Focus on Russian Scope: An Experimental Investigation of the Relationship between Quantifier Scope, Prosody, and Information Structure

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Abstract: This paper reports on an experimental investigation of quantifier scope in Russian SVO and OVS sentences. The factors of word order, prosody, information structure and indefinite form are manipulated experimentally. It is shown that native Russian speakers have a preference for surface scope under neutral prosody, though this preference is more pronounced with *one* indefinites than with *two* indefinites. It is furthermore found that contrastive focus on the fronted object QP in OVS order facilitates the inverse-scope reading, but that contrastive focus on the subject in SVO order does not. These findings have implications for the syntactic analysis of non-canonical word order in Russian (Bailyn 2011, Slioussar 2013), and support the link between contrastive focus and scope reconstruction in Russian (Ionin 2003, Neeleman and Titov 2009).

key words: contrast, focus, indefinite, information structure, Russian, scope, topic

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1 Introduction

The goal of this paper is to examine what factors influence scope interpretation in Russian, a case-marking, free word-order language. Our focus is on the Russian equivalents of the English simple transitive sentences in (1a) and (2a), with two quantifiers in subject and object positions.

(1) a. A doctor examined every patient.

b. surface scope: $\exists$x [x is a doctor and $\forall$y [y is a patient $\rightarrow$ x examined y]]

c. inverse scope: $\forall$y [y is a patient $\rightarrow$ $\exists$x [x is a doctor and x examined y]]

(2) a. Every doctor examined a patient.

b. surface scope: $\forall$x [x is a doctor $\rightarrow$ $\exists$y [y is a patient and x examined y]]

c. inverse scope: $\exists$y [y is a patient and $\forall$x [x is a doctor $\rightarrow$ x examined y]]

It is well-known that sentences such as (1a) and (2a) are scopally ambiguous; the surface-scope and inverse-scope readings are sketched out in (1b-c) and (2b-c). We adopt the standard approach of Montague's type-driven compositional semantics (Montague 1974; see Heim and Kratzer 1998), on which both indefinite and universal phrases are treated as quantifier phrases (QPs) (but see section 2.4 on the availability of referential readings to indefinites). A standard way of accounting for scope ambiguity is through the syntactic operation of Quantifier Raising (QR) (May 1977): the surface scope reading is derived by the subject QP raising higher than the object QP at LF, while the inverse scope reading is derived by the object QP raising higher.

In Russian, both (1a) and (2a) can be expressed using a variety of word orders.[1] Here, we focus on the two most frequent word orders of Russian: the canonical SVO order (3a,c), and the scrambled OVS order (3b,d)) (for evidence that OVS is the most frequent non-canonical word order, see Sirotinina 1965, Bivon 1971, Bailyn 1995:12, and Slioussar 2011). For readability, we use the passive voice to translate the OVS sentences into English, in order to indicate that the object comes first, but we note that the corresponding Russian sentences are in the active voice.

(3) a. Odin doktor osmotrel každogo pacienta.
one.Nom doctor.Nom examined.Masc every.Acc patient.Acc
'One doctor examined every patient.'

b. Odnogo pacienta osmotrel každyj doktor.
one.Acc patient.Acc examined.Masc every.Nom doctor.Nom
'One patient was examined by every doctor.'

c. Každyj doktor osmotrel odnogo pacienta.
every.Nom doctor.Nom examined.Masc one.Acc patient.Acc
'Every doctor examined one patient.'

d. Každogo pacienta osmotrel odin doktor.
every.Acc patient.Acc examined.Masc one.Nom doctor.Nom
'Every patient was examined by one doctor.'

At present, there is no consensus about the scope readings of Russian double-quantifier sentences. Ionin (2003) argues that, under neutral intonation, Russian exhibits frozen scope: i.e., only surface scope is available. If this claim is true, then Russian is grouped with

languages such as German, Mandarin and Japanese, in which scope is read off the surface structure (e.g., C.-T. Huang 1982, Hoji 1985, Frey 1989, 1993, Aoun and Li 1993, Lechner 1996, 1998, Krifka 1998, Bobaljik and Wurmbrand 2012).

Note that scrambling reverses what constitutes surface vs. inverse scope: the surface-scope reading of (3a) is the inverse-scope reading of (3d), and vice-versa (same for (3c) vs. (3b)). Ionin argues that scope is equally frozen in SVO and OVS sentences: the scrambled object cannot reconstruct to its base position, and covert QR to a position above the preverbal element (whether subject or object) is not possible. However, Antonyuk (2006, 2015) disagrees with Ionin (2003), and argues that Russian is just like English, with both surface-scope and inverse-scope readings possible, and derived by covert QR. Bailyn (2011 :287) notes frozen scope clearly does not hold for SVO sentences, which are ambiguous for many speakers, but appears to hold for OVS sentences.

We believe that this lack of consensus is due to a number of complicating factors, chief among which are general processing preferences and the role of information structure (IS) and prosody. The goal of this paper is to tease apart the relative contributions of these factors by using experimental methodology to elicit judgments of scope from linguistically naïve adult Russian speakers. Our ultimate conclusion is that scope in Russian is not frozen, but that the relative accessibility of surface-scope and inverse-scope readings is closely related to IS, with contrastive focus on the QP facilitating scope reconstruction. Our findings provide partial support for previous accounts linking contrastive focus and inverse scope in Russian (Ionin 2003, Neeleman and Titov 2009), but are not consistent with a recent cross-linguistic proposal of Bobaljik and Wurmbrand (2012) that predicts frozen

scope for canonical word-order sentences in scrambling languages. The results of our study also have implications for syntactic accounts of non-canonical word order in Russian (see Bailyn 2011). Finally, our findings uncover a previously unnoticed relationship between word order, scope, and contrastive focus in Russian, and point to the importance of using experimental methodology to study phenomena at the syntax/discourse interface.

This paper is organized as follows. In section 2, we provide an overview of scrambling, scope and IS in Russian and formulate our hypotheses. Section 3 reports on our experimental study. Section 4 provides a general discussion of the findings and lays out suggestions for future research.

2 Background: Scope, Scrambling and Information Structure in Russian

2.1 Processing Considerations and Russian Scope

Even in a language like English, where inverse scope of sentences such as (1a) and (2a) is assumed to be freely available, psycholinguistic studies have established a clear preference for surface scope on the part of native speakers, both offline and online (e.g., Ioup 1975, Kurtzman and MacDonald 1993, Tunstall 1998, Anderson 2004). These findings led Anderson (2004) to propose the Processing Scope Economy (PSE) principle in (4) (see also Tunstall 1998). Under the PSE, inverse scope is avoided because it is more costly, as it involves longer-distance QR.

(4) 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 2004:31)

Assuming that processing principles such as the PSE are universal (doing longer-distance QR should be costly in any language), Russian speakers should also disprefer the inverse-scope reading relative to the surface-scope reading. Thus, it is possible that the frozen scope that Ionin (2003) argued for is an illusion, which is due to a strong preference for surface scope. If that is the case, then we expect native Russian speakers to allow inverse-scope readings, but to a lesser degree than surface-scope readings.

2.2 Word Order Permutations in Russian

Russian scrambling, or constituent reordering, while receiving less attention than scrambling in, e.g., German or Japanese, has been investigated by a number of researchers (e.g., Bailyn 1995, 2003, 2004, Babyonyshev 1996, Sekerina 1997, 2003, Junghanns and Zybatow 1997, Pereltsvaig 2004, Williams 2006, Neeleman and Titov 2009, Slioussar 2011, in press). Here, we discuss possible derivations of both SVO and OVS sentences containing quantifiers in subject and object position, and the corresponding consequences for scope interpretation. We assume that in principle, the scope configuration can be affected by reconstruction as well as by covert QR. In this section, we lay out the logical possibilities of how inverse scope can be derived via reconstruction or via covert QR. In section 2.3, we will address how these possibilities relate to the role of IS in Russian.

2.2.1 Deriving SVO order

We start by assuming, following the literature, that in Russian SVO sentences, the nominative subject moves to [spec, TP] while the object stays inside the VP, as

schematized in (5a).[2] When the LF corresponds to the surface-scope reading of the sentence, the subject is interpreted *in situ*, while the object undergoes short movement driven by a type mismatch, as shown in (5b). Under standard assumptions (see Heim and Kratzer 1998), a transitive verb has type ⟨e, ⟨e, t⟩ ⟩, while a generalized quantifier has type ⟨⟨e, t⟩, t⟩, which results in a type mismatch between the verb and its object. On standard movement accounts, this type mismatch is resolved via covert movement, with the object QP undergoing short QR to the closest clause-denoting element which dominates it (in this case, the VP), leaving behind a trace of type *e* (see Fox 2000). In the resulting derivation in (5b), the LF position of the object is thus above the trace left by the subject.

Turning to the inverse-scope reading of the SVO sentence in (5a), there are in principle two ways to derive it: by reconstructing the subject to its position within the VP (5c), or by covertly raising the object to a TP-adjoined position above the subject (5d).

(5) SVO order with the subject in [spec, TP]

a. PF: [$_{TP}$ [one doctor.Nom]$_1$ [$_{VP}$ t_1 [examined [every patient.Acc]$_2$]]]

b. LF, surface-scope:

[$_{TP}$ [one doctor.Nom]$_1$ [$_{VP}$ [every patient.Acc]$_2$ [$_{VP}$ t_1 [examined t_2]]]]

c. LF, inverse scope via reconstruction of the subject:

[$_{TP}$ [$_{VP}$ [every patient.Acc]$_2$ [$_{VP}$ [one doctor]$_1$ [examined t_2]]]]

d. LF, inverse scope via QR of the object:

[$_{TP}$ [every patient.Acc]$_2$ [$_{TP}$ [one doctor.Nom]$_1$ [$_{VP}$ t_2 [$_{VP}$ t_1 [examined t_2]]]]]

The above derivation has the subject in [spec, TP]. However, it is also possible that the subject may, after passing through [spec, TP], move to a higher position in the C-domain, as schematized in (6a). In this case, if the LF corresponds to the PF, we get surface scope once again, as in (6b). Crucially, however, in (6), reconstruction of the subject does not necessarily lead to inverse scope: if the subject reconstructs only so far as [spec, TP], as in (6c), we will still have surface scope (if the subject reconstructs further, to its base position, inverse scope will result). Inverse scope is also still possible via covert QR, as in (6d), assuming that covert QR can target a position in the C-domain above the raised subject.

(6) SVO order with the subject in the C-domain

a. PF: [$_{CP}$ [one doctor.Nom]$_1$ [$_{TP}$ t_1 [$_{VP}$ t_1 [examined [every patient.Acc]$_2$]]]]

b. LF, surface-scope:

[$_{CP}$ [one doctor.Nom]$_1$ [$_{TP}$ t_1 [$_{VP}$ [every patient.Acc]$_2$ [$_{VP}$ t_1 [examined t_2]]]]]

c. LF, surface scope after reconstruction of the subject:

[$_{TP}$ [one doctor.Nom]$_1$ [$_{VP}$ [every patient.Acc]$_2$ [$_{VP}$ t_1 [examined t_2]]]]

d. LF, inverse scope via QR of the object:

[$_{CP}$ [every patient.Acc]$_2$ [$_{CP}$ [one doctor.Nom]$_1$ [$_{TP}$ t_1 [$_{VP}$ t_2 [$_{VP}$ t_1 [examined t_2]]]]]]

Table 1 summarizes the two possible derivations for SVO order discussed above, the ones in (5) and (6).

[INSERT Table 1 ABOUT HERE]

2.2.2 Deriving OVS order

There are multiple possibilities for deriving OVS order in Russian, discussed in Bailyn (2011).[3] Bailyn (1995) proposes that in OVS order, the object moves to [spec, TP], while the subject is extraposed to the right. Babyonyshev (1996) and Lavine and Freidin (2002), like Bailyn (1995), analyze preverbal non-nominative XPs in Russian as moving to [Spec, TP], and argue that this movement is driven by the EPP. Bailyn (2003, 2004) extends this analysis to OVS sentences, analyzing the fronted object as being in [Spec, TP], the verb raised to T, and the postverbal subject in its *in situ* position, rather than extraposed.

