

ИНТРУЗИВНЫЕ МЕСТОИМЕНЕНИЯ В РУССКОМ ЯЗЫКЕ: ЭКСПЕРИМЕНТАЛЬНОЕ ИССЛЕДОВАНИЕ*

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В статье исследуется приемлемость интрузивных местоимений в русском языке. Интрузивные местоимения — это местоимения, которые заполняют место следа при извлечении составляющей. Есть свидетельства того, что такие местоимения могут «чинить» предложения, в которых извлечение было неграмматичным. Цель данной работы — экспериментальными методами изучить, увеличивают ли интрузивные местоимения приемлемость предложений с извлечением из островных структур в русском языке. Результаты наших экспериментов показывают, что наличие интрузивных местоимений не только не увеличивает приемлемость, но и снижает ее. Кроме того, существует вероятность того, что разница между приемлемостью извлечения одушевленных и неодушевленных составляющих может быть индикатором типа конструкции.

Ключевые слова: интрузивные местоимения, резюмтивные местоимения, островные ограничения, русский язык, экспериментальный синтаксис, суждения приемлемости, градуальность.

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INTRUSIVE PRONOUNS IN RUSSIAN: AN EXPERIMENTAL STUDY^{*}

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Abstract: This paper examines the acceptability of intrusive pronouns in Russian. Intrusive pronouns are pronouns that fill a gap when a constituent is extracted. There is evidence that such pronouns can “repair” sentences in which movement was non-grammatical. The purpose of this work is to study whether intrusive pronouns increase acceptability of island subextraction in Russian using experimental methods. The results of the experiments show that the presence of intrusive pronouns not only does not increase the acceptability but decreases it. In addition, there is a possibility that the difference between acceptability of animate and inanimate constituent extraction can be an indicator of the construction type.

Keywords: Intrusive pronouns, resumption, island constraints, Russian, experimental syntax, acceptability judgments, Likert scale, forced-choice, graduality.

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1. Introduction

Resumptive pronouns are pronouns that fill the gap while being co-indexed with the moved constituent. A distinction between grammatical resumption and intrusive resumption was introduced in [Sells 1984]. Resumptive pronouns can be called grammatical, “true” resumptive pronouns, according to some authors observed, for example, in Hebrew or Lebanese Arabic (see [Sells 1984], [Nomi Erteschik-Shir, 1992]). Grammatical resumptive pronouns are required for use not only in island structures and are in a relationship of free variation with a gap in other cases. On the other hand, intrusive pronouns are used as a “last resort” to ameliorate island effects or to “repair” island structures from which the constituent has moved (see [Polinsky et al. 2013] for the possible reasons of this amelioration). In Russian there are no “true” resumptive pronouns, so, for greater unambiguity, following the distinction introduced in [Sells 1984], we will use the term “intrusive pronouns”.

In English, such pronouns are usually judged as inappropriate, but according to some studies intrusive pronouns can improve acceptability of sentences in which the movement from the island structure has occurred (see, for example, [Ross 1967], [Kroch 1981], [McCloskey 1990], [Shlonsky 1992], [Nomi Erteschik-Shir 1992] and [Ackerman et al. 2018]):

- (1) *This is the girl who I read in the New York Times yesterday that the awful man who raped *t/her had escaped from prison.* [Nomi Erteschik-Shir, 1992: 90]

In the Russian language, intrusive pronouns have not been studied. E. Lyutikova considered resumptive pronouns in the context of relative sentences with the relative pronoun *kotoryj* ‘which’ [Lyutikova 2009]. In this work, resumptive pronouns are mentioned, however, E. Lyutikova does not find differences in acceptability in their presence and in their absence (the island of adverbial sentences is considered), from which it is concluded that “As a result, the hypothesis that the resumptive pronoun appears in the position of a trace from an «illegal» extraction does not find confirmation in Russian material” [ibid: 449].

Thus, studies on different languages show rather contradictory results, and there have been no experimental studies on Russian. Corpus studies or observations are difficult regarding the intrusive pronouns due to the relatively low

frequency of such structures. For these reasons, this paper aims to initiate experimental research on intrusive pronouns in Russian.

Another reason why we are interested in Russian data is the observation made in [Salzmann 2006: 282] and [Heestand 2010]. In these works, it is noted that intrusive pronouns are acceptable only in languages with non-agreeing complementizers. Moreover, if a language has both agreeing and non-agreeing complementizer, intrusive pronouns will be possible only with the first ones. One example of those languages is Bulgarian, Slavic language like Russian. Although Russian have both options too — *kotoryj* as agreeing and *čto* as non-agreeing complementizer — *kotoryj* is much more common. Therefore, in this work we will concentrate on it and check if it will go along with the prediction or not. We leave non-agreeing complementizer *čto* for the future research.

This paper is structured as follows: in section 2 we revise the results of different studies on the intrusive pronouns. Sections 3 and 4 are devoted to experimental research — sections 3.1 and 3.2 describe the aims and design of the experiments, section 4 describes the experimental results, which are then discussed in section 5. Section 6 contains conclusions.

2. Previous studies

In this section we are going to look at the most prominent experimental research on intrusive pronouns. We decided to cover works, which are using different experimental methods, since they have shown surprisingly different results.

Amelioration: pro

Ackerman, Frazier, Yoshida (2018) explore the islands of the relative clause, the adjunct clause, and the island of the *wh*-question. At the same time, the acceptability of intrusive pronouns in these island constrictions is compared with their acceptability in non-island structures. Unlike previous studies, in this study they do not use acceptability judgment methods such as the Likert scale or magnitude estimation. Instead, the authors used forced-choice and fill-in-the-blank methods. The results show that intrusive pronouns are more preferable than empty gaps for all island structures, but not for non-island structures. The authors propose two options for interpretation of this result. On the one hand, it might be a real improvement in acceptability (then other methods for

obtaining acceptability estimates simply do not have enough statistical power to register such an effect of this size). Another option is that it can be an improvement of a non-syntactic nature, but a simplification in relation to cognitive load and restrictions on the parser, following in this others (see [Kluender 1991, 1998; Kluender, Kutas 1993; Hofmeister et al. 2013; Kluender, Gieselman 2013]).

