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How prosody signals force and focus—A study of pitch accents in Russian yes–no questions

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Abstract

Prosody signals sentential mood/force and information-structural distinctions in many languages. A case in point, discussed in the present paper, is Russian main clause yes–no questions, which differ from declarative clauses primarily by their intonational pattern. We address the question of how force (yes–no question versus declarative) and focus (highlighting, contrast) are signalled by intonational means in Russian. Based on authentic data, a production (reading) study of sentences in various contexts, and a perception experiment, it is shown how pitch height, accent shape, and peak alignment conspire in marking the relevant distinctions, where ambiguities arise, and what pragmatic distinctions cannot be disambiguated by prosody.

Keywords: Russian; Question; Intonation; Prosody; Focus; Yes–no interrogative

1. Introduction

In many languages, yes–no questions (henceforth: YNQs) and declarative clauses do not differ in their superficial morphosyntax, but only in their prosodic realization. This well-known phenomenon at the interfaces of the pragmatic, syntactic, and prosodic sub-systems of linguistic knowledge has been a topic of much research (for discussion, see Ladd, 1996; Gussenhoven, 2002, among many others). Russian is a particularly interesting language in this respect, because it marks both force and information-structural distinctions in YNQs by means of prosody, leading to the question of how these two functions may be signalled simultaneously. In this article, we argue on the basis of a reading study, a perception experiment, and authentic data from radio broadcasts, that the information-structural function of intonation in Russian YNQs is actually considerably impoverished.

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Russian shows two fundamental ways of marking a YNQ: first, the particle *li* unambiguously signals a yes–no interrogative, as illustrated in (1). *Li* is obligatory in *embedded* yes–no interrogatives.

(1) *Kupila li Maša knigu?*
bought *li* M.$_{NOM}$ book$_{ACC}$

(2) *Maša kupila knigu*
M.$_{NOM}$ bought book$_{ACC}$

Second, depending on the prosodic realization, a string as in (2) may be understood either as a YNQ or as a declarative. Some researchers have even claimed that intonation leads to full disambiguation of force; Siemund (2001) characterizes intonation as a function which takes a declarative sentence and yields an interrogative sentence in Russian. At the same time, it has been known from traditional descriptions (e.g., Bryzgunova, 1977) that intonation also marks information-structural distinctions in Russian.

This paper will only deal with YNQs of the type illustrated in (2); see e.g. Restan (1972) and King (1994) for an analysis of *li*-questions as in (1). We depart from an important observation discussed in Ladd (1996): Russian YNQs display a pattern of prominence which differs systematically from their declarative counterparts. In an ''out of the blue'' YNQ with no special context requirements, the finite verb (be it main verb or auxiliary) is the locus of the pitch accent, as indicated in (3a). This pattern, which may sound rough or impolite to English or German ears, is both common and extremely robust in Russian. It does not seem to convey an imposition on the hearer (in the sense of Yokoyama, 1986) or an implication that deaccented elements count as given in the discourse. On the other hand, in an ''out of the blue'' declarative without any special context requirements, it is regularly the most deeply embedded, sentence-final internal argument which is the main locus of prominence (3b). In a YNQ, a pitch accent at the same position would be understood as signalling a special, narrow highlighting of the object (3c).

(3) a. *Maša KUPILA knigu?*
M.$_{NOM}$ bought book$_{ACC}$

b. *Maša kupila KNIGU.*
M.$_{NOM}$ bought book$_{ACC}$

c. *Maša kupila KNIGU?*
M.$_{NOM}$ bought book$_{ACC}$

These facts have a number of interesting consequences: first, a direct comparison of an ''unmarked'' question tune with an ''unmarked'' declarative tune (as, e.g., in Makarova, 2001) seems a bit artificial, since the two pitch accents do not generally occur at the same locus in natural sentences (but see section 5 for an exception). Second, the pitch accent used in YNQs obviously marks both force and focus in an intertwined manner. Third, Russian does not fit the pattern of the so-called East European Question Tune (Grice et al., 2000), which has a HL phrase accent after the L*-marked focused element (see also Ladd, 1996:173). Fourth, one might think that there can be no counterpart of the English ''mixed'' sentence type of rising declaratives (Gunlogson, 2001) in Russian, since question intonation would mark such sentences as (*li*-less) YNQs unambiguously. However, Russian has further, structural indicators of syntactic sentence type (e.g., modal particles and negative polarity items), which can be used to distinguish between declarative sentences *used* as

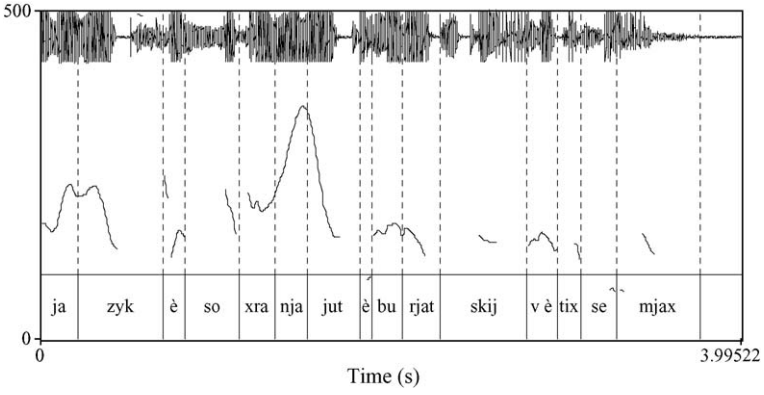
questions pragmatically on the one hand, and proper interrogative sentences on the other. Interestingly, the *locus* of the pitch accent in Russian YNQs follows the pattern described by Ladd (1996) only in the proper interrogative sentences, although the specific *shape* of the pitch accent also occurs in declarative clauses used as questions (see Meyer, 2004 for details).

Several background assumptions of our analysis need to be mentioned in advance. We distinguish two basic types of focus, namely, neutral (=new-information) and contrastive focus. Neutral focus extends the current context by a proposition, contrastive focus furthermore excludes contextually given or accommodated alternatives. Both types of focus can be minimal (i.e., highlighting a minimal constituent) or wide (i.e., encompassing a larger domain); however, we will almost exclusively deal with three types of focus here—minimal contrastive, minimal neutral, and wide neutral focus. Regarding Russian *declarative* clauses, it has been shown that the accent marking on contrastively focused elements differs from a minimal neutral accent in shape, syllable duration, and prosodic phrasing, respectively (Mehlhorn, 2002; Zybatow and Mehlhorn, 2000; Alter et al., 2001; see also section 3 for some qualification). Our null hypothesis is therefore that different types of focus should give rise to different prosodic realizations also in the case of YNQs.

The paper is organized as follows: section 2 demonstrates some of the basic YNQ prosodic patterns in Russian on the basis of authentic examples from radio interviews. Section 3 discusses detailed prosodic measurements based on a reading study in which Russian clauses were embedded into various contexts disambiguating their force and focus marking. Section 4 contains the results of a perception (categorization) experiment. In section 5, we propose an account of the empirical results and present a number of problematic related cases. Section 6 concludes.