Applying this analysis to double-quantifier sentences, we have the PF in (7a). In this derivation, the object has moved through a VP-adjoined position motivated by type considerations (see the previous section) prior to moving to [spec, TP]; the verb has raised to T, and the subject remains in its base position inside the VP. The LF corresponding to surface scope is then read straight off the PF. Reconstruction of the scrambled object to a VP-adjoined position, as in (7b), would not lead to inverse scope, since the reconstructed object would still be scoping over the subject (note that the object cannot reconstruct all the way to its base position, since this would lead to a type-mismatch). The only way to derive the inverse scope reading for the configuration in (7a) is via covert QR of the subject to a TP-adjoined (or higher) position, as in (7c).

(7) OVS order, object in [spec, TP] and subject *in situ*

a. PF = LF, surface-scope:

$[_{TP}$ [one patient.Acc]$_3$ examined$_2$ $[_{VP}$ t_3 $[_{VP}$ [every doctor.Nom]$_1$ t_2 $t_3]]]$

b. LF, surface scope after reconstruction of the scrambled object:

[$_{TP}$ examined$_2$ [$_{VP}$ [one patient.Acc]$_3$ [$_{VP}$ [every doctor.Nom]$_1$ t$_2$ t$_3$]]]

c. LF, inverse scope via QR of the subject:

[$_{TP}$ [every doctor.Nom]$_1$ [$_{TP}$ [one patient.Acc]$_3$ examined$_2$ [$_{VP}$ t$_3$ [$_{VP}$ t$_1$ t$_2$ t$_3$]]]]

We note that the configuration in (7) is in principle fully compatible with further movement of the object to a higher position in the C-domain, analogously to what we discussed for the subject moving out of [spec, TP] in the previous section. However, this would have no effect on the scope configuration: reconstruction of the object would still not lead to inverse scope, since the subject is *in situ*.

Slioussar (2011) points out a number of problems with the analysis in Bailyn (2004) (Slioussar's arguments are supported by corpus data): (i) adverbs typically precede the verb in Russian, in both SVO and OVS order, providing evidence against verb-raising to T; (ii) postverbal nominative subjects can bind a possessive anaphors inside the preverbal object, indicating that the subject did raise to [spec, TP]; and (iii) non-nominative XPs cannot bind possessive anaphors, indicating that they are *not* in [spec, TP]. Slioussar argues that nominative subjects in OVS sentences do move to [spec, TP], and that their postverbal position in overt syntax is a result of additional IS-driven movement: specifically, postverbal subjects are either in narrow focus or in contrastive focus. She furthermore analyzes the fronted object as being in a position higher than [spec, TP], in the C-domain (a position from which it c-commands, and hence scopes over, the right-dislocated subject). This derivation is schematized in (8a): the object has moved through a VP-adjoined position to a position above the TP, while the subject has moved through the [spec, TP]

position prior to right-adjoining to the TP (even if the subject reconstructs to [spec, TP] – or lower – at LF, the object will still c-command the subject and the result will still be surface scope).

For this configuration, inverse scope can be derived via reconstruction of the scrambled object, as in (8b) (note that in this case, the subject c-commands the object regardless of whether it stays in its extraposed position or reconstructs to [spec, TP]), or via covert QR of the subject to a position in the C-domain, as in (8c).

(8) OVS order, object in the C-domain, subject right-extraposed

a. PF = LF, surface-scope:

$[_{CP}$ [one patient.Acc]$_2$ $[_{TP}$ $[_{TP}$ t_1 $[_{VP}$ t_2 $[_{VP}$ t_1 [examined t_2]]]] [every doctor.Nom]$_1$]]

b. LF, inverse scope via reconstruction of the object:

$[_{TP}$ $[_{TP}$ t_1 $[_{VP}$ [one patient.Acc]$_2$ $[_{VP}$ t_1 [examined t_2]]]] [every doctor.Nom]$_1$]

c. LF, inverse scope via QR of the subject:

$[_{CP}$ [every doctor.Nom]$_1$ $[_{CP}$ [one patient.Acc]$_2$ $[_{TP}$ $[_{TP}$ t_1 $[_{VP}$ t_2 $[_{VP}$ t_1 [examined t_2]]]] t_1]]]

As noted by Bailyn (2011 :342), there is also the possibility of a 'hybrid' account, in which the object is in [spec, TP], as in (7), but the subject is right-extraposed, as in (8); since the [spec, TP] position is already occupied by the object, the subject does not raise to [spec, TP] and is instead right-extraposed to the edge of the VP, as schematized in (9a); as with (8), it is possible to derive inverse scope either via reconstruction of the object (9b) or covert QR of the subject (9c). We note that the derivation in (9) makes exactly the same predictions for scope interpretation as the one in (8), so data on (im)possible or

(dis)preferred scope readings would not be able to tease these two accounts apart. In light of Slioussar's arguments in favor of the extraposed subject moving through the [spec, TP] position, we adopt (8) rather than (9) in this paper.

(9) OVS order, object in [spec, TP], subject right-extraposed:

a. PF = LF, surface-scope:

[$_{TP}$ [one patient.Acc]$_2$ [[$_{VP}$ t$_2$ [$_{VP}$ t$_1$ [examined t$_2$]]] [every doctor.Nom]$_1$]]

b. LF, inverse scope via reconstruction of the object:

[$_{TP}$ [[$_{VP}$ [one patient.Acc]$_2$ [$_{VP}$ t$_1$ [examined t$_2$]]] [every doctor.Nom]$_1$]]

c. LF, inverse scope via QR of the subject:

[$_{TP}$ [every doctor.Nom]$_1$ [$_{TP}$ [one patient.Acc]$_2$ [[$_{VP}$ t$_2$ [$_{VP}$ t$_1$ [examined t$_2$]]] t$_1$]]]

Bailyn (2011 :342-343) argues that rightward extraposition of the subject is theoretically problematic under current syntactic theories, and proposes yet another derivation of OVS sentences, which requires neither verb-movement to T nor right-extraposition of the subject. This account involves (i) fronting of the object within the VP, as in (10a); and (ii) movement of the entire VP which contains the fronted object to the [spec, TP] position, while the subject stays in situ, as in (10b).

(10) OVS order, VP-movement

a. Object fronting within the VP:

[$_{TP}$ [$_{vP}$ [one doctor.Nom] [$_{VP}$ [every patient.Acc]$_1$ [$_{V'}$ examined t$_1$]]]]

b. PF after VP-fronting:

[TP [VP [every patient.Acc]1 [V' examined t1]]2 [vP [one doctor.Nom] t2]]

This derivation successfully accounts for the fact that OVS structures obviate Weak Crossover violation, yet do not allow anaphor binding by the scrambled object (see Bailyn 2011 :343). However, as far as we can see, it runs into a problem with regard to scope interpretation. The derivation in (10) cannot explain why the default scope reading for OVS sentences is *object* > *subject*: in (10b), the scrambled object does not c-command the subject, so it cannot scope over the subject. Assuming that the moved VP in (10b) leaves behind a trace of type ⟨e, t⟩, the VP-movement is semantically vacuous, and the subject still scopes over the object at LF. We do not see any straightforward way of deriving the *object>subject* scope for the configuration in (10b). Given that the *object>subject* reading is the default reading for OVS order (both according to existing accounts of Russian scope, and to the data reported in this paper), we do not consider this account any further.

Table 2 summarizes the two main alternatives discussed above for deriving OVS sentences: the ones in (7) and (8).

[INSERT Table 2 ABOUT HERE]

2.2.3 Interim Summary: Russian Scope and the PSE

As discussed above, there are two basic alternatives for the derivations of SVO as well as OVS orders. For the SVO order, the question is whether the subject QP is in [spec, TP] or higher at PF. The difference between these two derivations is that, if scope reconstruction happens, a subject in [spec, TP] will reconstruct to its base position and hence be in the scope of the object (resulting in inverse scope for the sentence), but a subject which is in

the C-domain could potentially reconstruct only as far as [spec, TP] and hence scope over the object even after reconstruction. For the OVS order, the crucial difference is whether the scrambled object has moved to (or through) [spec, TP] and, correspondingly, whether the subject has stayed *in situ* or undergone right-extraposition. If the subject has stayed *in situ*, then, even if the object undergoes reconstruction, it will still scope over the subject. In contrast, if the subject is right-adjoined to the TP, then reconstruction of the object will place it in the scope of the subject, yielding inverse scope.

Thus, the different derivations of SVO and OVS orders make different predictions with regard to whether reconstruction will lead to inverse scope. In contrast, covert QR of the postverbal QP to a position above the preverbal QP will always result in inverse scope. However, recall that covert QR, even if it is in principle possible, is predicted to be dispreferred for reasons of processing, per the PSE. The PSE was formulated for English, and therefore does not consider non-canonical word orders. However, it should apply to both SVO and OVS orders in Russian: inverse scope derived by covert QR should be more costly to process than surface scope, for both word orders. The PSE does not say anything about the processing cost of scope reconstruction, but it is reasonable to suppose that reconstruction also incurs a processing cost. If reconstruction, unlike covert QR, does *not* incur a processing cost, then we should expect inverse scope to be readily available whenever it can be derived via reconstruction. We will come back to this point.

2.3 The Relationship between Scope and Information Structure in Russian

Both SVO and OVS word orders can correspond to what Yokoyama (1986) termed *emotive* and *non-emotive* sentences (see also King 1995). Non-emotive sentences can be used to

answer the question "What happened?", and no element is in contrastive focus. Literature on Russian word order (e.g., King 1995, Junghanns and Zybatow 1997, among many others) generally analyzes non-emotive sentences as containing given information before new information. Emotive sentences, in contrast, are those that have an element in contrastive focus. It is generally assumed that focus is marked by stress in Russian (Jackendoff 1972 and much subsequent work). As discussed in Neeleman and Titov (2009, footnote 2), new-information foci and contrastive foci are both marked by a falling intonational contour, but contrastive focus is higher in tone and more intense (Bryzgunova 1971, 1981, Yokoyama 1986, Krylova and Khavronina 1988). While new-information focus in Russian typically occurs in clause-final position, contrastive focus can occur just about anywhere in the sentence (King 1995, Brun 2001, Junghanns and Zybatow 1997, Neeleman and Titov 2009, Bailyn 2011), including in the preverbal position of both SVO and OVS sentences.

2.3.1 Information Structure and Syntactic Position

An important question debated in the literature on Russian word order is whether discourse functions such as topic and focus correspond to particular syntactic positions (see Dyakonova 2009 and Bailyn 2011 for more discussion). "Cartographic" approaches (based on Rizzi 1997, 2004 and Cinque 1999) include those of King (1995) and Dyakonova (2009), and posit specific functional categories in the C-domain for Topic and Focus. In contrast, non-cartographic approaches, which include, among many others, Bailyn (1995, 2011), Junghanns and Zybatow (1997), Sekerina (1997), Pereltsvaig (2004) and Slioussar (2007, 2013), do not posit dedicated Topic or Focus positions. As discussed by Bailyn (2011),

focused elements can potentially occur anywhere in the sentence, both preverbally and postverbally, while topics can potentially be in the CP or the vP domain.

Slioussar (2013), addressing topicalization in Russian, argues that the correct distinction encoded by word order is not given vs. new (in fact, both NPs in SVO as well as OVS sentences can be new information), but rather that of relative accessibility: more accessible constituents must be higher in the syntactic structure than less accessible constituents. On Slioussar's analysis, topicalization involves the movement of a more accessible constituent over a less accessible one. Here, topic is defined as "the thing that the proposition expressed by the sentence is about" (Slioussar 2013:15; see, e.g., Strawson 1964, Gundel 1974, Reinhart 1982, Lambrecht 1994). For example, (3a,c) are sentences about doctors, but (3b,d) are about patients. If the object is more accessible than the subject (the object is the topic), the object is positioned somewhere in the C-domain, above [Spec, TP]. If the subject is more accessible than the object (the subject is the topic), no movement of the subject is necessary: a subject topic might be in [spec, TP], or higher up, in the C-domain. As long as the subject precedes the object, on this view, it is more accessible than the object. With regard to contrastive focus, Slioussar (2013) proposes that when focus movement occurs, it does not carry an IS-function, but is used for rhetorical / stylistic purposes ("starting the sentence with the most prominent part of the assertion", p. 22).

We adopt the non-cartographic approach in this paper. Following Slioussar, we assume that the preverbal element is often construed as the topic of the sentence, but that this does not necessarily correspond to a single syntactic position. We also assume that there is no dedicated position for contrastive focus, given that contrastively focused elements can

occur at different positions in the sentence. We propose that a fronted object is always fronted for reasons of topichood: it is what the sentence is about. A preverbal subject can also be a topic, but does not have to be: since SVO is the default word order, an SVO sentence can be uttered completely out of the blue, with all elements in the sentence being new information, and equally (in)accessible (see also Bailyn 2011 for more discussion).