Similar reasoning is given in [Beltrama, Xiang 2013]. In this article, sentences with a non-island structure and with an island of relative clause were studied, the embedding depth varied from 2 to 3. Within the framework of this work, a series of four experiments was carried out.

The first experiment was conducted on Italian material with the use of audio stimuli, the experimental sentences were presented in the context of a short dialogue. Respondents were asked to rate the comprehensibility of targeted sentences. The three remaining experiments were conducted on English language. In two of them, respondents also had to evaluate the comprehensibility of sentences with intrusive pronouns and without them on a scale from 1 to 7 (while in one of the experiments there is a context accompanying the experimental sentences, and in the other not). In the fourth experiment, which was also conducted on English material using context it was required to assess acceptability. The results show that sentences with intrusive pronouns do score better when judging comprehensibility and using context. In other cases, sentences with pronouns and intrusive pronouns and with gaps receive either the same scores, or gaps are preferred. Based on this, the authors put forward the assumption that the presence of an intrusive pronoun does not “save” sentences with the movement from the island structure in the direct, grammatical sense, but improves their comprehensibility and perception in general. An experimental study by Ferreira, Swets [2005] demonstrates that sentences with resumptive pronouns within the island are generated more often than sentences with a sentence with a gap. Let’s now consider experimental studies showing the opposite results.

Amelioration: contra

One line of experimental research comes to conclusions that intrusive pronouns do not really improve the level of acceptability. Thus, in [Alexopoulou, Keller 2007] authors investigate intrusive pronouns in English, Greek and German using the magnitude estimation method. For all three languages, a non-island

structure, a weak¹ island of the indirect question (corresponding to the English indirect question with the complementizer ‘whether’), and a strong island of the relative sentence were investigated. In addition, they investigate the interaction of the presence of an intrusive pronoun, the type of island and the depth of embedding of the structure (0–2) from which the extraction was made. It was found that for non-island structures the option without an intrusive pronoun was always more preferable, for a weak island this parameter turned out to be different for different languages. In German and Greek the results were similar to non-island structures; in English the results are similar to extraction from a strong island. For the strong islands, no statistically significant differences were found between sentences with and without intrusive pronouns in all languages. At the same time, while the embedding level consistently worsened the estimates for all types of structures without intrusive pronouns (if this deterioration was not statistically significant between the embedding level 0 and 1, a statistical difference was found between the level 0 and 2 in each case), sentences with intrusive pronouns with increasing embedding level showed an increase in the judgments. However, this does not change the fact that, at best, there was no difference between sentences with intrusive pronouns and sentences without them, while on average sentences with intrusive pronouns were rated significantly worse. Similar results were obtained for the German and Greek languages. Polinsky et al. [2013] study the relative clause island and the adjunct island in English and come to the same conclusions. They consider both *wh* and non-*wh* movements and examine acceptability on a Likert scale from 1 to 7. Interestingly, they find no differences between the scores of sentences with and without intrusive pronouns. Similar results were obtained for Swedish [Zaenen et al. 1981] and for Spanish [Sílvia Perpiñán 2020].

Therefore, various authors using Likert scale and magnitude estimation come to the same conclusion: intrusive pronouns either do not change the acceptability or lower it.

¹ It should be noted that the understanding of a weak island, which is used in the above-mentioned article, is not entirely traditional — in it, such islands are considered not as those from which only certain constituents can be removed, but as those from which the removal of constituents is less acceptable than from strong islands. This definition is not generally accepted, however, some of the data we obtained allow us to understand why such assumption was possible.

Summing up, experiments requiring generation and the results of forced choice method result in intrusive pronoun preference. Likert scale shows the same result for intrusive pronouns' acceptability, and they show better results only in comprehensibility test.

3. Experimental study

Since the data obtained using various methods often contradict each other, in this study we used both the acceptability judgment using the Likert scale, and the forced-choice method since the use of these methods has led, for example, [Ackerman et al. 2018] and [Polinsky et al. 2013] to the opposite results described above.

Following [Alexopoulou, Keller 2007], we consider in this paper various island structures — non-island subjunctive relative clauses with complementizer *čtoby* 'so that', potentially weak (at least exhibiting some restrictions on the extraction of components) island structures with indicative complementizer *čto* 'that', as well as strong islands of a complex noun phrase. This choice of materials should help examine the position that Russian language takes typologically with regard to the interaction of various types of island structures and intrusive pronouns. Among other things, the relative acceptability of intrusive pronouns in island and non-island constructions should help in determining whether a certain structure of interest to us is an island or not — if in this work a different pattern is found for different types of structures (as in [Alexopoulou, Keller 2007] and [Ackerman et al. 2018]), this can serve as a guide for future researchers, who will be able to use intrusive pronouns as a kind of indicators. At the same time, in this work, we do not aim to explain the phenomenon of intrusive pronouns — whether they are a grammatical or a discursive psycholinguistic phenomenon. The search for a theoretical explanation is planned to be carried out in future studies. In this case we set ourselves the task of obtaining primary data, which can later be used for theoretical purposes.

3.1. Aim and logic of experiments

In this series of experiments, our goal is to identify how the presence of intrusive pronouns in island structures affects their acceptability in Russian. We test the hypothesis that intrusive pronouns increase acceptability in island structures and decrease acceptability in non-island ones. In doing so, we also test the hypothesis that the weak and the strong islands may behave differently in

relation to intrusive pronouns. Another goal is to compare different experimental methods, as different assumptions arise about their ability to detect the effect of intrusive pronouns.

3.2. Experimental design

In this pilot study, three experiments were conducted. Experiment 1 used an acceptability judgment method Likert scale from 1 to 7. Experiment 2 was carried out using the forced-choice method.