2. Authentic evidence

In this section, we will illustrate the basic prosodic patterns of Russian YNQs by means of some authentic examples from conversational, spontaneous radio interviews broadcasted by the Russian station *Radio Mayak* over the internet. In example (4), the verb carries the default pitch accent for ''out of blue'' YNQs with neutral focus. Note that the topicalized object *jazyk* is marked by a topic accent. This topic accent is provided for illustration only; we will remain silent about the topic-comment dimension of information structure in the remainder. The postnuclear part is almost completely deaccented (F0 contour 1).

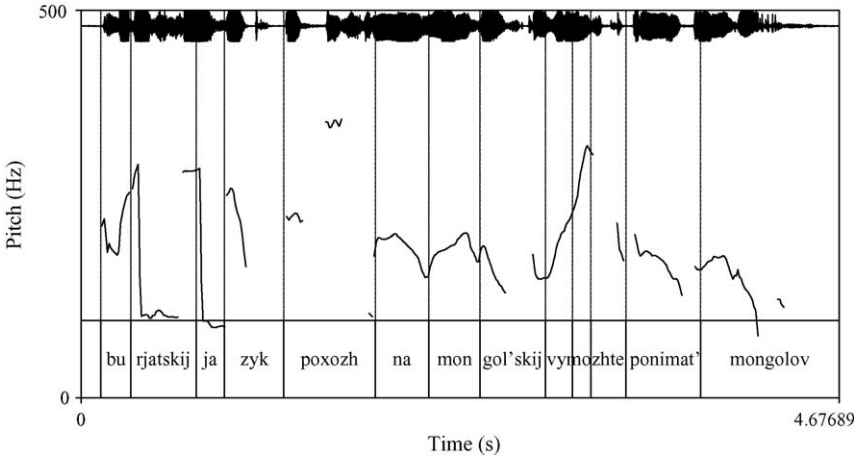


F0 contour 1. ''Out of the blue'' pitch accent on *soxranjajut*, topic accent on *jazyk*.

(4) [*Skažite, vot kogda mežnacional'nye braki proisxodjat*,]
say$_{IMP}$ there when international weddings happen
jazyk SOXRANJAJUT burjatskij v ètix sem'jax?
language cherish Buryat in those families
'[Tell me: When international marriages occur,] do they cherish the buryat language in those families?'

An almost indistinguishable pattern applies when the finite verb is the only (neutral) focus in the sentence and the rest is contextually given or may be easily acommodated, as illustrated in (5). This example contains a postnuclear secondary accent on the object *mongolov*, which is highlighted, although being contextually given (see Wenk, 1992 for some remarks on this phenomenon). We will concentrate on the primary nuclear accent here, noting the existence of secondary accents as in (5) only in passing (F0 contour 2).

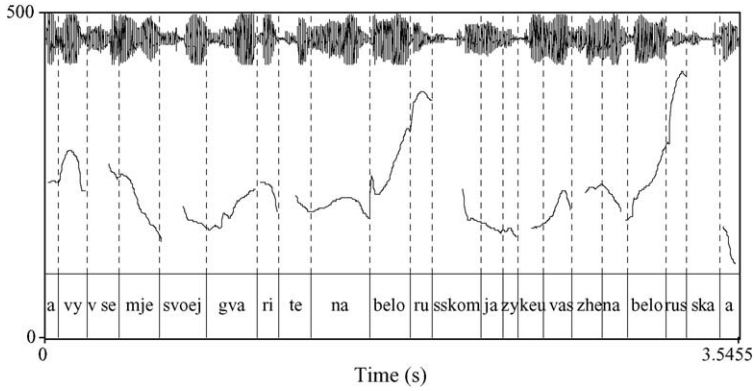
(5) [*Burjatskij jazyk poxož na mogolskij*] *vy MOŽETE ponimat' mongolov?*
Buryat language similar to Mongolian you can understand Mongoles
'[Is the Buryat language similar to Mongolian,] can you understand Mongoles?'



F0 contour 2. Maximal prominence on minimally focused verb.

As a final example, consider (6), which contains a contrastively focused object, marked by a very high F0 maximum (F0 contour 3).

(6) [Context: Many Byelorussians in Moscow live in mixed families and speak Russian among themselves.]
A vy v sem'je svoej govorite NA BELORUSSKOM JAZYKE, u vas
and you in family yours talk on Byelorussian language at you
žena BELORUSSKAJA?
wife Byelorussian
'And do you in your family speak Byelorussian, is your wife Byelorussian?'



F0 contour 3. Maximal prominence on (contrastively focused) argument.

Although the three examples adduced here clearly differ in contextual properties (''out of the blue'', minimal focus on the verb, contrast on the object), the shapes of the nuclear pitch accents are very similar. They all involve a steep, very high rise in fundamental frequency, followed by an immediate fall. The rise lasts throughout the accented syllable, and the fall begins immediately before the syllable boundary or occurs in the post-nuclear syllable. Further, secondary accents can involve topic marking (as in (4)) and postnuclear material (5). There are clear contrasts between these prosodic patterns and the ones used in declaratives. In declaratives, both maximal and minimal focus would involve a falling pitch accent. Contrastive focus, according to Mehlhorn (2002) and Zybatow and Mehlhorn (2000), would be signalled by a high peak aligned with the centre of the stressed syllable. We will consider these differences more systematically in section 3.

3. A production (reading) study

3.1. Background

In order to disentangle potential force-marking and focus-marking portions of Russian YNQ prosody, it is essential to contrast the right conditions (see also section 1): for differences in force marking, minimally and contrastively focused variants of declaratives and YNQs with the same locus of prominence should be compared. For contrasts in focus marking, (i) ''out of the blue'' YNQs versus YNQs with a minimally or contrastively focused finite verb, and (ii) YNQs with minimally versus contrastively focused arguments, are most relevant. Our leading hypothesis – probably too strong, but useful as a heuristic strategy – is that both focus and force are marked prosodically in a compositional way.

3.2. Reading study

3.2.1. Materials and design

In a reading study, participants were presented with simple subject-verb-object target sentences in various contexts which should disambiguate their focus-background-structure and sentential mood/force. The target sentences were matched carefully for the number of syllables and the loci of lexical stress. Due to the need for a controlled task, the examples used are admittedly somewhat artificial. Every subject, verb and object had three syllables, with word

stress being fixed to the second syllable. These sentences were embedded into 10 types of contexts; we distinguished two force conditions (declarative and YNQ) and five contextual conditions: (minimal) contrastive focus on the verb and on the object, respectively; minimal (neutral) focus on the verb and on the object, respectively; and wide (neutral) focus. The five YNQ conditions are illustrated in (7)–(11):

(7) [A: *Vy včera byli na koncerte?*] *Irina igrala mazurki?*
you yesterday were at concert $I._{NOM}$ played mazurkas
'[A: Have you been to the concert yesterday?] Did Irina play mazurkas?' (wide focus)

(8) [A: *Kak vam ob"jasnila Irina v tanceval'nom kružke mazurki?*]
how you_{DAT} explained Irina in dancing group mazurkas
Irina igrala mazurki?
$I._{NOM}$ played mazurkas
'[A: How did Irina explain mazurkas to you in the dancing group?]
Did she play mazurkas?' (minimal focus on V)