2.3.2 Information Structure and Scope

There is reason to believe that processing considerations, discussed in section 2.1, are not the only ones at work in determining scope in Russian: IS and prosody also matter. According to Ionin (2003), Russian scope is only frozen in emotively neutral sentences. Ionin proposes that frozen scope is a result of a discourse constraint: the topic must be interpreted first (i.e., take widest scope), which means that topics do not reconstruct, and nothing can QR to a position above the topic. In contrast, in emotively non-neutral sentences – specifically, in sentences where the preverbal element is in contrastive focus – inverse scope is predicted to be possible, since the constraint on topics no longer applies. Thus, to the extent that native Russian speakers allow both surface-scope and inverse-scope readings to double-quantifier sentences, it is possible that they assign different prosodic contours as well as different IS configurations to the two readings.

The link between prosodic contour and quantifier scope has previously been made for a number of languages, including German (Jacobs 1982, 1983, 1984, Lötscher 1984, Löbner 1990, Höhle 1992, Féry 1993, Büring 1997a,b, Krifka 1998, Sauerland and Bott 2002, Bobaljik and Wurmbrand 2012), Japanese (e.g., Hirotani 2004, Hirose and Kitagawa 2007) and Greek (Baltazani 2002). Antonyuk-Yudina (2011) also found different prosodic

contours to be associated with surface-scope and inverse-scope readings in Russian. Contrastive stress on the preverbal subject in SVO order was one of the strategies used by speakers to disambiguate the sentence in favor of an inverse-scope reading; however, in the perception part of the study, only 17% of sentences produced in inverse-scope-biasing contexts were disambiguated by listeners in favor of the inverse-scope reading (Antonyuk-Yudina 2011 is an extended abstract, so not much detail about the study is provided).

Neeleman and Titov (2009) propose that long-distance movement of a contrastively focused element in Russian across clause boundaries results in obligatory reconstruction for scope, for both objects and subjects of an embedded clause that are fronted to the beginning of the matrix clause. Neeleman and Titov do not consider local scrambling of the kind discussed in this paper, and its relationship to focus. However, we note that local scrambling is fully compatible with contrastive focus: all of the sentences in (3) can felicitously have the preverbal element in contrastive focus, as shown in (11) for (3a-b).

(11) a. ODIN doktor osmotrel každogo pacienta.
one.Nom doctor.Nom examined.Masc every.Acc patient.Acc
'ONE doctor examined every patient (not two doctors).'

b. ODNOGO pacienta osmotrel každyj doktor.
one.Acc patient.Acc examined.Masc every.Nom doctor.Nom
'Every doctor examined ONE patient (not two).'

We hypothesize that contrastive focus leads to reconstruction and can thus potentially result in the inverse-scope interpretation of the sentence. As discussed in section 2.3.1, in prosodically neutral, non-emotive sentences in Russian, the preverbal NP is normally the

topic, in the informal sense of being what the sentence is about. We follow Ionin's (2003) proposal that topics do not reconstruct: since the topic is what the sentence is about, it should be interpreted first. On the other hand, when the preverbal element is contrastively focused, it is not the topic; following Slioussar (2013), we assume that the fronting of a contrastively focused element is done purely for stylistic reasons, rather than for IS reasons, and hence is subject to reconstruction.[4]

We adopt the view that focus-driven reconstruction is obligatory in the constructions we consider here, rather than optional. We have two reasons for making this assumption. First, if fronting of a focused QP is done for purely stylistic / rhetorical reasons, with no interpretative effect, then it is reasonable to expect that such movement is obligatorily undone at LF. Second, if focus-driven reconstruction is optional rather than obligatory, and if any covert movement that changes the syntactic configuration carries a processing cost, then reconstruction should be avoided, just like covert QR. The result would be that we would not see any more inverse scope in the presence of contrastive focus than in its absence, since in both cases, inverse scope would carry a processing cost. Thus, treating reconstruction as optional would not derive the relationship between contrastive focus and inverse scope. The alternative would be to say that while focus-driven reconstruction is optional, it does not carry a processing cost, unlike covert QR; however, there is no principled reason for making such a distinction between two types of covert movement.

2.3.3 Word Order Asymmetries in Scope, and the Relevance of Information Structure

It is well-established that in some scrambling languages, notably German and Japanese, inverse scope is allowed for scrambled but not for canonical word orders (C.-T. Huang

1982, Hoji 1985, Frey 1989, 1993, Aoun and Li 1993, Lechner 1996, 1998, Krifka 1998). In a recent account of scope relations cross-linguistically, Bobaljik and Wurmbrand (2012) provide a possible explanation for this asymmetry by proposing the Scope Transparency principle in (12), which requires the PF to correspond to the LF (see also Wurmbrand 2008):

(12) *Scope Transparency (SCoT)* (Bobaljik & Wurmbrand 2012:373):

If the order of two elements at LF is A≫B, the order at PF is A≫B.

While SCoT requires surface scope, according to Bobaljik and Wurmbrand, it is a "soft constraint", which can be violated as a last resort. Take a canonical SOV sentence in German, with an indefinite in subject position and a universal in object position (the German equivalent of the Russian sentence in (3a)). If the target LF is *one>every*, then the PF matches the LF, SCoT is respected, and SOV order is grammatical. On the other hand, if the target LF is *every>one*, then the PF does not match the LF, and SCoT is violated; in contrast, the scrambled OSV version (the German equivalent of (3d)) does not violate SCoT, since the PF matches the LF. Therefore, the scrambled version is chosen over the canonical word-order version to express the *every>one* reading. In a language like English, where scrambling is not available, the canonical SVO order is grammatical with the *every>one* reading: SCoT can be violated because there is no other form that can successfully express the target meaning.

Note that this by itself is not enough to explain why the scrambled word order in German is ambiguous. The answer lies in information structure. Bobaljik and Wurmbrand (2012) propose that SCoT is relevant for IS as well as for LF. When IS and LF are in conflict (when the topic/focus configuration does not correspond to the scope

configuration), PF can match either LF or IS. Wurmbrand (2008) and Bobajik and Wurmbrand (2012) argue that the inverse-scope reading of a scrambled sentence is possible only when the fronted object is the topic: in that case, even though the PF does not match the LF, it matches the IS.[5]

SCoT is argued to be a universal principle, and should apply to Russian as well as German. If in Russian also, the PF can potentially match either the IS or the LF (not necessarily both), then we expect to see the same pattern for Russian as for German: namely, availability of inverse scope readings for scrambled OVS but not for canonical SVO sentences. This prediction is in full opposition to Bailyn's (2011 :287) observation that inverse scope in Russian is more readily available to SVO than to OVS sentences.

If in Russian the LF and the IS must necessarily match (as suggested by Ionin 2003, for whom a topic must be sentence-initial, and take widest scope), then Russian is predicted, on Bobaljik and Wurmbrand's account, to be a frozen-scope language: the PF should always match the LF (and the IS), in order to avoid a SCoT violation.

Once again, the picture is complicated by processing preferences. SCoT is a grammatical constraint, which affects which interpretations are possible vs. impossible for a given word order. Bobaljik and Wurmbrand assume, following much prior literature on German, that inverse scope is impossible in canonical word-order sentences. However, it is possible that it is strongly dispreferred rather than unavailable. In a recent experimental study, Bott and Schlotterbeck (2012) found that, in an offline truth-value judgment task, native German speakers exhibited a strong preference for surface scope over inverse scope for both SVO and OVS orders, but that acceptability of the inverse-scope reading was still

above that of baseline controls, for both word orders. This indicates that inverse scope is strongly dispreferred rather than unavailable, contra previous assumptions in the literature. If SCoT is at work in German, it would need to take preferences into account in order to accommodate these results. Interestingly, in an online task (incremental truth-value judgment task), Bott and Schlotterbeck (2012) found inverse scope to be entirely unavailable to German SVO sentences, but only dispreferred in the case of OVS sentences.

2.4 Referentiality

We have so far been assuming that both indefinite and universal phrases are QPs. However, we need to consider the fact that, on many accounts, indefinites are at least optionally non-quantificational. It is well-known that indefinites can take exceptional, or long-distance, scope out of configurations that serve as islands for regular quantifiers, such as relative clauses and antecedent of conditionals (see Farkas 1981, Fodor and Sag 1982, and much subsequent literature). There is a large body of literature on this topic, and many accounts of exceptional indefinite scope posit an ambiguity between quantificational and non-quantificational indefinites. For example, Fodor and Sag (1982) argued that indefinites are ambiguous between quantificational and referential (type *e*) readings. There are also many different variants of choice-function accounts (Reinhart 1997, Winter 1997, Kratzer 1998, Matthewson 1999, and much subsequent literature), on which the indefinite denotes a function which maps a set to a member of that set. There are also alternative accounts which treat indefinites as obligatorily quantificational, and derive long-distance scope by other means. For example, an influential account of Schwarzschild (2002) derives long-distance scope by means of implicit domain restriction: when an indefinite such as *a*

professor appears to take long-distance scope, it actually takes local scope but denotes a singleton set, e.g., *a professor* <u>*who is teaching Syntax I this semester*</u> (with the underlined material representing implicit domain restriction). For our purposes, it is not relevant whether apparently referential readings of indefinites are semantically distinct from quantificational readings (as on the choice-function accounts), or a result of implicit domain restriction. All that matters is that such readings (which we henceforth term 'referential') in principle exist, and that the apparent wide-scope reading of an indefinite above other scope-bearing elements is not a result of covert QR or reconstruction.

In our study, we focus exclusively on local scope configurations and are not concerned with how long-distance scope readings of indefinites are derived. If indefinites in principle have quantificational readings, these should certainly be available to the indefinites in (3). However, we need to consider the possibility that the *odin* 'one' indefinites in (3) may also have referential / choice-function / singleton readings, on which *one doctor* or *one patient* in (3) denotes a specific doctor or patient (one that the speaker has in mind, or one that is picked out by a choice function from the set of doctors / patients). Indeed, prior literature on specificity in Russian has argued that *odin* 'one', when phonologically reduced and unstressed, functions as a marker of specificity / referentiality, rather than a true numeral (Haspelmath 1997, Ionin 2010). We now consider the consequences of this for our proposal.

If the *odin* indefinites in (3) are given a referential reading, this should result in the appearance of surface scope for indefinite-first sentences (3a-b) and the appearance of inverse scope for universal-first sentences (3c-d). If *odin* indefinites are referential only when reduced and unstressed, then contrastive focus on *odin* will increase the availability

of inverse scope for indefinite-first sentences (3a-b) while also decreasing the availability of inverse scope for universal-first sentences (3c-d). In order to tease apart referential and quantificational readings, it is important to consider indefinites other than *odin* 'one'. In our study, we directly compare scope judgments with *odin* indefinites to those with *dva* 'two' indefinites. Whereas *odin* has been argued in the literature to have a non-numeral, specific/referential indefinite reading, no such argument has been made for *dva*, which is assumed to have only the standard numeral interpretation available to it. Thus, *dva* can be taken as being representative of indefinites more generally, including higher numerals.

2.5 Summary and Hypotheses

The first goal of this study is to establish whether Russian scope is frozen (for both SVO and OVS word orders, per Ionin 2003, or only for SVO order, as predicted on the Bobaljik and Wurmbrand 2012 account, or only for OVS order, as suggested by Bailyn 2011), or whether surface scope is only a preference. We hypothesize that Russian does *not* have frozen scope, and that the appearance of frozen scope is due to a strong processing-based preference. This is Hypothesis 1 in (13). This hypothesis is based on the disagreement in the literature and among speakers; if scope were truly frozen in Russian, we would expect informal judgments about lack of inverse scope to be more robust. Indeed, in the case of Mandarin Chinese, which is always described in the literature as a frozen-scope language (S.-F. Huang 1981; C.-T. Huang 1982; Lee 1986; Aoun and Li 1989, 1993), no disagreement on this point has ever been reported, and a recent experimental study by Scontras, Tsai, Mai and Polinsky (2014) found zero acceptance of sentences such as *One shark attacked every pirate* in contexts matching the inverse-scope reading.

(13) **Hypothesis 1**: Russian allows both surface-scope and inverse-scope readings of both SVO and OVS sentences, with inverse scope derived via covert QR of the postverbal QP to a position above the preverbal QP. Surface scope is preferred for processing reasons: covert QR carries a processing cost.