In both experiments, the respondent received instructions before starting the experiment, after which he evaluated five training sentences. The respondent was given 10 seconds to evaluate each stimulus. All experiments were carried out on the Ibexfarm platform [Drummond 2013], respondents were recruited using social networks and the Yandex.Toloka service.

3.2.1. Design of Likert scale experiment

As mentioned above, in experiment 1 we used Likert scale from 1 to 7 (LS). The design of the experiment included two independent variables, one of which had two levels, the other three: (i) the presence of an intrusive pronoun (yes / no), (ii) the type of island (complex noun phrase or CNP as a strong island; relative clauses with indicative complementizer *čto* ‘that’ — supposedly a weak island,² see [Lyutikova, Gerasimova 2021]; non-island subjunctive relative clauses with complementizer *čtoby* ‘so that’). That gives us 6 conditions. For each of the 6 conditions, 4 lexicalizations were made, so the experiments included 24 stimulus sentences. The factorial design of the experiment was planned according to the Latin square rule, resulting in 6 experimental sheets.

According to our observations, agentivity of the extracted constituent can affect the results. Because of that, in relation to animacy of the constituent being extracted, the stimulus blocks were split in a 1 to 1 ratio: half of the blocks contained an animate object, half of an inanimate object. At the same time, in the course of the study, we found that the effect of animacy on the acceptability of sentences is higher than we expected, which is we decided to analyze it both as an interfering and as the main variable.

² There is no certainty that relative clauses with the complementizer *čto* are actually a weak island — this would be too strong a statement, since the category of such constructions has not yet been finally determined. However, since the extension from such structures is limited, we will allow ourselves to call such structures in this work precisely weak islands, bearing in mind that this is only an assumption about their status.

When analyzing the interfering variables, we decided to fix some of them at one value. We referred to such confounding variables as, for example, the depth of embedding of the island structure. Despite the fact that many researchers have pointed out that how deeply the structure containing the proposed component is embedded depends on the acceptability of sentences (see [Nomi Erteschik-Shir, 1992; Beltrama, Xiang 2013], etc.), in this study, it was decided to fix the embedding depth of the structure on one clause. Besides, in all sentences we examined relative movement of a direct object.

In the example (2) the scheme of the experimental sentence is given, in the example (3) — the block of experimental stimuli. Prepositional groups have been added to make the sentences more natural.

(2) a. PPLOC-verb-object, *kotoryj* ‘which’-subject-verb + CNP + *čto*-subject of an embedded clause-verb-PPTEMP

b. PPLOC-verb-object, *kotoryj* ‘which’-subject-matrix verb-*čto*-subject of an embedded clause-verb-PPTEMP

c. PPLOC-verb-object, *kotoryj* ‘which’-subject-matrix verb-*čtoby*-subject of an embedded clause-verb-PPTEMP

(3) a. complex noun phrase (strong island), gap

na stene visel proekt ustanovki, kotoruju papa sdela-
on wall hung project device.GEN which.ACC father made

zajavlenie čto petja postroil _ za kanikuly.
announcement that Petya built during holidays

‘On the wall hang the project of the device which father made an announcement that Petya built _ during the holidays.’

b. *čto* relative clause (“weak” island), gap

na stene visel proekt ustanovki, kotoruju
on wall hung project device.GEN which.ACC

papa dumaet čto petja postroil _ za kanikuly.
father thinks that Petya built during holidays

‘On the wall hang the project of the device, which father thinks, that Petya built _ during the holidays.’

c. *čtoby* relative clause (non-island), gap

na stene visel projekt ustanovki, ktoruju papa hočet čtoby
 on wall hung project device.GEN which.ACC father wants so.that

petja postroil _ za kanikuly.
 Petya built during holidays

‘On the wall hang the project of the device, which father wants Petya to build _ during the holidays.’

d. complex noun phrase (strong island), intrusive pronoun

na stene visel projekt ustanovki, ktoruju papa sdelal
 on wall hung project device.GEN which.ACC father made

zajavlenie čto petja postroil eë za kanikuly.
 announcement that Petya built it.ACC during holidays

‘On the wall hang the project of the device which father made an announcement that Petya built **it** during the holidays.’

e. *čto* relative clause (“weak” island), intrusive pronoun

na stene visel projekt ustanovki, ktoruju papa dumaet čto
 on wall hung project device.GEN which.ACC father thinks that

petja postroil eë za kanikuly.
 Petya built it.ACC during holidays

‘On the wall hang the project of the device, which father thinks, that Petya built **it** during the holidays.’

f. *čtoby* relative clause (non-island), intrusive pronoun

na stene visel projekt ustanovki, ktoruju papa hočet čtoby
 on wall hung project device.GEN which.ACC father wants so.that

petja postroil eë za kanikuly.
 Petya built it.ACC during holidays

‘On the wall hang the project of the device, which father wants Petya to build **it** during the holidays.’

Besides, each experimental list included 24 fillers, 12 of which, according to my introspection, were rated 6–7 (these included sentences with relativization, but without violating island restrictions, see example (4)), as well as 12 fillers preliminary estimated at 1–2 — the gap was filled in them with a full noun phrase (see example (5)). This differentiation of fillers is intended to set “standards” of acceptability and unacceptability, as well as to determine the boundaries of the scale for each individual respondent.

(4) grammatical filler

v škafu viselo plat'e, kotoroe maša kupila, čtoby nadet'
 in closet hang dress which.ACC Masha bought so.that wear

na vypusknnoj.
 on prom

'There hung a dress in the closet that Masha bought to wear at the prom.'

(5) ungrammatical filler

v pole stojal tractor kotoryj pëtr znal,
 in field stood tractor which.ACC Pyotr knew

čto lěša kupil mašinu na prošloj nedele.
 that Lyosha bought car.ACC on last week

'There stood the tractor in the field that Peter knew that Alex bought a car last week.'

Thus, each experimental sheet included 48 sentences. After each grammatical filler, a test question was asked. The respondents who gave less than 50% of correct answers to such questions were excluded from the analysis.