(9) [A: *Ja slyšal, čto Irina vo svoëm vystuplenii propustila mazurki.*
I heard that $I._{NOM}$ in her performance left-out mazurkas
B: *Net.* A: *Čto?*] *Irina igrala mazurki?*
no what $I._{NOM}$ played mazurkas
'[A: I heard that Irina in her performance left out (the) mazurkas.
B: No, she didn't. A: What?] Irina played (the) mazurkas?' (contrast on V)

(10) [A: *Čto Irina igrala?*] *Irina igrala mazurki?*
$what_{ACC}$ $I._{NOM}$ played $I._{NOM}$ played mazurkas
'[A: What did Irina play?] Did Irina play mazurkas?' (minimal focus on O)

(11) [A: *Kakie proizvedenija Šopena Irina ispolnila? Polonezy?*
which works $Chopin_{GEN}$ $I._{NOM}$ performed Polonaises
B: *Net.* A: *Čto?*] *Irina igrala mazurki?*
no what $I._{NOM}$ played mazurkas
'[A: What works by Chopin did Irina perform? Polonaises?
B: No. A: What?] Irina performed mazurkas?' (contrast on O)

Eight different target items for each of the five conditions were presented together with a set of unrelated fillers in four different pseudo-randomized orders. (12)–(16) show examples of the respective declarative conditions. Again, the materials contained eight different target items for each condition, presented in pseudo-random order along with filler items:

(12) [*Na koncerte:*] *Irina igrala mazurki.*
at concert $I._{NOM}$ played mazurkas
'[At the concert:] Irina played mazurkas.' (wide focus)

(13) [A: *Kak vam ob"jasnila Irina v tanceval'nom kružke mazurki?*]
how you_{DAT} explained $I._{NOM}$ in dancing group mazurkas
B: *Irina igrala mazurki.*
$I._{NOM}$ played mazurkas
'[A: How did Irina explain mazurkas to you in the dancing group?]
B: Irina played mazurkas.' (minimal focus on V)

(14) [A: *Ja slyšal, čto Irina vo svoëm vystuplenii propustila mazurki*.]
I heard that I.$_{NOM}$ in her performance left-out mazurkas
B: *Kak, "propustila"? Irina igrala mazurki*.
how left out I.$_{NOM}$ played mazurkas
'[A: I heard that Irina in her performance left out (the) mazurkas.]
B: What do you mean? Irina played (the) mazurkas.' (contrast on V)

(15) [A: *Čto Irina igrala?*] B: *Irina igrala mazurki*.
what I.$_{NOM}$ played I.$_{NOM}$ played mazurkas
'[A: What did Irina play?] B: Irina played mazurkas.' (minimal focus on O)

(16) [A: *Čto Irina igrala? Tango?*
what I.$_{NOM}$ played tango
B: *Net.*] *Irina igrala mazurki.*
no I.$_{NOM}$ played mazurkas
'[A: What did Irina play? Tango?] B: No. Irina played mazurkas.' (contrast on O)

Table 1 summarizes the 10 conditions.

Table 1
Experimental conditions (reading study)

Force	Focus				
	Wide neutral focus	Contrastive focus on V	Minimal neutral focus on V	Contrastive focus on O	Minimal neutral focus on O
Yes–no-interrogative	maxinter	conVinter	minVinter	conOinter	minOinter
Declarative	maxdecl	conVdecl	minVdecl	conOdecl	minOdecl

3.2.2. Procedure

All the dialogues (target items embedded in their contexts) were read aloud by four female Russian speakers, recorded on DAT-tape, and digitized with 16 bit accuracy at a 44.1 kHz sampling rate. The target sentences were extracted from their contexts, marked up for syllable boundaries, and analyzed semi-automatically, using *Praat* by Paul Boersma and David Weenink. We measured the fundamental frequency and absolute time at each quarter syllable (i.e., at 37 points per sentence). Additionally, we noted the F0 maxima and minima for every syllable. Altogether, 320 experimental items (10×8 per subject) were analyzed.

3.2.3. Results

Since an appropriate methodology for the statistic evaluation of F0 and timing data is far from uncontroversial, we applied a relatively conservative and coarse approach and tested only for categorial differences using a non-parametric test (Wilcoxon). The results thus express a mere *ranking* between values, but not the size of a given contrast. In order to ensure comparability, we used carefully matched materials and, importantly, a *relative* time scale with quarter syllables as the unit of measurement. Across all the target sentences, the four speakers had an almost equal

baseline frequency. Although absolute F0 maxima differed (351–434 Hz), their averages were very similar across speakers (mean: 223–234 Hz; median: 206–222 Hz), so that a direct comparison of the production data seems to be justified. As a first step, idealized, average F0 curves over the relative time scale for each condition were constructed. Then, three parameters were evaluated: accent shape, maximal F0 height of the pitch accent, and timing of the accent peak (i.e., its alignment with syllable boundaries). Many, but not all of the apparently clear differences in average pitch contours turned out to be statistically significant. There are a number of relevant comparisons to be made within the set of conditions: to pin down contrasts related to force, the conditions *conVinter* versus *conVdecl*, *minVinter* versus *minVdecl*, *conOinter* versus *conOdecl*, and *minOinter* versus *minOdecl* should be taken into account (see Table 1 for abbreviations). In order to test for focus-related differences, *maxinter* versus *minVinter* versus *conVinter* and *maxdecl* versus *minOdecl* versus *conOdecl* are to be contrasted. The effects established through these comparisons should also be consistent with differences found when both focus and force vary, i.e., between *minVdecl* versus *conVinter*, *conVdecl* versus *maxinter*, etc., although the latter differ by more than one independent variable and cannot be compared directly.

3.2.3.1. F0 maximum of the pitch accent. The pitch accent in YNQs reaches a higher F0 maximum than in declaratives with equal focus. This holds for both the conditions with a minimal or contrastive focus on the verb and for those with a minimal or contrastive focus on the object. Diagram 1 displays the relevant comparisons between YNQ conditions with highest prominence on the verb (*minVinter*, *conVinter*) and the corresponding declaratives with minimal and contrastive focus on the verb (*minVdecl*, *conVdecl*). The difference between the conditions *minVinter* and *minVdecl* was highly significant ($W = 3$; $N = 27$; $p = .000$). Unfortunately, a number of realizations of YNQs with contrastive focus on the verb had to be excluded from evaluation, because (i) they contained a strongly rising tone towards the end of the utterance – an alternative prosodic pattern for reactive YNQs in Russian (IK-4 in Bryzgunova's, 1977 terminology) –, or (ii) main prominence was unexpectedly assigned to the object. With this proviso, the contrast in the F0 maximum between the conditions *conVinter* and *conVdecl* was also significant ($W = 3$; $N = 14$; $p = .002$).

