to do so, we must first be sure that the dispreference itself is legitimate; it might be the case that native speakers were in general unwilling to give high acceptability ratings for any of the stimuli. However, this possibility is ruled out by the presence of high native ratings on the grammatical filler stimuli.

Next, we must take a closer look at what is happening in subextraction. We suggest that the extra-grammatical factors causing the dispreference are a product of this construction. Pereltsvaig argues that subextraction in Russian often occurs when the aim of the utterance is a statement of *contrastive topic* (CT) or *contrastive focus* (CF). She claims that each of these structures requires a unique intonation pattern, without which a native speaker would not find the utterance acceptable.<sup>12</sup> We argue that expectations for these intonation patterns are the extra-grammatical factors that caused the native group to disprefer the grammatical stimuli sentences.

As Pereltsvaig writes, CT and CF have distinct intonation patterns associated with them, which suggests that they are interpretable at the interface where information structure is established.<sup>13</sup> Further, Lambrecht writes that information structure pairs conceptual representations of mental states with lexicogrammatical structures, which are interpreted as units of information in given discourse contexts.<sup>14</sup> Using this notion of CT and CF as reflections of information structure and information structure as a part of discourse, we establish a link between intonation patterns and discourse. In heritage literature, discourse is perhaps the archetypal grammar-external domain referenced in discussion of interfaces between syntax and other cognitive domains.<sup>iii</sup>

We have argued then that intonation indexes extra-grammatical information. There are two ways this information might cause the native speaker dispreference for the grammatical subextraction sentences. One possibility is that upon recognizing the subextraction—which we said often implies the presence of contrastive topic or focus—native speakers expected to hear a CT or CF intonation pattern, then judged the sentences unacceptable because, even with the proper syntax, they lacked the appropriate intonation pattern. This is conceivable since we did not control for prosody in the experiment. Another possibility is that the native group gave low acceptability ratings because of a lack of contextual information. We have already said that native speakers expect subextraction to carry with

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<sup>iii</sup> It should be noted that prosody itself can be interpreted as being grammar-internal or grammar-external. Since we defined *grammar-internal* to encompass only the domain of narrow-syntax, we consider prosody to be extra-grammatical and therefore consider any inability to make use of intonation patterns to be an inability with extra-grammatical factors. However, this categorization is not essential to our argument. We could treat prosody as grammar-internal in which case we would say the trouble lies at the interface of prosody and information structure.

it contrastive information about topic or focus; in order for this contrastive information to be warranted, there must be an established context with which to contrast. Without the proper context, the use of intonation associated with CT or CF intonation would be infelicitous even if grammatically acceptable. Thus, it is possible the native participants heard a CT or CF intonation pattern but, since our stimuli were not presented with contrastive contextual information, they judged the sentences unacceptable.

These ideas could be further investigated by examining the prosody patterns of the stimuli sentences to see whether they match the patterns associated with CT and CF, or by providing the relevant contexts that would license the contrastive topic or focus in order to see whether the dispreference remains.

## 5.2 Reason for the heritage ratings

Now we must justify our claim that heritage speakers rated the grammatical subextraction sentences high because they truly judged them to be acceptable, and not for some other reason. We rule out a number of alternate explanations of the data. First, perhaps heritage speakers were confused and this caused a deviation in their judgment. We discount this possibility, however, because the heritage speaker responses were neither chaotic nor uniform. Had they been chaotic, we might have supposed that heritage speakers were simply guessing at a rating; had they been uniform, we might have assumed they were using the same rating every time. Instead, they correctly judged the ungrammatical sentences to be unacceptable and the grammatical sentences to be acceptable, and in fact mimicked native speaker responses on the filler stimuli. Second, perhaps cross-linguistic influence from the heritage speakers' knowledge of English caused them to rate the sentences artificially high (i.e., if such sentences were acceptable in English, heritage participants might be more apt to rate them acceptable in Russian). However, this explanation would only be feasible if subextraction was possible in English, which it is not. It seems likely then that heritage ratings on the grammatical stimuli are an accurate reflection of ability and judgment and not a false representation.

Having justified these two claims ((1) that the native dispreference for the grammatical stimuli is due to grammar-external factors, and (2) that the high heritage ratings reflect a high rate of acceptance) we can successfully argue that the mechanism by which native speakers are able to make use of extra-grammatical knowledge is not intact in the heritage group. This supports the initial hypothesis that heritage speakers lack native-like ability in domains that involve grammar-external information.