Hypothesis 2: Contrastive focus on the preverbal QP triggers reconstruction of the focused QP to a lower position.

The second goal of the paper is to examine whether contrastive focus results in inverse scope. In light of the relationship between information structure and scope discussed in the previous section, we hypothesize that contrastive focus leads to reconstruction; this is Hypothesis 2. We propose that while covert QR is always available (but dispreferred), reconstruction becomes available only in the presence of contrastive focus. An alternative hypothesis would be to say that contrastive focus makes available (or facilitates) covert QR rather than reconstruction; however, this would be rather counterintuitive. If the contrastive focus in (11) facilitates inverse scope by means of covert QR, we would need to say that focus on the *preverbal indefinite* leads to covert QR of the *postverbal universal quantifier*. There is no motivation for this. In contrast, if inverse scope in (11) results from reconstruction, this means that focus on the *indefinite* results in reconstruction of the *indefinite*, a fairly reasonable hypothesis.[6]

The empirical consequences of reconstruction depend on the right analysis of SVO and OVS orders in Russian, as summarized in Table 1 and Table 2. Thus, the third goal of this paper is to use data on scope interpretation to provide information bearing on the right analysis of the derivation of both SVO and OVS sentences. Finally, as discussed in the

previous section, the availability of a referential reading, and in particular the tendency of unstressed *odin* indefinites to be referential, can potentially obscure any effects of covert QR or reconstruction, which apply only to quantificational indefinites. In order to address this issue, our study compares *odin* 'one' and *dva* 'two' indefinites; the fourth goal of this study is thus to determine whether the scope behavior of indefinites generalizes across different indefinite types, controlling for the availability of referential readings.[7]

3 Experimental Study

3.1 Experimental Materials

An auditory sentence-picture verification task (SPVT) was used; each item in the SPVT consisted of a sentence presented auditorily in the context of a picture. The sentences were read by a female native Russian speaker, and the pictures were created using clip art. Participants had to judge whether the sentence matched the picture by selecting either YES or NO. The SPVT was presented via the internet, using the survey gizmo tool. Four separate versions of the SPVT were created: Baseline-one and Focus-one contained *odin* 'one' indefinites, while Baseline-two and Focus-two contained *dva* 'two' indefinites.[8] The two Baseline versions were recorded with neutral prosody (sentence stress on the rightmost constituent, and no contrastive stress). In the two Focus versions, each target sentence was presented with contrastive stress on the indefinite determiner.[9] Each version of the SPVT was administered to a different set of participants.

3.1.1 Sentence Types

The target sentences in the Baseline-one and Focus-one SPVTs came in the four types illustrated in (3), repeated again in (14) below. These four sentence types are a result of the crossing of two factors: *word order* (SVO, as in (14a,c) and OVS, as in (14b,d)) and *quantifier-first*, i.e., which quantifier comes first in the sentence (the indefinite, as in (14a-b), or the universal, as in (14c-d)). For the Baseline-two and Focus-two versions of the SPVT, the sentences were replaced with minimally different sentences which used *dva* 'two' in place of *odin* 'one', as illustrated in (15). In the two Focus versions, contrastive stress was placed on the preverbal indefinite in (14a-b)/(15a-b), and on the postverbal indefinite in (14c-d)/(15c-d).

(14) a. Odin doktor osmotrel každogo pacienta.
one.Nom doctor.Nom examined.Masc every.Acc patient.Acc
'One doctor examined every patient.' (SVO, indefinite first)

b. Odnogo pacienta osmotrel každyj doktor.
one.Acc patient.Acc examined.Masc every.Nom doctor.Nom
'One patient was examined by every doctor.' (OVS, indefinite first)

c. Každyj doktor osmotrel odnogo pacienta.
every.Nom doctor.Nom examined.Masc one.Acc patient.Acc
'Every doctor examined one patient.' (SVO, universal first)

d. Každogo pacienta osmotrel odin doktor.
every.Acc patient.Acc examined.Masc one.Nom doctor.Nom
'Every patient was examined by one doctor.' (OVS, universal first)

(15) a. Dva doktora osmotreli každogo pacienta.
two.Nom doctor.Gen examined.Pl every.Acc patient.Acc
'Two doctors examined every patient.' (SVO, indefinite first)

b. Dvux pacientov osmotrel každyj doktor.
two.Acc patient.Acc.Pl examined.Masc every.Nom doctor.Nom
'Two patients were examined by every doctor.' (OVS, indefinite first)

c. Každyj doktor osmotrel dvux pacientov.
every.Nom doctor.Nom examined.Masc two.Acc patient.Acc.Pl
'Every doctor examined two patients.' (SVO, universal first)

d. Každogo pacienta osmotreli dva doktora.
every.Acc patient.Acc examined.Pl two.Nom doctor.Gen
'Every patient was examined by two doctors.' (OVS, universal first)

3.1.2 Picture types

Each sentence type was presented with two distinct picture types, control and test. The control pictures made the sentence true on both surface and inverse scope. For example, for the sentence type in (14a), the control picture showed one specific doctor examining all three patients (while two other doctors stand by and do nothing): this picture makes (14a) true both on surface scope (there is one doctor who examined all the patients) and on inverse scope (for every patient, one doctor examined him/her). For reasons of space, we do not report the results with control pictures here; performance with control pictures was close to ceiling, which indicates that participants were paying attention.

The test picture presented a distributive scenario, which teased apart the surface-scope and inverse-scope readings. In the Baseline-one and Focus-one versions, the same test picture was used for all sentence types in (14a-d); as shown in Figure 1, in the test picture, different doctors are paired up with different patients. In the context of Figure 1, (14a-b) are false on the surface-scope reading but true on the inverse-scope reading, while the opposite is the case for (14c-d). Thus, a response of YES to (14c-d) indicates availability of surface scope, while a response of YES to (14a-b) indicates availability of inverse scope. Per Hypothesis 1 in (13), we expect higher rates of YES responses to (14c-d) relative to (14a-b): i.e., we expect the factor *quantifier-first* to have a significant effect.

It is harder to interpret what a NO response means: for example, does a NO response to (14a-b) indicate that inverse scope is unavailable in Russian (not part of native speakers' grammar), or only dispreferred (e.g., for reasons of processing)? This question has been considered by Meyer and Sauerland (2009) for English (see also Ionin 2010); Meyer and Sauerland argue that if a scopally ambiguous sentence is true on its most accessible reading, it should be judged true, but if it is false on its most accessible reading and true on a less accessible reading, it may be judged as either true or false. While Meyer and Sauerland do not define what 'most accessible' means, they implicitly assume that surface-scope readings are more accessible than inverse-scope readings. This is fully compatible with processing-based accounts such as Anderson (2004) (see (4)). In light of these considerations, a NO response to (14a-b) in the context of Figure 1 would not necessarily mean that the inverse-scope reading is unavailable; it could, instead, be strongly dispreferred. On the other hand, a high rate of YES responses to (14a-b) would indicate

that inverse scope is available, which is what we expect when inverse scope is licensed via focus-driven reconstruction, per Hypothesis 2.

For the Baseline-two and Focus-two versions, the study design necessitated two types of test pictures: for (15a,d), the test picture showed a different pair of doctors examining each of the patients (Figure 2), while for (15b,c), the test picture showed a different pair of patients being examined by each doctor (Figure 3).

[INSERT FIGURES 1, 2 AND 3 ABOUT HERE]

3.1.3 Test Instrument Construction

In designing the SPVT, eight token sets were constructed; all items had the form in (14) (for the Baseline-one and Focus-one versions) or (15) (for the Baseline-two and Focus-two versions). The lexical material was varied (girls stroking kittens, boys feeding birds, doctors treating patients, women reading to children, etc.).[10] All test sentences were in the past tense (the past perfective form of the verb).

Two test lists were created, so that each sentence was presented only once within each list. For example, for the token set in (14), the sentences in (14a,c) were presented with control pictures in list1 and with the test picture in list2, while the opposite was the case for the sentences in (14b,d). Each list contained 32 target items (4 sentence types X 2 picture types X 4 tokens) and 32 fillers. The filler sentences contained either indefinite or universal quantifiers, but not both, and were not scopally ambiguous. The items within each list were blocked and randomized for order of presentation. Each list was preceded by instructions, as well as two example items and two practice items.

3.1.4 Addressing the role of context

In the SPVT versions discussed above, the only difference between the Baseline and Focus versions was prosody. We are assuming that contrastive prosody supports the contrastive focus reading, while neutral prosody supports the reading on which the preverbal QP is the topic. This assumption is based on our prior work, Ionin and Luchkina (2015). In that study, we created two additional versions of the SPVT, which used dialogues to establish the relevant context. Both versions were with *odin* indefinites. The Topic-context version set up a topic interpretation for the preverbal QP, and presented the target sentence with neutral prosody, as in the Baseline-one version. The Focus-context version set up a contrastive interpretation of the indefinite QP, and presented the target sentence with contrastive stress on the indefinite, exactly as in the Focus-one version. In Ionin and Luchkina (2015), we compared performance on the Topic-context and Focus-context versions to that on the Baseline-one and Focus-one versions (the same ones reported in this paper). The result was that context had no effect on the results: performance in the Baseline-one version was nearly identical to (and statistically not distinguishable from) performance in the Topic-context version, and the same held for the Focus-one vs. Focus-context versions. On the basis of these findings, we concluded that the presence of context made no difference to interpretation: prosody alone mattered. Therefore, in this paper we report only the results of SPVT versions where sentences were presented in isolation.

3.2 Predictions

Per Hypothesis 1, we predict that in the two Baseline versions, surface scope should be preferred for both SVO and OVS orders: in the context of the test picture, we should obtain

primarily YES responses for (14a-b) and (15a-b), and primarily NO responses for (14c-d) and (15c-d). Per Hypothesis 2, we predict that in the two versions with contrastive prosody (Focus-one and Focus-two), the fronted focused indefinite in (14a-b) and (15a-b) will undergo reconstruction. For (14c-d) and (15c-d), contrastive focus is not expected to have any effect, since the focused QP is postverbal and already lower in the structure than the preverbal QP.[11] The empirical consequences of the reconstruction in (14a-b) and (15a-b) will depend on the alternatives spelled out in Table 1 and Table 2, as laid out in (16) below.

(16) Predictions: effect of reconstruction, driven by contrastive focus, on availability of inverse scope:

a. variant 1 in Table 1 and variant 1 in Table 2: inverse scope facilitated only for SVO order
b. variant 1 in Table 1 and variant 2 in Table 2: inverse scope facilitated for both SVO and OVS orders
c. variant 2 in Table 1 and variant 1 in Table 2: inverse scope not facilitated for either word order
d. variant 2 in Table 1 and variant 2 in Table 2: inverse scope facilitated only for OVS order

If inverse scope becomes equally accessible to both SVO order (14a)/(15a) and OVS order (14b)/(15b), this would indicate that the subject in SVO order is reconstructing to its base position, and that in OVS order, the subject is right-dislocated, so that it can scope over the reconstructed object; this is prediction (16b). If we observe inverse scope facilitation only for SVO order but not for OVS order, this would be most compatible with

Bailyn's (2011) account (16a): the focused subject in SVO order reconstructs to its base position, resulting in inverse scope, but reconstruction of the focused object in OVS order does not lead to inverse scope, because the postverbal subject is still lower, in its base position. If in contrast we observe inverse scope facilitation for OVS order but *not* for SVO order, this would suggest that a focused subject in SVO order reconstructs only so far as [spec, TP], while the focused object in OVS order reconstructs to a position in the scope of the right-dislocated subject (16d). This is most compatible with Slioussar (2011), since it places both preverbal subjects and preverbal objects in the C-domain. Finally, if we see no facilitation of contrastive focus for either SVO or OVS order, this could mean that reconstruction of the preverbal QP is always to a position which is structurally higher than the surface position of the postverbal QP, per (16c); of course, this result could also mean that reconstruction is not taking place at all, contra Hypothesis 2.

3.3 Participants

The participants in the study were 119 adult native Russian speakers. Thirty-one speakers completed the Baseline-one version (14 for list1, 17 for list2), 30 completed the Focus-one version (15 per list), 30 completed the Baseline-two version (15 per list), and 28 completed the Focus-two version (15 for list1, 13 for list2). Participants ranged in age from 18 to 59, with the mean age of 24 and median age of 20. Participants were compensated monetarily for completing the surveys.