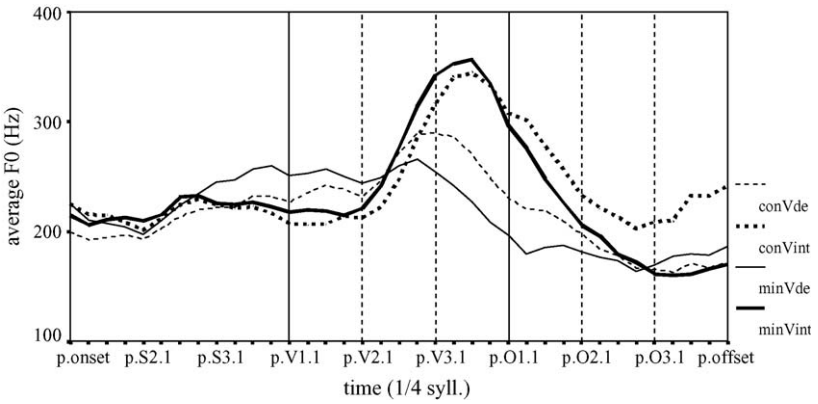


Diagram 1. YNQ vs. declarative—contrastive/minimal focus on V.

Diagram 2 shows that both YNQ conditions with highest prominence on the object (*minOinter*, *conOinter*) are higher in F0 maximum than the corresponding declaratives with minimal or contrastive foci on the object (*minOdecl*, *conOdecl*). Again, the differences for the relevant comparisons are significant (*minOinter* versus *minOdecl*: $W = 2$; $N = 16$; $p < .001$; *conOinter* versus *conOdecl*: $W = 7$; $N = 30$; $p = .000$).

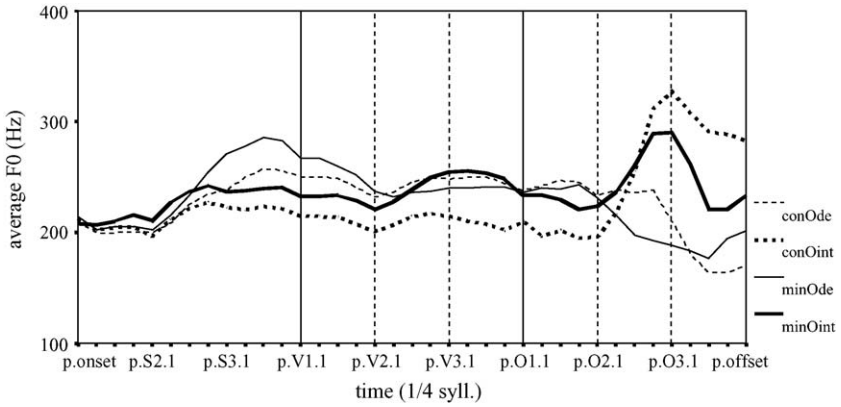


Diagram 2. YNQ vs. declarative—contrastive/minimal focus on O.

Obviously, there is a close connection between pitch accent height and force marking as YNQ versus declarative.

At the same time, differences in pitch height also point to distinctions in focus type. Contrastive focus involves higher F0 maxima than neutral minimal or wide focus (cf. Mehlhorn, 2002, for declaratives). This claim is statistically supported by the study reported here, but only for *declarative* sentences. The relevant cases for foci on the verb are illustrated in Diagram 1. Within the declaratives, the difference in F0 height between the conditions *conVdecl* and *minVdecl* is significant ($W = 83$; $N = 27$; $p < .012$), whereas the accent *shapes* look very similar, and could be most aptly described as H* + L.[1] Conditions with focus on the object show the same behaviour with respect to F0 height (see Diagram 3; *conOdecl* versus *minOdecl*: $W = 93$; $N = 28$; $p = .012$; *conOdecl* versus *maxdecl*: $W = 13$; $N = 18$; $p = .002$). However, we find a clear distinction in accent shapes: non-contrastive (minimal or maximal) foci contain a H + L* nuclear accent, whereas the contrastive focus condition has a H* + L accent. Thus, contrastive focus correlates with especially high F0 (in the case of pitch accents on the verb) and/or with a specific accent shape (in the case of pitch accents on the object).

[1] The label H* + L is intended to describe a genuinely falling accent (cf. Ladd, 1996:92) here, rather than an H* which triggers downstep, as in Pierrehumbert (1980).

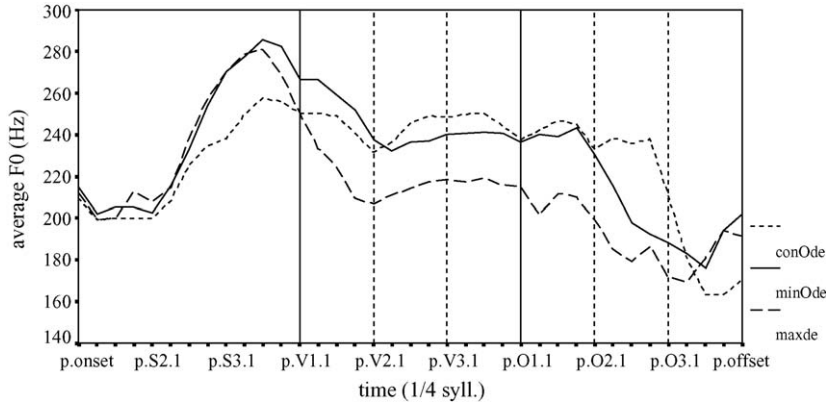


Diagram 3. Declaratives—max. focus; contrastive/minimal focus on O.

Turning to *YNQs*, the average, idealized contours in Diagrams 1 and 2 suggest that the overall pitch maximum in YNQs with contrastive or minimal focus on the verb was also higher than in ''neutral'', ''out of the blue'' contexts. Maybe surprisingly, the pitch accent in the minimal focus condition even appears slightly higher than in the contrastive condition (cf. Diagram 4).

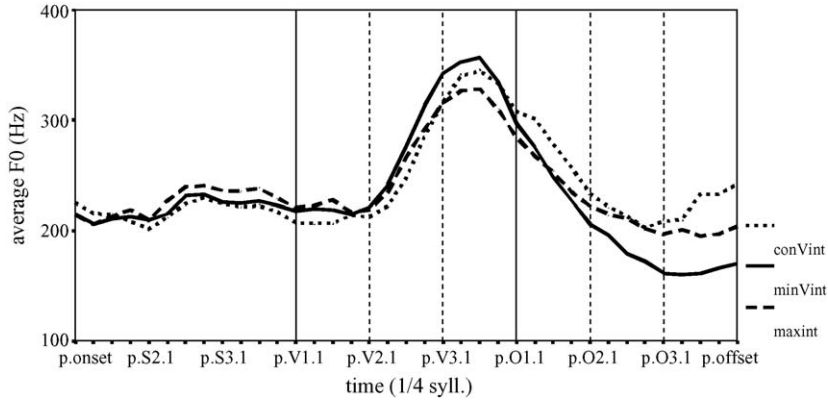


Diagram 4. YNQs—max. focus; contrastive/minimal focus on V.

According to statistic evaluation, however, the average F0-diagrams deceive the eye in this case. There was no detectable difference in pitch maximum between the conditions *conVinter* versus *minVinter* ($p = .414$) or *conVinter* versus *maxint* ($p = .795$) at all. As for the YNQ conditions with highest prominence on the object, it seems once more that contrastive focus was marked by especially high pitch (cf. Diagram 2). As before, this apparent tendency in the mean contours is deceptive. Statistically, the two F0 maxima did not differ (*conOinter* versus *minOinter*: $p = .557$). The conclusion to be drawn from this observation is that in contrast to declaratives, minimal, wide, and contrastive foci in YNQs are not distinguished by means of their F0 maximum.