## 6. Implications

We dedicate the rest of the paper to discussing possible reasons for this lack of ability. Recall that in the introduction, we outlined a number of theories. First, the *nativism* argument suggested that grammar learning is privileged, i.e., that there is an innate framework of constraints on what rules a grammar can follow. These constraints would allow heritage speakers to acquire the necessary knowledge for determining grammaticality efficiently and hence early on, while the ability to determine felicity (of sentences about contrastive topic or focus, for instance) would come by learning rules about context and pragmatics over a longer period of time. The fact that the heritage group is able to distinguish between what is grammatical and what is not (i.e., they accept the grammatical

sentences and do not accept the ungrammatical sentences) but not between what is and is not extra-grammatically preferred, may be evidence that while their grammatical knowledge is intact, their grammar-external knowledge is not. While this would support the *nativism* argument, we still would not be sure that the intactness of the grammar-internal knowledge is indeed due to privileged learning.

The *data-driven* argument proposed that patterns that allow grammar-internal knowledge to be inferred are trackable early on in acquisition while patterns related to grammar-external knowledge can only be tracked later, due to increased cognitive abilities at successive stages of development. This phenomenon would have the same effect as privileged learning on the intactness of grammar-internal knowledge at an early phase of development. Therefore, we would need to devise a way to distinguish innately guided knowledge versus data-driven knowledge. One way we might accomplish this would be to design a study (perhaps using corpus data and/or conversation transcripts) to quantify the frequency with which subextraction occurs naturally in Russian. If we found a low enough frequency, we might be able to argue that the *data-driven* approach would identify instances of subextraction as nothing more than speech errors, and therefore would not treat subextraction as an acceptable construction. We could then argue that it must be because of an innate, guiding hypothesis that heritage speakers can correctly identify these infrequent occurrences of subextraction as part of the grammar.

It is also possible that the reason for the heritage speakers' lack of ability in grammar-external domains is *not* due to unacquired knowledge, but instead to a difficulty in connecting two perfectly intact systems of information. This is the argument put forth by the *Interface Hypothesis*, under which it seems both grammar-internal and grammar-external knowledge are sufficiently acquired, but heritage speakers have difficulty where these two systems interface (e.g., the interface between narrow syntax and discourse). This would suggest that if we devised a way to divorce these systems of knowledge, we would find that they are both present and intact. A study similar to the current experiment would be sufficient to show that grammar-internal knowledge is intact. However, demonstrating the intactness of grammar-external knowledge may be more difficult. One possible method would be to provide participants with various prosodic contours—where the words themselves are muffled and cannot be made out—and ask them to choose from among a few carefully selected contextual situations that the contours might represent. We would need a clever design for such a study, but could ideally show that extra-grammatical knowledge (e.g., knowledge of context versus appropriate intonation patterns) is intact regardless of knowledge in narrow syntax.

However, even if we could argue that both grammar-internal and grammar-external knowledge is intact, we would still require further study to understand exactly what the issue might be in linking the two systems. Sorace identifies one major line of argument that suggests there are differences between bilinguals' and monolinguals' knowledge representations of structures and interface conditions, mostly due to influence from the grammatical system of a second language.<sup>15</sup> In order to gain further insight into how significant a role knowledge representations might play, we would need to carefully examine the degree to which heritage speakers' L2 influences the heritage language. Perhaps even with—or perhaps especially because of—completely intact systems of knowledge, it is difficult to separate one language's syntax-discourse interface conditions from the conditions of the other. Moreover, perhaps it is easy in general to separate grammatical knowledge of two languages but more difficult to separate extra-grammatical knowledge involving social cues and contexts that might span both languages.

## 7. Conclusion

We identified a trend in recent data in which the language abilities of bilingual speakers, specifically heritage speakers, were shown to be weaker in areas where syntax interfaced with grammar-external domains. The experimental data we presented supported this trend, quantifying a lack of heritage speaker ability to make use of extra-grammatical factors in determining the acceptability of sentences involving subextraction. We considered three arguments for why heritage abilities are weaker outside of narrow syntax. The *nativism* argument suggested that the language faculty is structured in a way that privileges grammar learning, allowing heritage speakers to acquire the ability to determine grammaticality before acquiring a robust system of extra-grammatical constraints. The *data-driven* argument pointed to the early limitations of developing cognitive capabilities on tracking grammar-external information. The *Interface Hypothesis* argued that both grammar-internal and grammar-external knowledge systems are sufficiently acquired but heritage speakers struggle to link them together.

Though our data did not conclusively support one particular theory about how heritage speakers acquire language, we looked at a number of ways our study could be expanded in order to gain a deeper understanding of the cause of the ability gap between heritage and native speakers with respect to extra-grammatical factors. For instance, we suggested a corpus-based study to tease apart the *nativism* and *data-driven* arguments, and imagined a study involving prosody and context to determine the intactness of the grammar-internal and external systems relevant to the *Interface Hypothesis*. Further, we proposed that by redesigning our current study to control for prosody and contextual constraints on contrastive topic and focus, we might better understand the implications heritage performance with subextraction has on each of the theories we considered.

Much more work is needed in order to determine the validity and scope of these arguments. However, continuing to ask questions about heritage speaker grammars, and striving to understand how this specific group of bilinguals acquires language, could have important implications for language teaching and learning and could ultimately help us to better understand the process of language acquisition in general.

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