3.2.2. Design of forced-choice experiment

Experiment 2 used the same set of independent variables, as well as the same number of stimuli per condition and the same ratio of stimulus sentences and fillers. However, unlike Likert scale experiment, in experiment 2 we used the forced-choice method: the respondents were required to make a choice between two options of sentence completion — with and without an intrusive pronoun. This method was chosen to presumably reduce the load on the cognitive apparatus during the experiment: the respondent did not have to read similar sentences twice and look for differences in them, which, it seems, should have reduced the load, given the considerable number of stimuli. Each experimental block included three sentences, each with two options for completion. As a consequence, there were three experimental sheets in the experiment. Example (6) demonstrates one of the experimental blocks.

(6) a. complex noun phrase (strong island)

na stene visel proekt ustanovki, kotoruju
 on wall hung project device.GEN which.ACC

papa sdelał zjavlenie, čto petja ...
 father made announcement that Petya

‘On the wall hang the project of the device which father made an announcement that Petya ...’

- *postroil _ za kanikuly.*
built during holidays
‘... built _ during the holidays.’
- *postroil eë za kanikuly.*
built it.ACC during holidays
‘... built it during the holidays.’

b. *čto* relative clause (“weak” island)

na stene visel projekt ustanovki, ktoruju
on wall hung project device.GEN which.ACC

papa dumaet , čto petja ...
father thinks that Petya

‘On the wall hang the project of the device which father thinks that Petya ...’

- *postroil _ za kanikuly.*
built during holidays
‘... built _ during the holidays.’
- *postroil eë za kanikuly.*
built it.ACC during holidays
‘... built it during the holidays.’

c. *čtoby* relative clause (non-island)

na stene visel projekt ustanovki, ktoruju
on wall hung project device.GEN which.ACC

papa hočet, čtoby petja ...
father wants so.that Petya

‘On the wall hang the project of the device which father wants Petya to ...’

- *postroil _ za kanikuly.*
built during holidays
‘... build _ during the holidays.’
- *postroil eë za kanikuly.*
built it.ACC during holidays
‘... build it during the holidays.’

Fillers had the same structure as experimental sentences. At the same time, fillers in this experiment were divided into three types. In fillers of the first type the choice between options was unambiguous — one of the options was obviously more acceptable than the other:

(7) unambiguous filler

v cirke vystupali klouny, kotorye delali vše, čtoby ...
 in circus performed clowns which.PL did everything so.that
 ‘Clowns performed in circus, who did everything so that ...’

- *zriteli ix poljubili poskoree.*
 audience them fall.in.love sooner
 ‘... the audience fell in love with them as soon as possible.’

- *zriteli ego poljubili poskoree.*
 audience him fall.in.love sooner
 ‘... the audience fell in love with him as soon as possible.’

In the second group, both options were, according to my introspective perception, equally acceptable:

(8) filler with two equally acceptable options

na čerdake žili golubi, kotorye kurlykali tak gromko, čto ...
 on attic lived pigeons which.PL were.humming so loudly that
 ‘In the attic lived pigeons who were humming so loudly that ...’

- *babuška ne mogla usnut’ noč-ami.*
 grandmother not could fall.asleep night-INST.PL
 ‘... grandmother could not sleep at night.’
- *babuška ne mogla usnut’ po nočam.*
 grandmother not could fall.asleep on nights
 ‘... grandmother could not sleep at night.’

Both options in the third group were equally unacceptable, the gap in them was filled with either a full noun phrase or a relative pronoun:

(9) filler with two equally unacceptable options

na stene visel akordeon, kotoryj maša vyskazala mysl’, čto ...
 on wall hung accordion which.ACC Masha expressed thought that
 ‘There hung an accordion on the wall, which Masha expressed the idea that ...’

- *kostja kupil akordeon včera.*
Kostya bought accordion yesterday
'... Kostya bought an accorion yesterday.'
- *kostja kupil kotoryj včera.*
Kostya bought which.ACC yesterday
'... Kostya bought which yesterday.'

This selection of filler groups was made in order to find out exactly how respondents react to different combinations of acceptable and unacceptable options. Given that there is a possibility that sentences with and without an intrusive pronoun are equally unacceptable, such a selection seems justified. At the same time, since filler sentences were not aligned and not divided into variables, and their number itself is not enough for serious conclusions, the data obtained with their help will give only the most general idea of the principles of choosing between variants of the same or different (un)grammaticality, which is possible, will change with more detailed research.

2.3. Experiment participants³

In experiment 1, 112 people from 14 to 61 years old took part. The average age of the participant was 26 years, $sd=10.719$, 74% of the respondents were women, 26% were men. 31 participants indicated that they have a linguistic education. Distribution of respondents by experimental lists was: 16–21–12–19–14–30⁴.

In experiment 2, 89 people from 13 to 58 years old took part. The average age of the participant was 23 years old, $sd=8.12$, 76% of the respondents were women, 24% were men. 30 participants indicated that they have a linguistic education. Distribution of respondents by experimental lists was: 29–26–34.

In total, we removed the data from 5 people who systematically exhibited the same scores for all stimuli and/or incorrectly answered test questions.

³ All the data presented below were given by the respondents themselves and were not verified in any way, therefore it can only provide an approximate picture of the social characteristics of the respondents.

⁴ This disbalance of respondents is due to random distribution. However, it has not skewed the results — every type of rearrangement and mixing of the results showed the same picture.

3. Experimental results

In this section, we present the results of our experiments. In experiments 1, the scores obtained using the Likert scale were normalized (z-score transformation).

As already mentioned above, when analyzing the results, the effect of animacy of the extracted object on the acceptability of sentences was found. For this reason, this section will present both the results without taking into account animacy (where, as we assume, the effect of animate and inanimate objects balances each other), and the results in which animate is taken into account as the main variable, since taking it into account might shed light on some important properties of intrusive pronouns. At the same time, we realize that the number of both animate and inanimate stimuli were two times less than it would be required to represent it as the main variable, which is why the effect of animacy should be studied in more detail in the future.