3.2.3.2. Accent shape. The general accent shape is a prosodic feature which serves to mark focus distinctions in declaratives, where different pitch accents in conditions with the same locus of prominence but different kind of focus can be distinguished: Although minimal focus on the object is realized prosodically in a way quite similar to maximal focus, they can both be distinguished from contrastive focus (cf. Diagram 3). However, pitch accents for minimal and contrastive focus on the verb are of virtually identical shape, as discussed above in connection with F0 maxima (see Diagram 1).

As far as YNQs are concerned, the shapes of the pitch accents in all focus conditions in YNQs appear quite similar. In the conditions with highest prominence on the verb, the three accents virtually coincide, forming an extra-high peak (see Diagram 4). We would describe the shape of this accent as L + H* followed by an obligatory low tone (cf. also Ladd, 1996:172). In our test conditions, this postnuclear low target was aligned with the stressed syllable of the object, but secondary accents in authentic examples (see F0 contour 2) indicate the possibility of later alignment. Ladd (1996:215) discusses a similar pattern for English postnuclear L phrase tones which align with the most prominent syllable after a rising-falling sequence in a (rising-)falling-rising tune. Notably, it differs from Ladd's (1996) East European Question Tune, because the nuclear accent in Russian YNQs is always L + H*, rather than L*. As far as our YNQ conditions with focus on the object are concerned, the shape of the accents marking contrastive focus and minimal focus does not differ (cf. Diagram 2). Abstracting away from the effect of sentence declination, YNQ pitch accents on both the verb and the object can thus be regarded as having basically the same shape (see Diagrams 2 and 4). It should be borne in mind that a later, lower pitch accent is usually still perceived as equally high—so the four accents represented here virtually coincide in shape. This supports our above claim that focus distinctions within YNQs are prosodically ambiguous.

3.2.3.3. Peak delay. We observe that in YNQs, the F0 maximum in the word carrying the pitch accent occurred relatively *later* than in the corresponding declaratives (in terms of quarter syllables). This holds for each of the minimally or contrastively focused conditions. The relevant comparisons for *verbal* prominence (see Diagram 1) are statistically significant (*conVinter* versus *conVdecl*: $W = 7.5$; $N = 18$; $p = .001$; *minVinter* versus *minVdecl*: $W = 2.5$; $N = 25$; $p = .000$). Note that YNQs with maximal focus cannot be directly compared to declaratives with maximal focus (both having a different locus of prominence—on the verb versus on the most deeply embedded constituent). But the YNQs with maximal focus showed the same peak alignment as those with a contrastive or minimal verbal focus (cf. Diagram 4). The F0 maximum occurred even significantly later than the end of the syllable bearing lexical stress, i.e., it was delayed into the postnuclear syllable. Regarding the relative timing of the F0 maximum and of the relevant syllable boundary, we get significant contrasts (*maxinter* versus boundary: $W = 0$; $N = 23$; $p = .000$; *minVinter* versus boundary: $W = 4.5$; $N = 28$; $p = .000$; *conVinter* versus boundary: $W = 0$; $N = 16$; $p = .000$). No such peak delay occurred in any of the declarative conditions.

It should be noted that peak delay in YNQ versus declaratives conditions with prominence on the *object* is less obvious (cf. Diagram 2). Since declaratives with a maximal focus or a minimal focus on the object carry a falling pitch accent (H + L*), it is not fair to compare the timing of the pitch maximum to the one in YNQs (L + H* L(*)). But at least for the case of contrastive object foci, such a comparison makes sense. And as before, the F0 peak occurring in the YNQ condition was delayed significantly here (*conOinter* versus *conOdecl*: $W = 15$; $N = 28$; $p = .000$). Obviously then, peak delay is a force-related, distinct feature of Russian YNQs.

3.3. Discussion

Let us reconsider how the three parameters *F0 maximum of the pitch accent*, *accent shape* and *peak delay* could work together compositionally to mark the focus and force of a YNQ versus a declarative in Russian. Turning first to *force* distinctions, if the height of the pitch maximum is decisive in this case, then YNQs must have a higher F0 maximum than declaratives with the same locus of prominence. If peak delay makes the difference, then it has to be excluded in declaratives. Both consequences seem to hold. In our reading study, the overall pitch maximum in YNQs with prominence on the verb was higher than in the respective declaratives and occurred relatively later. Regarding maximal prominence on the object, declaratives and YNQs with contrastive focus (having comparable pitch accent shapes) are similarly distinct in pitch maximum and peak delay.

As concerns *focus* distinctions, if the height of the pitch maximum is decisive, then we expect contrastive foci to be marked by higher pitch than minimal or wide foci, possibly with a further contrast between the latter two. This is borne out only partly by the data: Only for declaratives could we find a clear difference in the F0 maximum between contrastive and neutral foci; but this was also correlated with a distinction in accent shapes, at least in the conditions with prominence on the object. For YNQs, various focus accents on the verb and on the object virtually collapse into one—at least our results do not support any clearcut difference. Contrastive and minimal focus accents in all YNQ conditions turned out to be similar in shape, height and peak alignment. Prosodic marking of focus seems weakened or neutralized in this case. Moreover, peak delay never occurred as a marker for focus distinctions in the above study.

We conclude that a distinction in terms of the F0 maximum generally correlates with force as well as with focus distinctions in Russian. Peak delay, however, is sufficient to mark YNQs.[2] The reading study does not answer the question whether peak delay and an especially high F0 maximum can compensate for each other. Gussenhoven (2002) argues on the basis of YNQ marking in various languages that both higher and later peaks are functionally equivalent manifestations of the so-called effort code. According to our findings, higher peaks in Russian are pragmatically ambiguous—they occur in contrastively (versus neutrally) focused declarative clauses, but also in connection with YNQ (versus declarative) force. Three distinct categories in terms of accent shape could be isolated: (i) neutral focus in declaratives, (ii) contrastive focus in declaratives, and (iii) YNQ force (without further focus distinctions). The accents marking (i) versus (ii) differ at least in shape and height, in most cases; (i) versus (iii) differ at least in shape, height and peak alignment, and (ii) versus (iii) differ at least in peak alignment.

If these generalizations hold, they would have to be reflected in perception mode as well. Specifically, speakers should be able to recognize YNQs with a delayed peak easily, while they should have problems in declaratives with a contrastive focus on the verb or the object. They should also distinguish object-prominent declaratives from YNQs easily, due to their distinct accent shapes. To further investigate these points, we undertook a perception experiment on the basis of a selection of the data acquired in the production study.

[2] Křížková (1972) has claimed first, to our knowledge, that the shape of the pitch accent remains the same in Russian YNQs, irrespective of its location. She also gives some impressionistic evidence for the low target after the L + H* sequence being delayed even several constituents further to the right. Whether this can be shown experimentally, and whether the amount of delay is related to pragmatic differences, are still open questions.