Except for four participants in the Baseline-one version, all of the participants resided in Russia at the time of the study. One Baseline-one version participant resided in Belarus (where Russian is the primary language for much of the population). The remaining three

Baseline-one version participants were born and raised in Russia, but resided in the U.S. at the time of testing; they had arrived in the U.S. as adults in their twenties, and had between four and nine years of U.S. residence. (Participants with more than ten years of residence outside of Russia were excluded, to control for the possibility of attrition).

Some of the participants were tested in person by an experimenter (on the experimenter's laptop or a publicly available computer), while others were provided with the URL for the test and completed the test on their own computers.

3.4 Results

The results for the performance in the test context are given in Figure 4. One immediately striking observation is that we have much higher rates of YES responses in all conditions with *two* relative to the conditions with *one*. At the same time, we observe similar patterns for both *one* and *two*, with contrastive focus on *two* raising the ratings for indefinite-first OVS sentences and, to a lesser extent, for indefinite-first SVO sentences, but not for universal-first sentences.

[INSERT FIGURE 4 ABOUT HERE]

The data for the test condition were analyzed using a mixed effects binary logistic regression. We introduced the following fixed effects: *quantifier-first* (indefinite first vs. universal first), *word order* (SVO vs. OVS), *prosody* (neutral, as in the two Baseline versions, vs. contrastive, as in the two Focus versions), *numeral* (*one* vs. *two*), and *list* (1 vs. 2). The following fixed effect combinations were introduced as interaction terms: *quantifier-first * word order*, *quantifier-first * prosody*, *word order * prosody*, *quantifier-first * numeral, word order * numeral, prosody * numeral, quantifier-first * word order*

** prosody, quantifier-first * word order * numeral, quantifier-first * prosody * numeral, word order * prosody * numeral,* and *quantifier-first * word order * prosody * numeral*. Participants (N=119) and items (N=32) were introduced as random effects. The model was fit in the R software package (R Development Core Team 2014) using the *lmer()* function of the *lme4* package (Bates, Maechler, Bolker and Walker 2015).

The model output is provided in Table 3: as shown, the only main effects came from *quantifier-first* (the universal-first sentences were given higher ratings than the indefinite-first sentences, which is expected given that only the former are true on surface scope) and *numeral* (ratings were significantly higher for the SPVT versions with *two* than for those with *one*). While there were no other main effects, we observe significant two-way interactions among the factors of *quantifier-first, word order* and *prosody*. None of the higher-level interaction terms came out as significant. The factor *numeral* did not interact with any of the other variables: this indicates that, despite the overall difference in ratings, the same patterns were attested in the *two* SPVT versions as in the *one* SPVT versions. There was also no significant effect of list.

[INSERT Table 3 ABOUT HERE]

In order to explore the interactions, we examined the results of post-hoc pairwise comparisons (the Bonferroni adjustment for multiple comparisons was automatically implemented in R). The pairwise comparisons were averaged across the two levels of *list.* We conducted separate pairwise comparisons for the *one* SPVTs (Table 4) and for the *two* SPVTs (Table 5), and furthermore compared each condition for *one* and *two* (Table 6). In light of the absence of any interactions between *numeral* and any other factor, this was not

strictly speaking necessary, and we could have averaged the pairwise comparisons across the factor *numeral*. However, since since one of our goals was to examine whether *one* and *two* indefinites behave similarly, we wanted to check whether individual pairwise comparisons with *two* would pattern like those with *one*.

[INSERT Table 4, Table 5 and Table 6 ABOUT HERE]

We start with the pairwise comparisons for *odin* indefinites in Table 4. We draw the reader's attention to the following points. First, when word order and the first quantifier are held constant (rows 1 to 4), prosody affects only one of the four conditions, increasing the rate of YES responses for OVS order with an indefinite in preverbal position (14b) (row 2). Second, when both the first quantifier and prosody are held constant (rows 5 to 8), word order has a significant effect in only one condition: indefinite-first sentences under contrastive prosody (row 6); this indicates that contrastive prosody facilitates inverse scope only for OVS but not for SVO order. Third, we examine the effect of the first quantifier when word order and prosody are held context (rows 9 to 12). For OVS order (14b,d), the rates of YES responses are significantly different under neutral prosody (row 11), but similar under contrastive prosody on the indefinite (row 12). This indicates, once again, that contrastive focus on the preverbal indefinite object facilitates inverse scope. On the other hand, there are significant differences for SVO order under both neutral or contrastive prosody (rows 9 and 10): surface scope is always more accessible than inverse scope.

We now turn to the pairwise comparisons for the two *dva* SPVT versions, reported in Table 5. Looking first at rows 1 through 4, we observe exactly the same pattern as in the corresponding rows in Table 4: contrastive focus affects the rate of YES responses only for

indefinite-first OVS sentences (row 2). Even though, numerically, the rate of YES responses for indefinite-first SVO sentences is higher with contrastive prosody than with neutral prosody, this difference is not significant (row 1). Turning next to rows 5 through 12, we see that for the most part, the results reported in Table 4 and Table 5 are similar (the pairwise comparisons in rows 9 and 11 are significant in both, whereas the comparisons in rows 5, 7, 8 and 12 are not significant in either). The two differences are the comparisons in rows 6 and 10, which are significant in Table 4 but not in Table 5. Both comparisons have to do with indefinite-first SVO sentences under contrastive prosody. In Table 4, this sentence type receives significantly lower rates of YES responses than indefinite-first OVS sentences with contrastive prosody (row 6) and than universal-first SVO sentences with contrastive prosody (row 10); in Table 5, the corresponding differences do not reach significance. We believe that the issue here is ceiling effects. In both *odin* and *dva* SPVT versions, contrastive focus on the subject in indefinite-first SVO sentences raises the rate of YES responses slightly (but not enough for contrastive focus to have a significant effect on this sentence type). For the Focus-two version, this small increase is enough to bring the rate of YES responses up to 90%. Given that the rates of YES responses for indefinite-first OVS and universal-first SVO orders in the Focus-two version are at ceiling (96-97%), the result is a lack of a significant difference in the corresponding pairwise comparisons.

To sum up, we find a statistically significant preference for the surface-scope reading with neutral prosody, for both SVO and OVS word orders, and with both *odin* and *dva*. Contrastive stress on the indefinite determiner facilitates the inverse-scope reading of OVS sentences, but not of SVO sentences. We see the same pattern of performance in the *dva*

SPVT versions as in the *odin* SPVT versions, but the overall rate of YES responses is significantly higher (and numerically much higher) in the former relative to the latter, which gives rise to ceiling effects in the *dva* SPVT versions. Indeed, as shown in Table 6, the rate of YES responses is significantly higher for the *dva* versions than for the *odin* versions for every single condition except one (row 3, where a numerical difference is still present, but does not reach significance probably as a result of a ceiling effect).

3.5 Discussion

3.5.1 Surface-scope: A Preference or a Requirement?

First, we see a strong preference for surface scope under neutral intonation, consistent with Hypothesis 1 in (13). However, this is clearly a preference, rather than a case of frozen scope. In the versions with neutral prosody, the indefinite-first sentence types, for which a YES response indicates availability of inverse scope, obtain YES responses 30% to 37% of the time with *odin* indefinites, and 76% with *dva* indefinites. These numbers are clearly too high to be ascribed to noise. We suggest that Russian, as in English, it is possible to derive inverse scope via covert QR, independently of word order and prosody considerations. Just as in English, covert QR in Russian is available, but dispreferred for reasons of processing.

One might argue that in the case of *odin* indefinites, the rate of YES responses (around 30%) is low enough that it could be ascribed to noise, and that, for sentences with *odin* indefinites, scope is after all frozen in Russian. Evidence against this comes from comparing Russian to English and to Mandarin Chinese. As discussed earlier, English is

assumed to allow both surface-scope and inverse-scope readings, even though the former is preferred. On the other hand, the literature on Mandarin is in agreement that inverse scope is unavailable to double-quantifier sentences (S.-F. Huang 1981; C.-T. Huang 1982; Lee 1986; Aoun and Li 1989, 1993). Scontras et al. (2014), in an experimental study of scope in Mandarin and English with a paradigm similar to ours (using written stimuli), found a 0% acceptance rate of Mandarin equivalents of sentences such as *One shark attacked every pirate* in inverse-scope scenarios. In contrast, in the English part of their study, inverse-scope readings were allowed, though dispreferred in reference to surface-scope readings. The acceptance rate for *One shark attacked every pirate* was 28% in inverse-scope scenarios and 85% in surface-scope scenarios. The corresponding acceptance rates for *A shark attacked every pirate* were 56% in inverse-scope scenarios and 100% in surface-scope scenarios.

Scontras et al.'s findings for English are largely replicated in our own work (Ionin and Luchkina to appear). We used the same materials as in the Russian study reported above, but with English stimuli: in place of the SVO and OVS conditions, we used active vs. passive voice sentences, and we administered versions of the test instrument with *a* and with *one* indefinites. We found that sentences such as *One doctor examined every patient*, when presented in an inverse-scope scenario, were accepted 51% of the time, while the acceptance rate in surface-scope scenarios was 92%. For *A doctor examined every patient,* the acceptance rates were nearly identical in inverse-scope and surface-scope scenarios (84% and 82%, respectively). While our acceptance rates are higher than those in Scontras et al. (probably due to differences in the test instruments), we obtain convergent findings with

them that surface scope is preferred to inverse scope for sentences with a *one* indefinite in subject position; in the case of *a* indefinites, the preference for surface scope is weaker (Scontras et al.) or non-existent (Ionin and Luchkina in press).

Coming back to Russian, if we treat a 51% acceptance rate of English sentences in inverse-scope scenarios as indicating that inverse scope is available but dispreferred, it is reasonable to make the same conclusion for a 30% acceptance rate of corresponding Russian sentences in the same scenario. The surface-scope preference does appear stronger in Russian than in English, but the rate of YES responses to the sentence types in (14a-b) appears to be too strong to be ascribed to noise. Our conclusion is that in Russian, as in English, it is possible to derive inverse scope via covert QR, independently of word order and prosody considerations. Just as in English, covert QR in Russian is dispreferred for reasons of processing.

3.5.2 Contrastive Focus and Reconstruction

Contrastive focus was found to facilitate inverse scope in Russian, supporting Hypothesis 2. However, it had a significant effect only on OVS order, though numerically, there was a small effect with SVO order as well. Coming back to the different predictions in (16), we see that our findings concerning the effect of reconstruction are most consistent with (16d): a focused preverbal object reconstructs to a position in the scope of the subject, leading to inverse scope (variant 2 in Table 2), while a focused preverbal subject reconstructs only as far as [spec, TP], hence still taking scope over the object (variant 2 in Table 1).

The fact that contrastive focus leads to availability of inverse scope readings for OVS sentences provides strong evidence against analyzing the postverbal subject as being *in situ*:

if it were, reconstruction of the object would not lead to inverse scope. Our findings are fully consistent with Slioussar's (2011) analysis of the subject being right-adjoined to TP, to a position above the base position of the object.

Turning to SVO order, our findings provide strong evidence that, even with contrastive focus, inverse scope does not become available. This could in principle mean that a contrastively focused subject does not reconstruct; however, if contrastive focus drives reconstruction of scrambled objects, there is no principled reason for why it should not drive reconstruction of the subject. The most straightforward explanation of our findings is that the subject does reconstruct, but that reconstruction in this case does not lead to inverse scope because the reconstructed subject is still in a position higher than the object at LF. Assuming that the object has undergone short type-driven movement to a VP-adjoined position, this means that the subject does not reconstruct to its base position within the VP. We speculate (see variant 2 in Table 1) that the subject is in a position above [spec, TP] at PF, and reconstructs only as far as [spec, TP]. We assume that focused elements are always in the C-domain, in a position where they move for stylistic reasons (recall that Slioussar 2013 treats focused NPs as being moved for stylistic purposes). We do not assume a dedicated Focus position, given that contrastive focus can occur at different position of the sentence in Russian.

The question is *why* a focused subject reconstructs only as far as [spec, TP] and not all the way to its base position inside the VP. A possible answer is that contrastive focus leads to reconstruction, but reconstruction still carries a processing cost, and the more long-distance the reconstruction, the greater the cost. As a result, if reconstruction can target

[spec, TP], it will stop there, rather than take the subject QP all the way to its VP-internal position. This predicts that reconstruction will be all the way to the VP-internal position of the subject some of the time: just as covert QR is costly to process but nevertheless sometimes happens, so reconstruction all the way to the base position of the subject is costly, yet may happen. This prediction is partially supported: as shown in Figure 4, numerically, indefinite-first SVO sentences do receive higher rates of YES responses when the subject is focused relative to when it is not. It is possible that the small increase in YES responses is due to occasional reconstruction of the subject all the way to its VP-internal position. However, given that this small increase is not statistically significant, this is necessarily a tentative explanation.