In this work, in data analysis we used normalized z-scores. The results of Experiments 1 were processed using the ANOVA method, after which they were also processed using the Tukey pairwise comparison test.

3.1. Experimental results without animacy

3.1.1. Experiment 1 (Likert scale)

Analysis showed that the type of construction, presence of an intrusive pronoun and the combination of this factors turned out to be statistically significant.

Table 1. ANOVA test results for experiment 1

	Df	Sum sq	Mean sq	F value	P-value	Sign.
IslandType	2	49.7	49.66	146.93	$< 2 \cdot 10^{-16}$	***
Intrusive	1	111.5	55.77	165.02	$< 2 \cdot 10^{-16}$	***
IslandType : Intrusive	2	9.3	4.66	17.78	$< 2 \cdot 10^{-16}$	***
Residuals	2391	808.1	0.34			
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1						

The Table 2 provides means for all conditions, as well as grammatical and non-grammatical fillers and the Figure 1 shows an interaction plot of z-scores of various conditions, as well as grammatical and non-grammatical fillers.

Table 2. Mean z-scores and standard deviation for various conditions according to the results of experiment 1

Island type	Intrusive pronoun	Mean z-score	sd
CNP	no	-0.548	0.528
CNP	yes	-0.707	0.416
<i>čto</i>	no	-0.121	0.694
<i>čto</i>	yes	-0.397	0.554
<i>čtoby</i>	no	0.100	0.710
<i>čtoby</i>	yes	-0.358	0.541
Ungrammatical fillers		-0.629	-0.685
Grammatical fillers		1.40	1.37

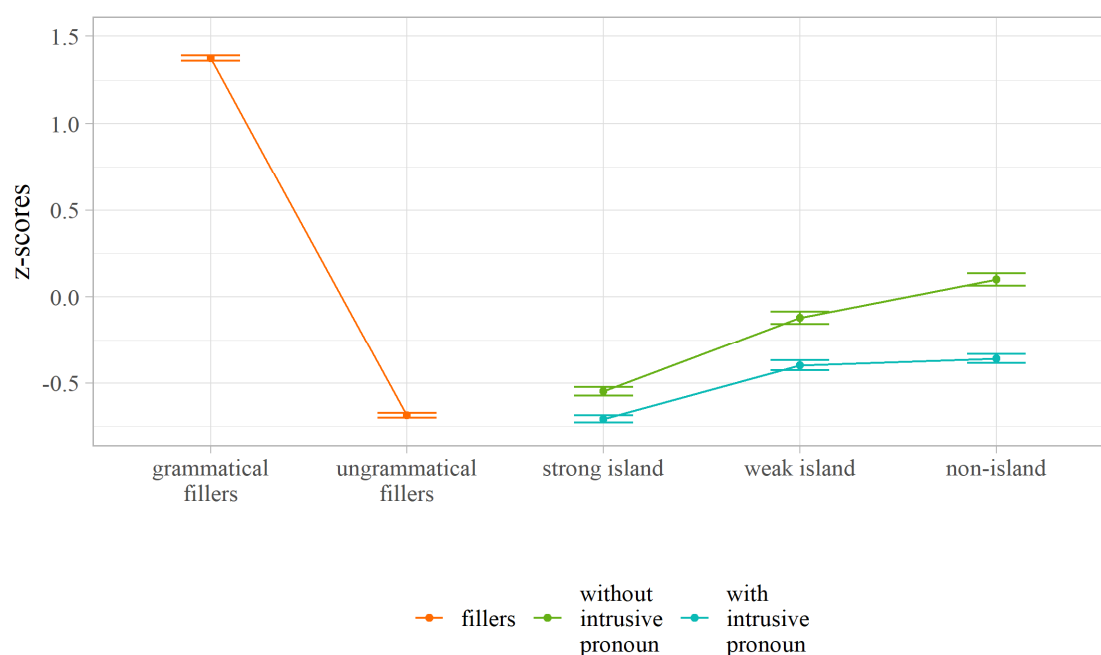


Figure 1. Comparison of z-scores of different conditions for the Likert scale

The results of pairwise comparison of conditions with and without intrusive pronouns for each island type can be seen in Table 3.

Table 3. The results of Tukey pairwise comparison test to the data of experiment 1

Island type (comparing conditions with and without intrusive pronouns)	p-value
Complex noun phrase	0.001
Relative clause with <i>čto</i> completizer	0.000
Relative clause with <i>čtoby</i> completizer	0.000

Thus, for all types of constructions the difference between sentences with and without intrusive pronouns turns out to be statistically significant — for all types of islands it is true that intrusive pronouns worsen judgments of acceptability (for an island of a complex noun phrase -0.548 vs. -0.707 , $p = 0.001$, for constructions with the complementizer *čto* -0.121 vs. -0.397 , and for constructions with the complementizer *čtoby* 0.1 vs. -0.358 , $p = 0$ for both). At the same time, if the differences between sentences with an island of a complex noun phrase and an intrusive pronoun and non-grammatical fillers still turn out to be statistically insignificant (-0.707 vs. -0.685 , $p = 0.997$), this is not the case for sentences without an intrusive pronoun in an island of a complex noun phrase (-0.548 vs. -0.685 , $p = 0.0002$).

3.1.2. Experiment 2 (forced-choice)

Experiment 2 results also show that sentences without intrusive pronouns are preferred. This can be clearly seen in Figure 2, where the results of the experiment are considered without considering animacy, and was also confirmed using the sign test, the results of which can be seen in Table 4.