4. A perception (categorization) study

4.1. Background

Probably the easiest way to test the recognition of force distinctions is a categorization task. Speakers listen to target items out of context and have to decide whether they are questions or statements. Further possibilities would include a cross-splicing experiment in which target sentences are artificially inserted into (appropriate and unappropriate) contexts and the resulting items are judged for acceptability. The latter task seems more natural than the former, but it is practically feasible only if the number of context conditions is low. However, a categorization task can provide a good first overview. The zero hypothesis is that speakers can make use of prosodic signals equally well in all conditions. However, according to the generalizations in section 3, we would expect specific difficulties in the conditions marked by high pitch accents, since these occur both in contrastive declaratives and in YNQs. On the other hand, declaratives with prominence on the object and, generally, YNQs should be recognized easily and correctly, since these involve unambiguous prosodic signals (a specific accent shape and peak delay, respectively).

4.2. Perception study

4.2.1. Materials and design

We tested items from 9 of the 10 conditions used in the production task in a related design, leaving out the neutral wide focus declaratives, which are prosodically maximally dissimilar from YNQs (see above). The sentences recorded during the production study were evaluated for their closeness to the prototypical realizations of each category, and two to four sentences per category were selected in such a way that the relevant comparisons concerned only identical lexical material. We construed questionnaires with 38 target items intermixed with 24 fillers in four different pseudo-randomized orders. The materials contained 20 YNQs and 18 declaratives (target items), 14 *wh*-exclamatives and *wh*-questions, 5 *li*-questions and 5 declaratives (fillers), i.e., a total of 62 sentences.

4.2.2. Procedure

The normalized items were presented auditorily one by one and simultaneously displayed on a computer monitor (excluding interpunction). Speakers were instructed to decide whether a given sentence was (a) a question or (b) an exclamation[3] or statement and mark the respective checkbox in a window on the screen. Presentation was self-paced, and participants could listen to the target items as often as they wished. We recorded the timing of responses, correct and erroneous categorizations, and the rate at which each target item was replayed. Twenty native Russian speakers (students of the University of Leipzig) took part in the experiment.

4.2.3. Results

All participants achieved overall correctness rates between 50 and 57 (of 62). That the task was such a little demand was unexpected. The participants' ability to recognize the force of the stimuli is represented in the correctness rates across different conditions. As a measure for the certainty upon their decision, we also recorded the replaying rates which participants chose. The results are presented separately for the five conditions with the main pitch accent on the verb and for the four conditions with the main pitch accent on the object, respectively.

[3] Exclamations were added as an option because of a second sub-experiment involving *wh* questions and *wh* exclamatives, which was presented intermixed with unrelated filler items and with the YNQs discussed above.

4.2.3.1. Accent on the verb. As for YNQs conditions with the main accent on the verb, categorization errors were generally rare. However, declaratives with a contrastive focus on the verb were categorized correctly only at chance level (see Diagram 5). A one-way ANOVA revealed a highly significant influence of the original context type in which the item was produced on the amount of correct recognitions ($F(4,16) = 96.837$, $p < .000$). Pairwise comparisons, using a *t*-test with Bonferroni correction, show that the contrastive declaratives differ from all other conditions significantly ($p < .002$), being recognized worst of all. Minimally focused declaratives take an intermediate position, differing significantly both from the declarative contrastive and from the interrogative conditions ($p < .002$).

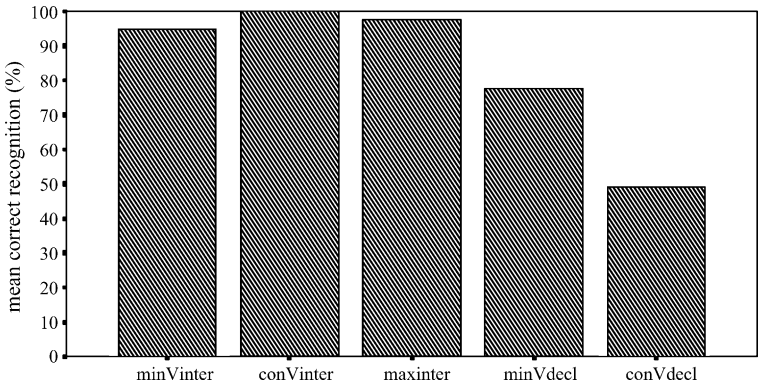


Diagram 5. Correct YNQ/declarative recognition (verb prominent; perception study).

The rates at which subjects decided to replay the stimuli turned out to be a helpful measure, pointing to the same conclusions as the mere correctness rates. A one-way ANOVA indicated an overall effect of the context of production of a given item on the item's replay rate in the recognition task ($F(4,16) = 6.285$; $p = .003$). Participants chose to listen to the contrastive declaratives more often than to items from any other condition (see Diagram 6). The difference in the playing rates between contrastive declaratives and all other conditions was significant across subjects ($p < .003$).

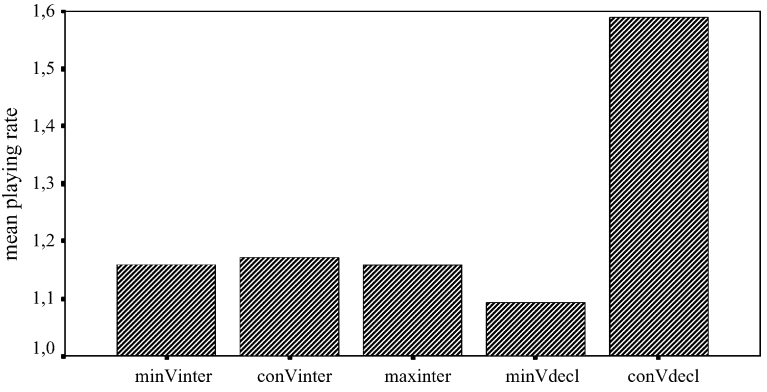


Diagram 6. Rate of replaying (verb prominent; perception study).

4.2.3.2. Accent on the object. In the conditions with the main accent on the object, incorrect classifications also occurred at an extremely low frequency (see Diagram 7). As far as the recognition rate is concerned, a one-way ANOVA revealed a significant overall effect of the original context type ($F(3,17) = 14.729$; $p < .000$). In pairwise comparisons, the declaratives with contrastive focus on the object stick out by their bad recognition rate; they differed significantly both from the declaratives with minimal neutral focus ($p = .000$) and from the interrogatives with minimal focus ($p = .025$) in *t*-tests with Bonferroni correction. There was no significant difference between the other conditions.

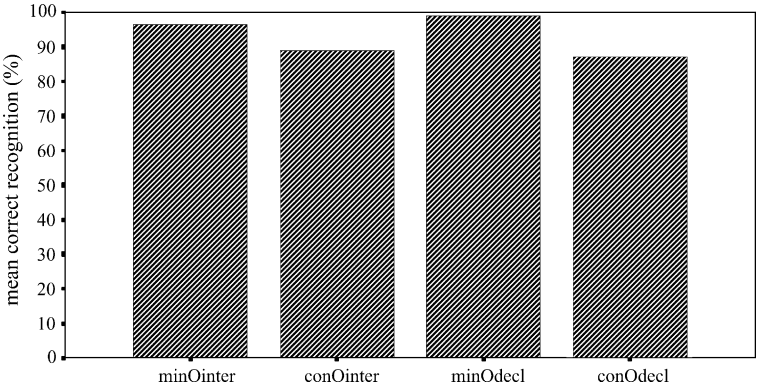


Diagram 7. Correct YNQ/declarative recognition (object prominent; perception study).