Finally, we ask whether reconstruction is necessary for deriving inverse scope of OVS sentences under contrastive focus: could the effect instead be due to covert QR? We argue that the answer is NO, for three reasons. First, if covert QR were at work, we would have to make a very unintuitive claim, namely that focusing the scrambled object leads to covert QR of the postverbal subject (as opposed to reconstruction of the object itself). Second, covert QR would not be able to account for the difference between SVO and OVS sentences: it should be possible for the postverbal QP to undergo QR to a position above the preverbal QP, regardless of the structural configuration. And third, if contrastive focus facilitated covert QR, it would be most natural to suppose that it should facilitate covert QR of the *focused* QP, i.e., the postverbal indefinite in (14c-d). However, we have seen that contrastive prosody had no effect on the sentence types in (14c-d).

3.5.3 Interim Summary: Derivation of SVO and OVS Sentences

In this section, we have laid out our argument that (i) Russian double-quantifier sentences exhibit a preference for surface-scope, but scope is not frozen; and (ii) inverse scope of scrambled Russian sentences results from focus-driven reconstruction.

For sentences with contrastive focus on the preverbal indefinite, we have argued that the indefinite is in the C-domain at PF, and reconstructs at LF: to [spec, TP] in the case of SVO sentences (variant 2 in Table 1), and to a VP-adjoined position in the case of OVS sentences (variant 2 in Table 2). If Slioussar (2011) is right, and fronting of a focused element is purely stylistic, then it makes perfect sense that such elements reconstruct at LF: the stylistic movement is semantically vacuous.

Turning to prosodically neutral sentences, we assume that in SVO sentences, the subject is either in [spec, TP] or in the C-domain (either variant 1 or variant 2 in Table 1); inverse scope (though dispreferred) can be obtained in either case via covert QR of the object. The subject can be in [spec, TP] even if it is interpreted as a topic (as in our Topic-context SPVT version). Per Slioussar (2011), there is no need for a subject topic to move from [spec, TP]: it can be interpreted as a topic as long as it precedes the object.

In the case of OVS sentences with neutral prosody, our data are again compatible with either variant in Table 2 (since inverse scope can be derived via covert QR of the subject, in either case). We opt for variant 2 in Table 2 both in light of Slioussar's (2011) arguments for the subject being TP-adjoined, and because this is the variant that we have adopted for sentences with a focused element. It is more parsimonious not to adopt radically different derivations for OVS sentences with neutral vs. contrastive prosody. We assume that in both

cases, the object has moved to a position in the C-domain, but is able to reconstruct only under contrastive focus.

3.5.4 The Role of Referentiality

We now consider the finding that sentences with *dva* indefinites were consistently accepted to a higher extent than those with *odin* indefinites, in both word orders, and under both neutral and contrastive prosody. We believe that this difference stems from referentiality. In section 2.4, we discussed the possibility that *odin* indefnites are ambiguous between referential and quantificational readings. The availability of the referential reading of *odin* can account for why indefinite-first sentences with *odin* often receive surface scope (14a-b), as well as for why universal-first sentences (14c-d) sometimes allow inverse scope, even though it makes the sentences false in the test context. On the referential reading of *odin*, all our test sentences – indefinite-first as well as universal-first – are equally incompatible with the test picture in Figure 3, in which there is no single doctor or patient acting or being acted upon. At the same time, performance with (14c-d) was no different under neutral prosody than under contrastive prosody. This indicates that the availability of the referential interpretation is not restricted to indefinites with unstressed *odin*: it was equally available to contrastively stressed *odin*, which clearly has a numeral interpretation.

Turning to the sentence types in (14a-b), we examine whether the availability of the referential reading can account for the strong surface-scope preference under neutral prosody. The story would have to go something like this. Unstressed *odin* indefinites are preferentially interpreted as referential (cf. Haspelmath 1997, Ionin 2003), and hence give the appearance of taking wide scope in (14a-b). Contrastive stress on *odin* brings out the

numeral reading, which is fully compatible with both wide-scope and narrow-scope interpretations. On this account, we are not dealing with focus-induced reconstruction, but rather with the fact that *odin* is ambiguous between a referential reading and a regular numeral, quantificational reading. However, this account faces two problems. First, it cannot explain why contrastive stress on *odin* failed to bring out the narrow-scope reading of *odin* in SVO sentences (14a) relative to OVS ones (14b): if contrastive stress gets rid of the referential interpretation and brings out the numeral interpretation, this should happen independently of the syntactic role of the indefinite. Second, this account cannot explain why, as noted above, the sentence types in (14c-d) received similar rates of YES responses under neutral and under contrastive prosody. Thus, while the referential reading of *odin* indefinites can account for some of the data, it cannot be the whole story.

Our explanation of the different behavior of *odin* vs. *dva* is that, while both indefinite types can be quantificational, *dva* indefinites are much less likely than *odin* indefinites to be interpreted referentially. They are (nearly) always given a quantificational reading, with the result that both surface-scope and inverse-scope readings are readily available. We still see a small (and statistically significant) preference for surface scope even with *dva* indefinites: under neutral prosody, universal-first sentences, which are true on surface scope, receive significantly more YES responses than indefinite-first sentences, which are true only on inverse scope. The difference is between near-ceiling acceptance of universal-first sentences (93-96%) relative to high but not ceiling acceptance of indefinite-first sentences (76%). This difference, we argue, is attributed to the processing cost of covert QR, which is needed to derive inverse scope.

Importantly, contrastive focus facilitates reconstruction, with the result that inverse scope becomes fully acceptable to OVS sentences, for *dva* indefinites as for *odin* indefinites. Table 7 summarizes our proposal, showing the sources of all the different readings. On our analysis, the referential reading of *odin* indefinites raises the surface-scope preferences for indefinite-first sentences and makes the inverse-scope readings of universal-first sentences at least occasionally available. With regard to quantificational readings, *odin* and *dva* indefinites behave the same: surface scope is easier to process than inverse scope, and contrastive focus leads to facilitation of the inverse-scope reading of OVS sentences.

[INSERT Table 7 ABOUT HERE]

Our study was not designed to tease apart the referential and quantificational readings of *odin* indefinites, and more empirical work is required on this point (see section 4). However, as discussed above, the comparison between *odin* and *dva* indefinites provides evidence for the existence of both readings. On the one hand, the existence of the quantificational readings of indefinites, coupled with a processing-based preference for surface scope, accounts for the similarities in the behavior of *odin* and *dva* indefinites. On the other hand, the availability of a referential reading for *odin* accounts for why *odin* indefinites are overall accepted less in the distributive context than are *dva* indefinites.

The question that naturally arises is *why* the referential reading should be more readily available to *odin* than to *dva* indefinites. The answer cannot lie in the fact that phonologically reduced *odin* is often used as a marker of specificity (see section 2.4), given that we see exactly the same difference between *odin* and *dva* even when the numeral is

contrastively focused. The answer also cannot lie in unavailability of referential readings for higher numerals: if referential readings (whether derived via choice functions or by some other means) are in principle available to indefinites, they should be available to all numeral indefinites to the same extent. We hypothesize that the answer lies in pragmatics, specifically, in the reasons for choosing to use *one* vs. *two*.

The reasons for using *two* are quite straightforward: to indicate number. By saying that a doctor treated two patients, the speaker is indicating that the doctor is not treating three or four patients. However, this reasoning does not work for *one*: the singular form of the NP alone, in Russian as well as English, suffices to indicate number. Thus, when a hearer encounters *odin/one*, she looks for a reason for why it was used; one such reason that the hearer may infer is that the *odin* indefinites denote a specific individual that the speaker has in mind (i.e., a referential interpretation, whether derived on Fodor and Sag's 1982 analysis of referentiality, or on Kratzer's 1998 analysis of contextually determined choice functions, or Schwarzschild's 2002 singleton indefinite approach). No such inference is made with a *two* indefinite, because indication of number (two rather than three) is already sufficient reason for using *two*. We emphasize that the referential reading is by no means the only one available to *odin/one* indefinites, only that it is chosen more often for such indefinites than for other types of indefinites. Conversely, the referential or choice function reading is in principle available to *dva/two* indefinites (which is why they are able to scope out of islands), but the quantificational reading is accessed more readily.

We note that a tendency for *one* indefinites to take wide scope is by no means restricted to our study, or to Russian. English *one* indefinites have also been noted to take wide scope

more readily than *a* indefinites (Scontras et al. 2014; Ionin and Luchkina to appear). A similar experimental finding was made with regard to long-distance scope contexts by Ionin et al. (2011): in their study, *one* indefinites in English were accepted significantly more than *a* indefinites with widest-scope readings out of syntactic islands. A greater preference for wide scope for *one* indefinites than for *a* indefinites is fully consistent with our account: *one* indefinites, unlike *a* indefinites (which are the default indefinite form in English), need a reason for use, and one such reason is that they have a referential / choice-function / singleton interpretation.

4 Conclusion and Suggestions for Future Research

The study reported in this paper provides evidence for two main conclusions concerning Russian scope. The first conclusion is that scope in Russian is not frozen (contra Ionin 2003). Rather, there is a preference for surface scope, which is much stronger for sentences with preverbal *odin* indefinites than for those with preverbal *dva* indefinites. We have proposed that this preference for surface scope has two sources. First, there is a processing-based preference (cf. Anderson 2004), on which surface-scope readings of double-quantifier sentences are easier to process than their inverse-scope readings. This applies to sentences with both *one-every* and *two-every* scope interactions. Second, there is the possibility of interpreting indefinites as referential, which gives the appearance of surface scope in indefinite-first sentences (and the appearance of inverse scope in universal-first sentences). We have suggested that the latter explanation applies to *odin* indefinites only: while the referential reading is in principle available to all indefinite types, pragmatically,

there is more reason to adopt it in the case of *odin* indefinites than in the case of higher numeral indefinites.

The second conclusion of our study is that contrastive focus facilitates reconstruction of quantifiers for scope purposes. We have observed the same pattern of contrastive focus effects for both *odin* and *dva* indefinites: when the focused indefinite is a preverbal object, there is a significant increase in inverse-scope availability; when the focused indefinite is a preverbal subject, there is only a numerically small, non-significant increase. Our explanation is that contrastive focus drives reconstruction in both cases, but that only objects reconstruct far enough to take narrow scope relative to the other quantifier. We note that our analysis of contrastive scope facilitating reconstruction is consistent with the proposal of Neeleman and Titov (2009) that contrastively focused QPs reconstruct for scope purposes. Neeleman and Titov discuss only reconstruction of QPs that have undergone long-distance movement. Our findings suggest that contrastive focus facilitates reconstruction regardless of the type of scrambling (local vs. long-distance).

Our analysis gives rise to predictions that should be tested further. In particular, our proposal that the difference between *odin* and *dva* indefinites in Russian is due to a preference for interpreting *odin* referentially (or as a choice-function) makes an empirical prediction: *odin* indefinites should take long-distance scope out of syntactic islands (such as relative clauses) more readily than *dva* indefinites.

A number of other questions remain open for future study. It would be fruitful to extend our study to other word orders and syntactic configurations in Russian. We are at present examining scope with SOV and OSV word orders, to see if the same patterns hold as with

SVO and OSV word orders (see Bailyn 2011 on possible derivations of these word orders). Another direction for future study would be to experimentally test scope readings in double-object constructions, where, according to Antonyuk-Yudina (2015), scope is frozen (see also Titov 2017 for the effects of focus with double-object constructions).

Given that the preference for surface scope is argued to be processing-based, it would also be quite interesting to conduct a reaction-time study on Russian, to see if surface-scope readings are indeed accessed faster than inverse-scope readings, and how this is affected by word order, prosody, and type of indefinite. As discussed in section 2.1, processing studies on English scope have found faster response times when an ambiguous sentence was presented in a surface-scope context relative to an inverse-scope context. A recent paper on processing scope in German (Bott and Schlotterbeck 2015) has also found that inverse scope carries a processing cost. An interesting question to investigate for Russian is whether inverse scope incurs a processing cost only with neutral prosody or with contrastive prosody as well; if, as we have hypothesized, contrastive focus requires reconstruction (hence making processing considerations irrelevant), then we expect to find an interaction between scope configuration and prosody (i.e., reaction times should be slower when the context supports an inverse-scope reading relative to a surface-scope reading, but this effect should disappear under contrastive focus). It would also be very interesting to compare offline and online tasks on Russian scope, given that in the case of German scope, Bott and Schlotterbeck (2012) found a different pattern of performance across the two tasks (see section 2.3.3).