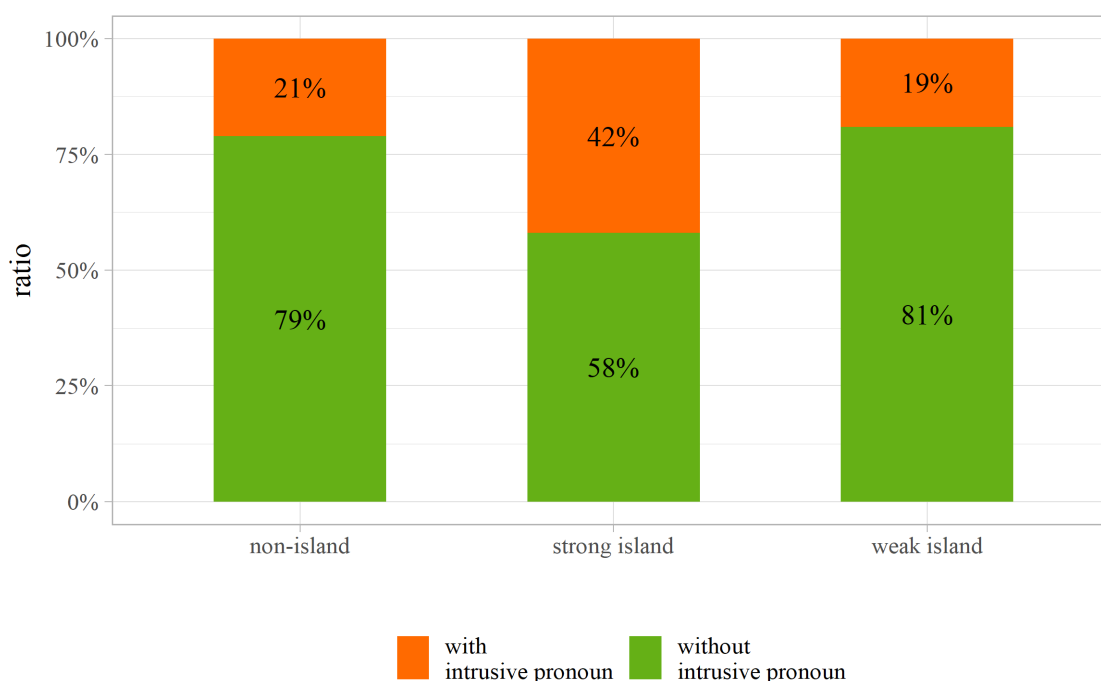


Figure 2. Results of the forced-choice experiment

Table 4. The results of applying the sign test to the data obtained using the forced-choice method

Island type	p-value
Complex noun phrase	0.0002
<i>čto</i>	$2.2 \cdot 10^{-16}$
<i>čtoby</i>	$2.2 \cdot 10^{-16}$

At the same time, the difference between constructions with relative clauses with *čto* and *čtoby* turns out to be statistically insignificant (χ -square = 0.342, $df = 1$, p -value = 0.559). All other differences between different types of islands appear to be significant (χ -square = 77.994, $df = 1$, p -value $< 2.2 \cdot 10^{-16}$).

3.2. Results of experiments with animacy

As mentioned above, analyzing the results we found that animacy significantly affects the results. For this reason, we decided to consider animacy as a factor, although we realize that when considering animacy as an independent variable, the number of observations will be less than desired. Nevertheless, in this section we present the results of both experiments with animacy as they seem to be of additional interest.

3.2.2. Experiment 1.2 (Likert scale)

The type of island, presence of an intrusive pronoun, animacy and the combinations of this factors were significant variables.

Table 5. ANOVA test results for experiment 1 (with animacy)

	Df	Sum sq	Mean sq	F value	Pr(>F)	Sign.
IslandType	2	40.8	20.387	62.977	$< 2 \cdot 10^{-16}$	***
Intrusive	1	19.0	18.981	58.633	$< 2 \cdot 10^{-16}$	***
Animacy	1	0.7	0.740	2.285	0.1308	
IslandType : Intrusive	2	9.7	4.872	15.050	$< 2 \cdot 10^{-16}$	***
IslandType : Animacy	2	1.3	0.628	1.940	0.1440	
Intrusive : Animacy	1	2.0	2.044	6.315	0.0121	*
IslandType : Intrusive : Animacy	2	0.7	0.347	1.071	0.3430	
Residuals	1817	588.2	0.324			
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1						

The Table 6 provides means for all conditions, as well as grammatical and non-grammatical fillers and the Figure 3 shows a boxplot of z-scores of various conditions, as well as grammatical and non-grammatical fillers.

Table 6. Mean z-scores and standard deviation for various conditions according to the results of experiment 1 (with animacy)

Island type	Intrusive pronoun	Animacy	Mean z-score	sd
CNP	no	Inanimate	-0.530	0.381
CNP	no	Animate	-0.545	0.359
CNP	yes	Inanimate	-0.587	0.328
CNP	yes	Animate	-0.525	0.419
<i>čto</i>	no	Inanimate	-0.211	0.636
<i>čto</i>	no	Animate	-0.350	0.517
<i>čto</i>	yes	Inanimate	-0.476	0.442
<i>čto</i>	yes	Animate	-0.415	0.472
<i>čtoby</i>	no	Inanimate	-0.045	0.645
<i>čtoby</i>	no	Animate	-0.134	0.652
<i>čtoby</i>	yes	Inanimate	-0.373	0.515
<i>čtoby</i>	yes	Animate	-0.411	0.519
Ungrammatical fillers			-0.586	0.336
Grammatical fillers			1.10	0.520