The playing rates also showed a significant main effect (ANOVA: $F(3,17) = 4.946$; $p < .012$); pairwise comparisons, however, yielded a difference only between the declaratives with minimal neutral focus and those with contrastive focus ($p = .006$). Again, the other conditions showed no difference. These results support the idea that the prosodic parameters of the interrogative conditions – high, delayed pitch – and also the distinct accent patterns of object-prominent, neutrally focused declaratives provide reliable cues for the recognition of sentential force. On the other hand, the high pitch on the accented syllable leads to ambiguity and causes specific perception problems with contrastive declaratives (as already pointed out above for verbal foci).

4.3. Discussion

The outcome of the perception study is: (i) neutrally focused declaratives (with minimal or wide focus) are recognized easily and accurately. (ii) Examples involving peak delay (i.e., all YNQs) are recognized easily and accurately. (iii) Items with a high, non-delayed F0 maximum (i.e., contrastive declaratives) pose a certain problem for recognition. In the case of a contrast on the verb, they are categorized correctly only at chance level.

All three results fit the production part reported in section 3 very well: since neutrally focused declaratives are marked by a distinct pitch accent shape (H + L*) and thus differ clearly from YNQs, (i) is expected. We identified peak delay as a distinctive feature of YNQ pitch accents in section 3. This is supported by result (ii), which also indicates that delayed peaks are usually not mistaken for very high peaks (as in contrastive declaratives). As we know from the production part, higher pitch is typical for YNQ pitch accents and also the characteristic feature of contrastive declaratives. This makes the latter good candidates for being misunderstood as a

YNQ, as shown by result (iii). Combining our findings in the reading and the perception study, Russian YNQ prosody seem to involve a refinement of Gussenhoven's (2002) effort code. While pitch height can in principle substitute for peak delay (leading to difficulties when sentential mood/force has to be recognized), the reverse is not true. Peak delay unambiguously marks YNQs.

5. Towards an explanatory account

The preceding two sections mainly dealt with the prosodic properties of pitch accents in declaratives and YNQs; we found that there are no clear intonational distinctions depending on the contextually expected focus types in Russian YNQs. In the present section, we return to the issue of the *locus* of prominence in different sentence types and focus conditions. The analytical idea is that the clause-type marker Q in Russian proper YNQs includes a lexical specification as a focus particle, akin to overt *only*, and obligatorily associates with a focus in its scope. Before explicating this idea, we will review the focus/prominence relation in Russian YNQs in some more detail.

5.1. Focus/prominence in Russian YNQs: more complicated cases

Maximal prominence on the finite verb in Russian YNQs may signal several functions. As in English or German, it may, e.g. highlight the temporal specification of the situation or the claim ''that the situation described indeed obtains, in contrast to the opposite claim'' (Klein, 1998:227); except for the periphrastic future tense, it can also contrast the lexical content of the verb with contextual alternatives. Since negation is a verbal proclitic in Russian, maximal prominence on the verb may even highlight sentential negation.

Most relevant for our purposes is the ''claim'' or ''assertion'' component, called VERUM by Höhle (1992). Höhle (1992) argues that VERUM cannot be an *illocutionary* operator, since focus on this element is possible also in embedded clauses, which do not have an illocutionary force of their own. Rather, VERUM is viewed as a semantic component used to express the speaker's opinion about the truth value of a given proposition; sentential adverbials like *probably*, *possibly*, and/or negation (or groups of such elements) could count as potential alternatives (a proposal attributed to J. Jacobs). On the basis of data from German, Höhle (1992) further distinguishes C-VERUM focus (expressed by prominence on the complementizers, relative pronouns etc.) and F-VERUM focus (prominence on the finite verb), showing that only the latter, but not the former, can be in the scope of sentential negation. According to Brandt et al. (1992), VERUM is generally located in the highest clausal projection, and VERUM focus highlights that there exists an event in the actual world which corresponds to the event role of the main predicate. This idea shifts the perspective away from the speaker's attitude, towards sentence grammar. Romero and Han (2004), on the other hand, offer a formal semantic analysis in which VERUM focus is an operator on a proposition p expressing that the speaker is certain that p should be added to the common ground. Interestingly, on their account, VERUM is both independent of negation – with which it enters into scopal ambiguities –, and of the interrogative Q-morpheme, which always takes widest scope. They show in detail how VERUM focus induces certain pragmatic implicatures, arguing that a YNQ *p?* with VERUM focus denotes an ''unbalanced'' set of alternatives {FOR-SURE(p), ¬FOR-SURE(p)}, with ¬FOR-SURE(p) covering all other epistemic degrees. It may be derived that VERUM focus in a YNQ *p?* implicates that the speaker originally believed p not to hold (Romero and Han, 2004).

It has to be stressed that VERUM focus in this sense is not at stake in our case: neither do Russian ''out of the blue'' YNQs generally presuppose *p* to be known to the hearer, nor do they implicate a belief on the part of the speaker that *p* does not apply. For illustration, consider, e.g., example (4) from section 2: In English or German, it would be odd to stress a finite auxiliary in this context, conveying the pragmatic effect of VERUM focus; in Russian, however, this pattern of prominence would be completely unsurprising and actually the norm. This clear cross-linguistic difference is often overlooked in traditional descriptions of Russian YNQs which try and derive the necessity of accenting the finite verb from general semantic considerations (Restan, 1972; Bryzgunova, 1977; partly also Mehlig, 1990, 1994, and Šatunovskij, 2004). According to Baranov and Kobozeva (1983), on the other hand, the speaker must have a positive epistemic or positive emotional attitude towards *p* when he utters *p?*, but need not necessarily presuppose *p*. The factor involved is one of bias rather than information structure. Mehlig (1990, 1994) claims that prominence on the finite verb very often implies that the event description has to be given or known for the hearer (i.e., information-structurally in the background). However, as he points out himself (1994:210), at least verbs in the imperfective aspect can carry main prominence without the propositional content being known or even identifiable by the hearer at all:

(17) *Ty uže* PRINIMAL *èto lekarstvo?*
you already took-IPF this medicine
'Did you ever take this medicine?' (Mehlig, 1994:210 (51b))

This use of the imperfective aspect is known as the 'general-factual meaning (*obščefaktičeskoe značenie*)' in Russian linguistics. In Mehlig's analysis, cases with maximal prominence on the verb generally imply the givenness of an event description and ask only for its instantiation in the actual world; but under this view, the imperfective aspect is left as an exception. Note also that the postverbal secondary accents presented in section 2 only occur when the nuclear accent rests on the finite verb, but not on any other constitutent.[4] Maximal prominence on the finite verb thus opens up new possibilites for the highlighting of other constituents.