Finally, we note that our analysis is not fully compatible with Bobaljik and Wurmbrand (2012). As discussed in section 2.3.3, Bobaljik and Wurmbrand predict that in a free word-order language, scope should be frozen for SVO order but not for OVS order. In the case of German, the prediction of their account (as well as much prior literature on German, including Frey 1989 and Krifka 1998) is partially supported by experimental results: as discussed in section 2.3.3, Bott and Schlotterbeck (2012) found inverse scope to be unavailable to SVO sentences in an online task, but only dispreferred in an offline task, whereas inverse scope of OVS sentences was only dispreferred in both tasks. In the case of Russian, while we do find an SVO/OVS asymmetry in our data, it is manifested only in the presence of contrastive focus on the preverbal indefinite. Otherwise, we see that both surface scope and inverse scope are available, with a preference for surface scope even when the indefinite is not referential. Thus, our findings from an offline task in Russian bear a resemblance to Bott and Schlotterbeck's (2012) findings from an offline task in German: surface scope is preferred to inverse scope for both canonical and scrambled word orders, in both languages. It would be very interesting to compare Russian and German using the same methodology. This can be done both by adapting Bott and Schlotterbeck's offline and online tasks to Russian, and by using our SPVT in German.

On the methodological level, our study highlights the value of doing controlled experiments when it comes to studying interface phenomena. While simple acceptability judgments of written sentences have been found to yield highly similar results whether administered formally or informally (see, e.g., Sprouse and Almeida 2012), this is arguably not the case for phenomena that fall at the interface between syntax, discourse and prosody.

Indeed, in the case of Russian scope, prior accounts relying on introspection and informal judgments have disagreed on the judgments: Ionin (2003) argued that Russian scope is frozen, Antonyuk (2006, 2015) argued that it is not, and Bailyn (2011) tentatively suggested that it is frozen for OVS but not for SVO order.

We further note that the difference between SVO and OVS orders when it comes to the effects of contrastive focus is something never before, to the best of our knowledge, noted in the literature on Russian scope. We have reason to believe that this difference would not be revealed via introspection and informal judgments. Our data show that there is quite a bit of variability on speakers' judgments, and if a researcher only relied on introspection and on gathering informal judgments, it is not clear whether any definitive conclusion could be reached. However, with controlled testing and statistical analysis, we see that the SVO / OVS asymmetry with regard to contrastive focus has proven to be quite robust, and has held up across different versions of our test. To conclude, we see this paper as a first step in an experimental investigation of how information structure, prosody and processing preferences influence quantifier scope cross-linguistically.

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Table 1. Deriving SVO order: summary

PF	Can inverse scope be derived by reconstruction?	Can inverse scope be derived by covert QR?
variant 1: subject in [spec, TP], object in situ (5)	YES, reconstruction of subject to base position inside VP yields inverse scope	YES, by QR of object to a TP-adjoined or higher position
variant 2: subject in C-domain, object in situ (6)	NO, if reconstruction of subject is to [spec, TP], which yields surface scope (if reconstruction is to base position, this is identical to variant 1)	YES, by QR of object to a position in the C-domain above the subject

Table 2. Deriving OVS order: summary

PF	can inverse scope be derived by reconstruction?	can inverse scope be derived by covert QR?
variant 1: object in [spec, TP] (or higher), subject in situ inside the VP (7)	NO, reconstruction of object to VP-adjoined position yields surface scope	YES, by QR of subject to a TP-adjoined or higher position
variant 2: object in the C-domain, subject extraposed to TP-adjoined position (8)	YES, reconstruction of object to VP-adjoined position yields inverse scope	YES, by QR of subject to a position in the C-domain above the object

Table 3. Fixed effect estimates (top) and Variance Estimates (bottom) for Binary Logit Model of YES Responses (N=1904, log-likelihood: -761.7)

Fixed Effects	**Coefficient**	**SE**	**Wald z**	**p-value**
intercept	-1.072858	0.420329	-2.552	.010*
quantifier-first	3.489090	0.415353	8.400	<.001*
word order	0.449918	0.341650	1.317	.188
prosody	0.584067	0.521038	1.121	.262
numeral	2.877406	0.544856	5.281	<.001*
list	-0.248709	0.345420	-0.720	.472
quantifier-first * word order	-1.618734	0.518688	-3.121	.002*
quantifier-first * prosody	-1.730126	0.518974	-3.334	<.001*
word order * prosody	1.255879	0.465992	2.695	.007*
quantifier-first * numeral	-1.048650	0.676264	-1.551	.121
word order * numeral	-0.465780	0.478560	-0.973	.330
prosody * numeral	0.752665	0.810658	0.928	.353
quantifier-first * word order * prosody	-0.783863	0.683728	-1.146	.252
quantifier-first * word order * numeral	1.086728	0.866691	1.254	.210
quantifier-first * prosody * numeral	0.851457	1.030888	0.826	.409
word order * prosody * numeral	-0.001265	0.865518	-0.001	.999
quantifier-first * word order * prosody * numeral	-1.472314	1.371815	-1.073	.283
Random Effects	**Variance**	**SD**		
subject	2.43040	1.5590		
item	0.05504	0.2346		

*significant p-value (<.05)

Table 4. Results of pairwise comparisons for *one*, averaged over the levels of *list*

	pairwise comparison	coefficient	SE	Wald z	p-value
1	SVO, indefinite-first (14a), with neutral vs. contrastive prosody	-0.584	0.521	-1.121	.999
2	OVS, indefinite-first (14b), with neutral vs. contrastive prosody	-1.840	0.522	-3.523	.036*
3	SVO, universal-first (14c), with neutral vs. contrastive prosody	1.146	0.556	2.060	.791
4	OVS, universal-first (14d), with neutral vs. contrastive prosody	0.674	0.520	1.296	.996
5	indefinite-first: SVO vs. OVS, (14a) vs. (14b), neutral	-0.450	0.342	-1.317	.995
6	indefinite-first: SVO vs. OVS, (14a) vs. (14b), contrastive	-1.706	0.359	-4.756	<.001*
7	universal-first: SVO vs. OVS, (14c) vs. (14d), neutral	1.169	0.389	3.005	.166
8	universal-first: SVO vs. OVS, (14c) vs. (14d), contrastive	0.697	0.350	1.994	.829
9	SVO: indefinite vs. universal first, (14a) vs. (14c), neutral	-3.489	0.415	-8.400	<.001*
10	SVO: indefinite vs. universal first, (14a) vs. (14c), contrastive	-1.759	0.360	-4.880	<.001*
11	OVS: indefinite vs. universal first, (14b) vs. (14d), neutral	-1.870	0.352	-5.316	<.001*
12	OVS: indefinite vs. universal first, (14b) vs. (14d), contrastive	0.644	0.348	1.849	.898

*significant p-value (<.05)

Table 5. Results of pairwise comparisons for *two* averaged over the levels of *list*

	pairwise comparison	coefficient	SE	Wald z	p-value
1	SVO, indefinite-first (15a), with neutral vs. contrastive prosody	-1.337	0.622	-2.149	.733
2	OVS, indefinite-first (15b), with neutral vs. contrastive prosody	-2.59	0.751	-3.452	.046*
3	SVO, universal-first (15c), with neutral vs. contrastive prosody	-0.458	0.912	-0.502	1.000
4	OVS, universal-first (15d), with neutral vs. contrastive prosody	0.543	0.702	0.775	1.000
5	indefinite-first: SVO vs. OVS, (15a) vs. (15b), neutral	0.016	0.374	0.042	1.000
6	indefinite-first: SVO vs. OVS, (15a) vs. (15b), contrastive	-1.239	0.649	-1.909	.872
7	universal-first: SVO vs. OVS, (15c) vs. (15d), neutral	0.548	0.631	0.868	1.000
8	universal-first: SVO vs. OVS, (15c) vs. (15d), contrastive	1.549	0.712	2.175	0.715
9	SVO: indefinite vs. universal first, (15a) vs. (15c), neutral	-2.440	0.564	-4.329	.002*
10	SVO: indefinite vs. universal first, (15a) vs. (15c), contrastive	-1.562	0.712	-2.195	0.701
11	OVS: indefinite vs. universal first, (15b) vs. (15d), neutral	-1.908	0.490	-3.892	.010*
12	OVS: indefinite vs. universal first, (15b) vs. (15d), contrastive	1.226	0.650	1.888	.882

*significant p-value (<.05)

Table 6. Results of pairwise comparisons for *one* vs. *two*, averaged over the levels of *list*

	pairwise comparison	coefficient	SE	Wald z	p-value
1	SVO, indefinite-first, neutral prosody *one* vs. *two* ((14a) vs. (15a))	-2.877	0.545	-5.281	<.001*
2	OVS, indefinite-first, neutral prosody: *one* vs. *two* ((14b) vs. (15b))	-2.412	0.538	-4.485	<.001*
3	SVO, universal-first, neutral prosody: *one* vs. *two* ((14c) vs. (15c))	-1.829	0.712	-2.567	0.422
4	OVS, universal-first, neutral prosody: *one* vs. *two* ((14d) vs. (15d))	-2.450	0.632	-3.874	0.010*
5	SVO, indefinite-first, contrastive prosody: *one* vs. *two* ((14a) vs. (15a))	-3.630	0.617	-5.879	<.001*
6	OVS, indefinite-first, contrastive prosody: *one* vs. *two* ((14b) vs. (15b))	-3.163	0.746	-4.241	.002*
7	SVO, universal-first, contrastive prosody: *one* vs. *two* ((14c) vs. (15c))	-3.433	0.803	-4.277	.002*
8	OVS, universal-first, contrastive prosody: *one* vs. *two* ((14d) vs. (15d))	-2.580	0.614	-4.205	.003*

*significant p-value (<.05)

Table 7. Summary of available readings and their derivations

sentence type	scope reading	*odin* 'one' indefinite	*dva* 'two' indefinite
indefinite-first SVO	surface scope (NO response)[a]	results from referential reading of *odin* AND from quantificational reading of *odin*	results from quantificational reading of *dva*
indefinite-first SVO	**inverse scope (YES response)**	**results from quantificational reading of *odin* + covert QR of object (costly)**	**results from quantificational reading of *dva* + covert QR of object (costly)**
indefinite-first OVS	surface scope (NO response)	results from referential reading of *odin* AND from quantificational reading of *odin*	results from quantificational reading of *dva*
indefinite-first OVS	**inverse scope (YES response)**	**results from quantificational reading of *odin* + covert QR of subject (costly)**	**results from quantificational reading of *dva* + covert QR of subject (costly)**
		under contrastive prosody, results from quantificational reading of *odin* + reconstruction of focused object	**under contrastive prosody, results from quantificational reading of *dva* + reconstruction of focused object**
universal-first SVO	surface scope (YES response)	results from quantificational reading of *odin*	results from quantificational reading of *dva*
universal-first SVO	**inverse scope (NO response)**	**results from referential reading of *odin***	**not attested**
universal-first OVS	surface scope (YES response)	results from quantificational reading of *odin*	results from quantificational reading of *dva*
universal-first OVS	**inverse scope (NO response)**	**results from referential reading of *odin***	**not attested**

[a] The YES and NO responses correspond to the truth-value of the sentence in the context of the test picture (Figure 1 for *one*, Figures 2 and 3 for *two*).