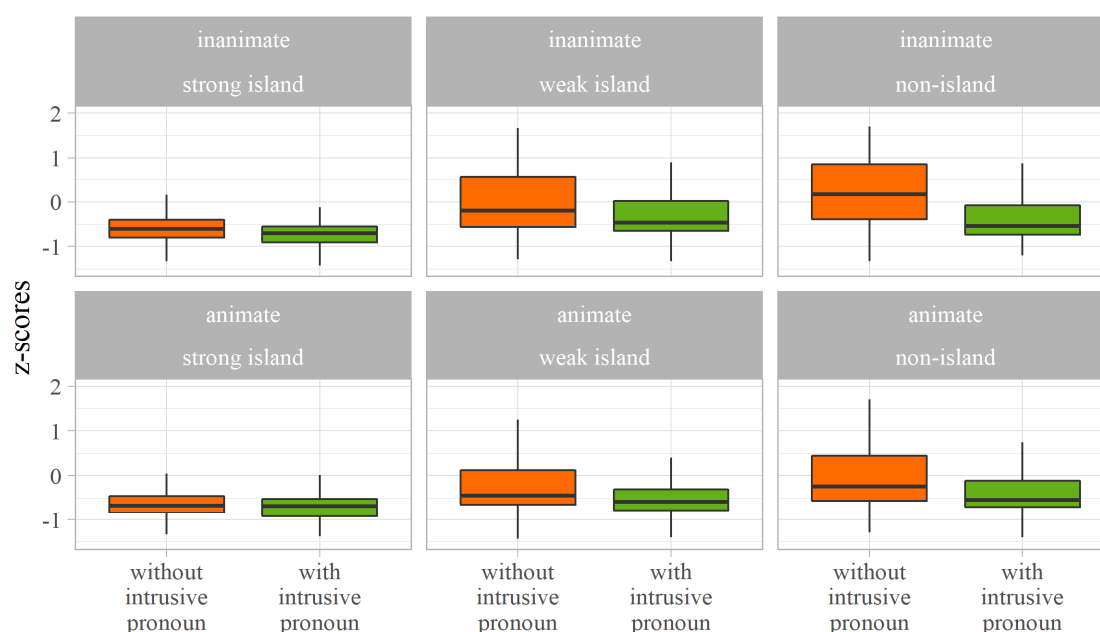


Figure 3. Comparison of z-scores of different conditions for the experiment 1 (with animacy)

For an island of a complex noun phrase, the difference between such sentences turned out to be insignificant that both of them have an intrusive pronoun or not, and the difference consists only in animacy (for sentences without an intrusive pronoun -0.522 vs. -0.579, $p=0.997$, for sentences with an intrusive pronoun -0.708 vs. -0.706, $p=1$). The difference between sentences without an intrusive pronoun and with an animated object and sentences with an

intrusive pronoun and with an inanimate object was also insignificant (-0.579 vs. -0.708, $p=0.514$). In all other cases, the presence of an intrusive pronoun significantly worsened scores of sentences.

For the island of a relative clause with the *čto* complementizer the difference between sentences without an intrusive pronoun and with an animated object and sentences with an intrusive pronoun and with an inanimate object turned out to be insignificant (-0.238 vs. -0.281 at $p=0.999$). In all other cases, the presence of an intrusive pronoun significantly worsened acceptability judgments.

For the construction with a relative clause with the complementizer *čtoby* the differences between sentences with an animate and inanimate object in the presence of an intrusive pronoun turned out to be insignificant (-0.339 vs. -0.378 with $p=0.999$). In all other cases, the presence of an intrusive pronoun significantly lowers the acceptability judgments.

Moreover, if we separately analyze the data for animate and inanimate conditions, we get a similar picture — when considering inanimate conditions, we will see significant differences between sentences without intrusive pronouns and with them for all types of constructions (for a complex noun phrase: -0.522 vs. -0.708 at $p=0.015$, for *čto*: 0.021 vs. -0.281 at $p=0.0001$, for *čtoby*: 0.254 vs. -0.339 at $p=0$). For conditions with an animated object, the differences for constructions with the complementizers *čto* and *čtoby* remain (-0.238 vs. -0.494 and -0.053 vs. -0.378, respectively, $p < 0.001$ in both cases), and for the island of a complex noun phrase, the differences between sentences with and without intrusive pronouns are insignificant (-0.706 vs. -0.579, $p=0.194$).

3.2.3. Experiment 2

Let's now consider the results of Experiment 2 taking animacy into account. We applied the sign test to the results, which showed the statistically significant difference between the presence of the intrusive pronoun and its absence for all conditions. The results of applying sign test are presented in Table 7, on the Figure 4 the ratio of answers for various conditions is presented:

Table 7. Results of applying the sign test to data obtained using the forced-choice method

Island type, objects' animacy	p-value
CNP, inanimate	0.003
CNP, animate	0.022
<i>čto</i> , inanimate	$2.2 \cdot 10^{-16}$
<i>čto</i> , animate	$2.2 \cdot 10^{-16}$
<i>čtoby</i> , inanimate	$2.2 \cdot 10^{-16}$
<i>čtoby</i> , animate	$2.2 \cdot 10^{-16}$