Maximal prominence on any other element than the finite verb has been characterized as conveying a *narrow* focus by Ladd (1996:169). While this is certainly true in many cases, Mehlig (1990, 1994) has discovered that Russian YNQs which ask about the proper description of a given or presupposed event regularly involve a nuclear accent on the constituent which would act as the exponent of maximal focus in the corresponding declarative clause, rather than on the finite verb (so-called constructions with a 'non-inherent theme', see also Baranov and Kobozeva, 1983; Janko, 2001, for relevant remarks). An example is provided in (18):

(18) [*Čto èto včera byl za šum za stenoj?*] *Sosedi peredvigali* PIANINO*?*
what that yesterday was for noise behind wall neighbours moved piano
[*Net, èto deti igrali s mjačom.*]
no PART children played with ball
'[What noise was there behind the wall yesterday?] Was it the neighbours moving the piano? [No, it was the children playing ball.]' (Mehlig, 1990:223 (47b))

[4] We are grateful to Katya Yasinskaya for an interesting conversation about secondary accents in Russian YNQs.

That it is really the typical declarative focus-prominence pattern which is at stake here, is also apparent from topicless intransitive constructions (so-called thetic sentences, cf. Junghanns and Zybatow, 1997, for Russian), where the syntactic subject constitutes the neutral locus of prominence:

(19) [*Počemu ona xromaet?*] *Noga bolit?/Botinki žmut?*
why she limps leg hurts shoes pinch
'[Why is she limping?] Is her leg hurting?/Are her shoes pinching?'
(Mehlig, 1994:189 (17)–203 (41))

Another instance of this focus-prominence pattern are alternative questions in which non-minimal constituents may be juxtaposed:

(20) *Dokladčica razvila novye idei ili tol'ko povtorila xorošo izvestnoe?*
speaker developed new ideas or only repeated well known
'Did the speaker develop new ideas or did she only repeat well-known things?'

Obviously, the ''contrastive flavour'' alluded to above may not only affect minimal constituents, but also larger units. Cases like (17)–(19) show that YNQ force does not generally exclude the phenomenon of integration into larger focus domains (''focus projection''), which is common in Russian declarative clauses. However, the domain of focus does not extend over the whole sentence here; as is evident from Mehlig's (1990, 1994) analysis of (17), the existence of a situation which can be described by the propositional content must be presupposed. In an analysis which makes this component of sentence structure explicit (such as e.g. Brandt et al., 1992), the component which amounts to the sentential mood/force specification would remain in the background, with focus pertaining only to the description of the proposition.

Our studies discussed in the preceding sections indicate that the *shape* of the nuclear pitch accent remains virtually constant for all kinds of focus in Russian YNQs. Evidence we collected from pitch tracks of alternative questions like (19), of Mehlig's (1990, 1994) ''explicative questions'' like (17) and of improper questions containing modal particles which are reserved for declarative clauses points to the same pitch accent, although the locus of prominence in all these cases follows the declarative pattern. Interrogative *function* is thus related to the L + H* L(*) accent, whereas focus is encoded by the locus of prominence, with no further distinction into potential subtypes.

5.2. Q as a focus particle in Russian YNQs

The preceding discussion leaves us with two major differences between focus marking in Russian YNQs and declarative clauses: (i) maximal prominence on the finite verb in YNQs does not necessarily produce VERUM effects; instead, it allows for further, secondary pitch accents. (ii) Nuclear accents in YNQs are very similar in shape, independently of contextual conditions; if the nuclear accent falls on a constituent different from the finite verb, it conveys a kind of contrastive meaning. Both in a restricted subset of YNQs and in declaratives, we can find integration into larger focus domains according to the same rules of prominence/focus-mapping; however, this type of focus does not extend over the whole clause (including the sentential mood marker) in YNQs.

Partly building on ideas by Reich (2001), Jacobs (1984) and Stechow (1993) for German, we propose that the sentence type marker Q in Russian not only forms a set of propositions from a

single proposition, but also acts as a focus binder, i.e., as a silent degree particle, akin to overt *only*. Russian Q requires a focused constituent [$_{+F}$ X] in its scope, which is interpreted as exclusive, i.e., it implies the exclusion of contextually possible alternatives of X.[5] This property of Q is responsible for the ''narrowly focused'' reading alluded to in Ladd (1996:169). Focusing the finite verb, or rather, the position of sentential polarity, has no comparable semantic effect in YNQs, since the excluded alternative $\neg p$ is brought back in when Q forms the question meaning $\{\lambda w.p(w), \lambda w.\neg p(w)\}$. If this is on the right track, then focusing in Russian YNQs does not have to induce the semantic effects of *contrastive* focus. It needs no special contextual licensing, but brings about the exclusion of potential alternatives automatically. But why does focus on the finite verb in a YNQ *p?* not even have to evoke pragmatic VERUM effects (i.e., an implicature that the speaker did not expect *p* to hold)? Romero and Han (2004:631) point out that there are cases where polarity stress does not trigger a VERUM implicature even in English. For example, polarity stress may simply mark that the question is being re-asked, as in

(21) *I was wondering whether Sue visited you last week. So, DID she visit you last week?*
(Cresswell, 2000, cited after Romero and Han, 2004)

Romero and Han's system predicts that an epistemic implicature will arise when ''focal stress cannot be licensed as anything other than VERUM'' (2004:631 fn). But we have assumed above that there is always another binder of focus and licensor of prosodic prominence available in Russian YNQs, namely Q itself. Thus, under the view that VERUM focus is not a necessary consequence of nuclear stress on the position of sentential polarity, but just one out of a set of potential focus licensors, it falls out naturally that maximal prominence on the finite verb is possible without pragmatic VERUM effects in Russian.

6. Conclusion

The Russian YNQs discussed in this paper are marked by a special pitch accent, a steep L + H* with peak delay into the postnuclear syllable, followed by a secondary L* target. This accent marks a sentence unambiguously as a (pragmatic) question act. It does not vary fundamentally with respect to focus distinctions, as evidence from production and perception studies shows. As far as prosody and potential contexts are concerned, we may thus plausibly assume that the sentence-type feature [Q] acts similarly as a focus particle in Russian YNQs, obligatorily binding a focused constituent in its scope. Focus on the finite verb counts as ''neutral'' in the sense that it imposes the least specific information-structural requirements on the rest of the sentence. The usual semantic effect of bound focus, the exclusion of alternatives, is suspended in Russian YNQs due to question semantics. Since this focus is already licensed by Q, there is no necessity of a VERUM operator. Declaratives with a contrastive focus, on the other hand, are marked by a H* or H* + L, close in shape to a YNQ accent, but without peak delay. We have shown that the similarity between these accents leads to specific perception difficulties: While the delayed YNQ accent is recognized clearly and easily, the contrastive focus declaratives are often falsely analysed as YNQs. Thus, the mutual substitution of peak height and peak delay in question marking (Gussenhoven, 2002) seems to work only in one direction in Russian. It would be promising to relate our Russian findings to the cross-linguistic picture of peak

[5] We assume that quantification over y can be properly restricted to a set of relevant entities, as in most current semantic theories of focus.

alignment patterns. Further extensions of the research presented here should concern the topic and secondary accents observed in section 1, semantic formalization and integration with the other types of YNQs in Russian, notably *li*-marked questions.

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