Figure 1. Sample distributive picture for the sentences in (14a-d)

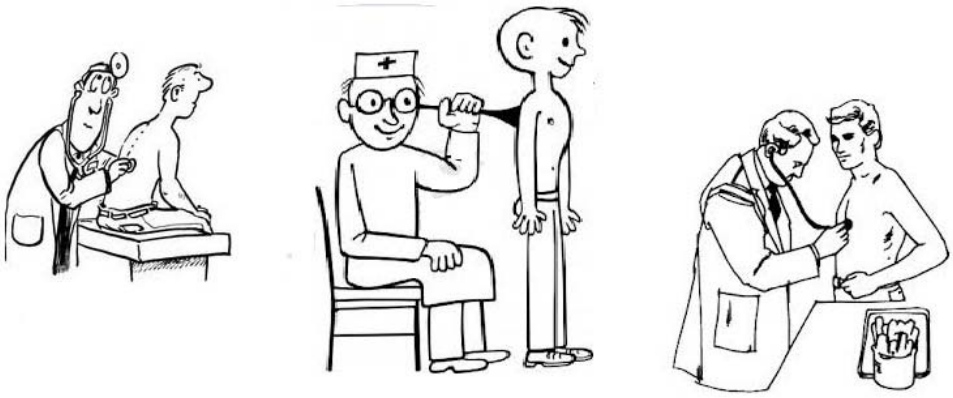


Figure 2. Sample distributive picture for the sentences in (15a,d)

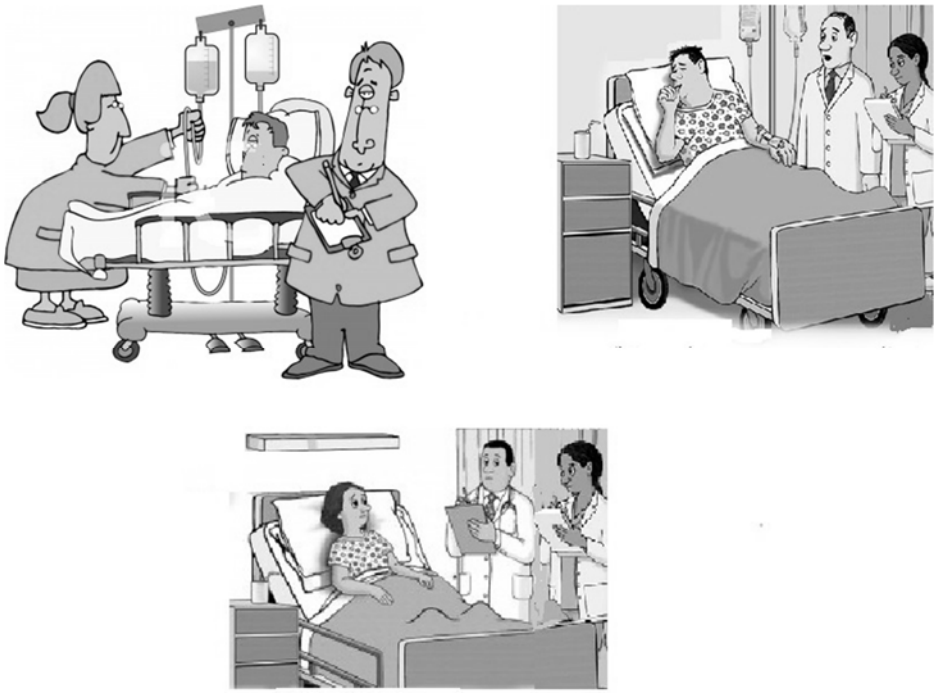


Figure 3. Sample distributive picture for the sentences in (15b,c)

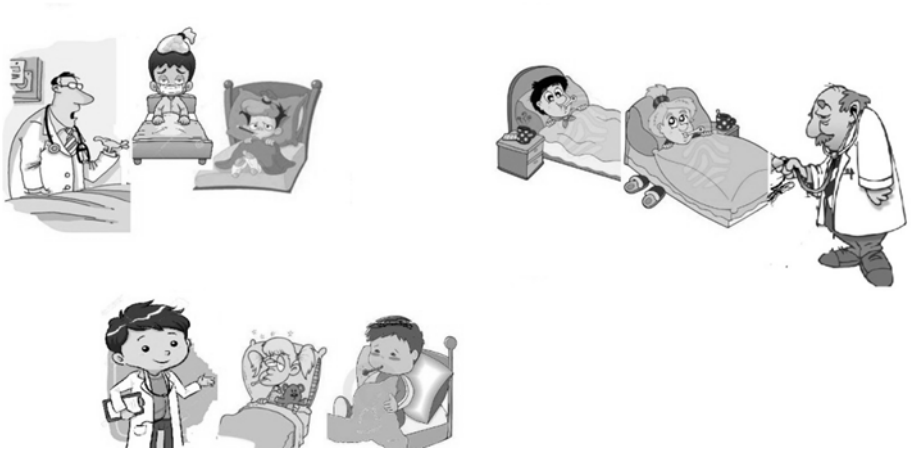
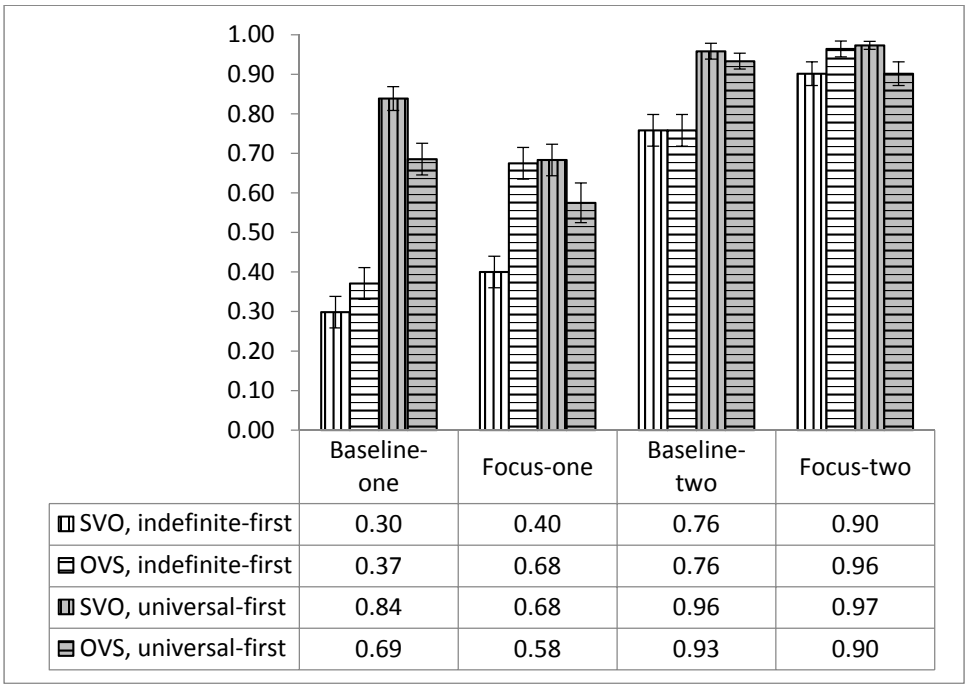


Figure 4. Results with test pictures, % YES responses (error bars indicate +/-1 standard error)



	Baseline-one	Focus-one	Baseline-two	Focus-two
SVO, indefinite-first	0.30	0.40	0.76	0.90
OVS, indefinite-first	0.37	0.68	0.76	0.96
SVO, universal-first	0.84	0.68	0.96	0.97
OVS, universal-first	0.69	0.58	0.93	0.90

NOTES

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[1] Russian has no articles, so we use the word *odin* 'one' to indicate indefiniteness. A bare NP such as *doktor* 'doctor' is ambiguous between definite and indefinite interpretations, and therefore cannot be used to examine indefinite scope.

[2] We are abstracting away from the question of whether there is a vP projection above the VP, and whether the verb moves through little *v* prior to raising to T, as these issues do not affect the scope interpretation of the sentence. We similarly abstract away from whether the underlying position of the subject is inside the VP or inside the vP.

[3] We discuss only movement accounts of scrambling here, and do not consider accounts of scrambling as base-generation, such as Bošković and Takahashi (1998). On the account of Bošković and Takahashi, the scrambled DP undergoes post-syntactic lowering at LF to its thematic position. There are many arguments against the base-generation approach (see, e.g., Bailyn 2001, 2011; Boeckx 2003). The most relevant argument for our purposes has to do with scope: as discussed in Bailyn (2011 :307), the base-generation account predicts that scrambled sentences will not have *object>subject* scope readings, since the scrambled object DP is interpreted in its thematic position, i.e., in the scope of the subject. Given that

this is manifestly a wrong prediction for Russian – all accounts of Russian scope agree that surface, *object>subject* scope is the most readily available reading for scrambled OVS sentences – we do not consider the base-generation account any further.

[4] An alternative approach would be to posit a direct link between contrastive focus and reconstruction that follows from the semantics of contrastive focus. This approach is pursued by Büring (1997a) to explain the relationship between scope and focus in sentences such as */ALL politicians are NOT\ corrupt* in German, which are analyzed as topic/focus structures (see also Jacobs 1984, Löbner 1990, Krifka 1998, among many others). Büring's analysis is specifically about the contrastive topic-focus configuration; when only the preverbal QP is in focus (the German equivalent of *ALL politicians are not corrupt*), according to Büring the surface-scope reading is freely available, even preferred. Büring's analysis would hence not predict the unavailability of the surface-scope reading for the sentence type we are considering in this paper. Developing a link between reconstruction and the semantics of contrastive focus is beyond the scope of this paper.

[5] Bobaljik and Wurmbrand furthermore propose an account of why canonical word order sentences in German become ambiguous under the rise-fall intonational contour, which corresponds to the topic/focus configuration (Büring 1997a,b, Krifka 1998, among many others); once again, the surface-scope vs. inverse-scope readings derive because SCoT can match either the LF or the IS. In one of our follow-up studies (not reported here), we tested whether Bobaljik and Wurmbrand's proposal makes the right predictions for Russian; we used the same materials as described in section 3 below, but with a rise-fall intonation contour on the two quantifiers. This study yielded a null result: introducing a rise-fall

contour made no difference to scope interpretation relative to the version of the study with neutral prosody. We are not certain at present whether this null result is due to (i) the fact that the rise-fall contour does not mark the topic/focus configuration in Russian; or (ii) the fact that Bobaljik and Wurmbrand's account does not apply to Russian (perhaps because in Russian, the LF must always correspond to the IS).

[6] It is not, of course, impossible to suppose that contrastive focus could lead to covert QR of the *focused* NP. This would mean that focusing the postverbal indefinite in (3c-d) should lead to covert QR of the indefinite and hence to inverse scope for the sentence. As discussed below, our data show that this does not happen.

[7] We conducted several additional studies with the goal of generalizing our findings beyond *odin*: a study in which we tested scope with *po krajnej mere odin* 'at least one', which is less likely to have a specific interpretation than the plain *odin* 'one'; and another study in which we examined the effect of contrastive focus on the universal quantifier *každyj* 'every'. The results of these findings are reported in Ionin and Luchkina (2017), and largely provide convergent data with the studies reported here.

[8] The results of the Baseline-one and Focus-one versions are also reported in Ionin and Luchkina (2015, 2017), where they are compared to other versions with different manipulations. The results of the Baseline-two and Focus-two versions have not previously been reported anywhere else.

[9] Due to space limitations, we do not provide a prosodic analysis of our test items. Upon visual examination of the prosodic contours of the test items, and statistical tests assessing the differences in the acoustic-prosodic features of the stimuli used in different SPVT

versions, we conclude that the contours produced with neutral vs. contrastive prosody were distinct. For additional analyses of acoustic-prosodic features of the stimuli used in this study, see Luchkina and Ionin (2015).

We opted to place contrastive stress on the quantifier alone rather than on the entire QP (or just the lexical NP) for reasons of felicity. For example, in the context of Figure 3, it is quite felicitous to talk about ONE doctor treating every patient (and not two), given that there are three doctors total in the picture (i.e., two doctors treating every patient is a possible alternative). On the other hand, talking about ONE DOCTOR (or one DOCTOR) treating every patient generates the implicature that somebody else (e.g., a nurse) did not treat every patient. Given that there are no nurses (or any other people besides doctors and patients) in the picture, focusing the lexical NP seems rather infelicitous. We note that the literature on prosodic effects on scope differs in whether stress is placed on the entire QP (e.g., Neeleman and Titov 2009) or just the quantifier (e.g., Krifka 1998).

[10] In six of the eight token sets, the object was in the accusative case, as in (14); in the remaining two, the object was in the dative case (the verbs were *čitat'* 'read' (to someone) and *pomogat'* 'help' (someone), which take dative objects). The subject and object NPs were always animate, which restricted the choice of possible verbs. The decision to use only animate NPs was motivated by the need to make scope readings fully felicitous.

[11] In (14d), if the postverbal indefinite subject is right-dislocated and TP-adjoined (variant 2 in Table 2), contrastive focus should cause this subject to reconstruct to [spec, TP] or to its base position. However, on the hypothesis that the object QP in (14d) is in a position above the TP, reconstruction of the subject will not change the scope configuration.