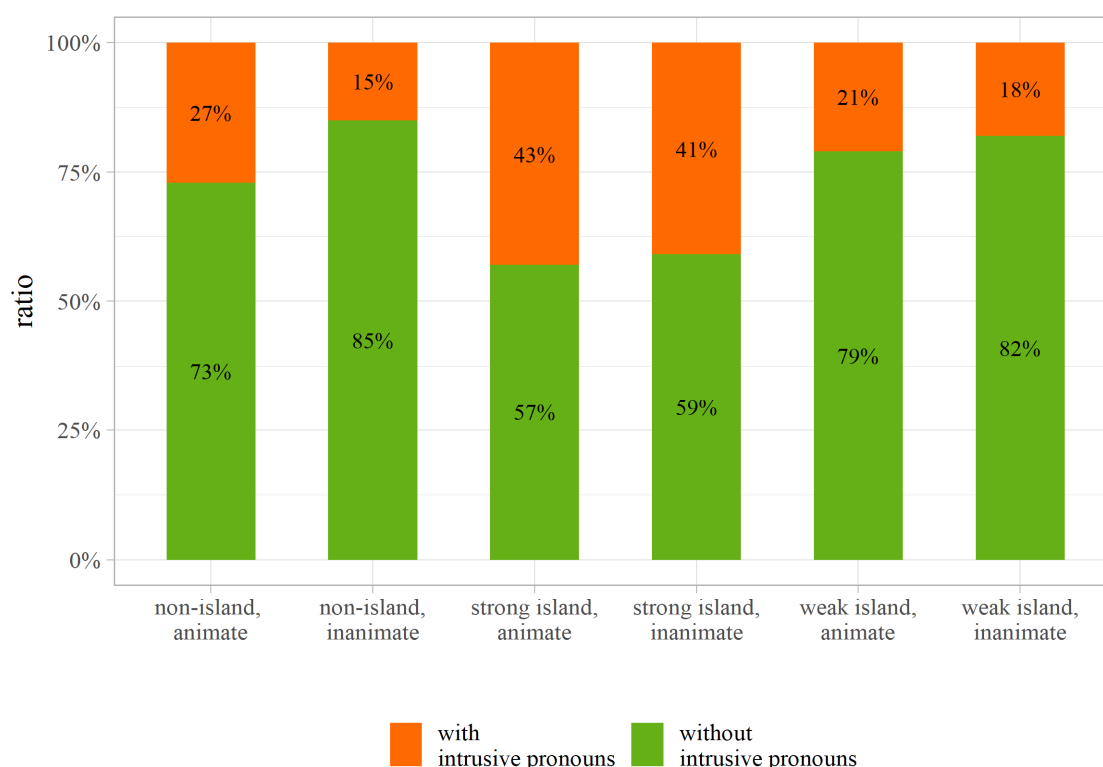


Figure 4. The results of an experiment 2 (with animacy)

For sentences with a relative clause with the complementizer *čtoby*, the difference between sentences with an animate and inanimate object turned out to be statistically significant ($p\text{-value} = 0.0002$). For the subordinate explanatory with *čto* complementizer and the island of a complex noun phrase, this difference was insignificant ($p\text{-value} = 0.437$ and $p\text{-value} = 0.696$, respectively).

At the same time, it is noteworthy that for fillers, where both variants were equally non-grammatical — the choice was given in them between an option with a full noun phrase or with a relative pronoun in place of a gap — a preference was found in favor of sentences with a noun phrase⁵. Note that the differences in the ratio of these two options turned out to be greater than the differences between sentences in which there was an extraction from a complex noun phrase.

⁵ This raises many questions. What does it mean that sentences with a full noun phrase in place of a gap are more acceptable than sentences with a relative pronoun in the same position? Can we say that one of these types of sentences is more grammatical than the other? Or it should be analyzed in such a way that both constructs are non-grammatical, but one of them “sounds better”, as is done in the work on intrusive pronouns [Beltrama, Xiang 2016]? This question remains open.

4. Discussion

In this section, we will compare and analyze the results of the experiments carried out.

For a more visual consideration of the results of these experiments, let us again consider the interaction plots for various types of structures with and without intrusive pronouns.

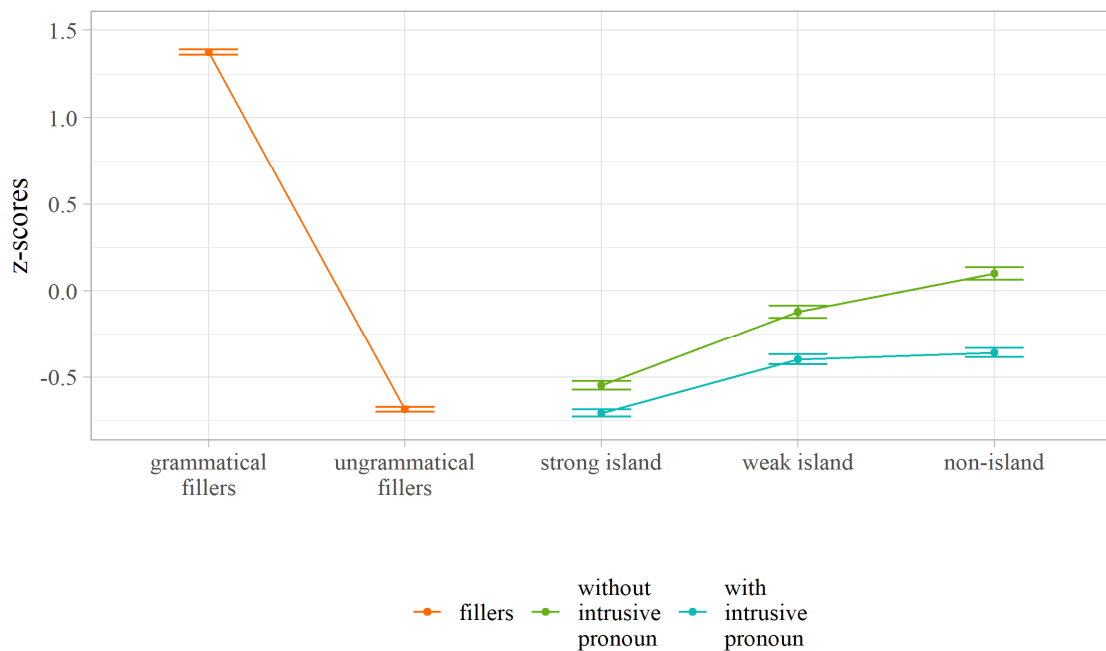


Figure 5. The results of the experiment without animacy

As can be clearly seen in the plots, sentences with intrusive pronouns receive lower scores for each type of structure, which suggests that the initial hypothesis that intrusive pronouns are able to “save”, “repair” or increase the acceptability of the island constructions from which the extraction occurred is incorrect. At the same time, the data obtained using the Likert scale are consistent with the data obtained using the forced-choice method — both methods detected the presence of a significant deterioration in the presence of an intrusive pronoun in the island of a complex noun phrase. This distinguishes Russian from English, Greek and German — according to data in [Alexopoulou, Keller 2007] in strong islands the differences between sentences with and without intrusive pronouns disappeared. Thus, we can assume the following reasons for this. Firstly, the Russian language may indeed be of a different “type” than the languages studied in the above-mentioned work — there is no language there, which would distinguish sentences with and without intrusive pronouns in all

types of construction. On the other hand, this may indicate that the methods used in previous studies have less statistical power than those used by us, which is why such a difference was not found. However, with the same success we can assert that we received a false positive result, but in this case, it was obtained using two different methods at once. Moreover, according to study [Sprouse, Almeida 2017] forced-choice method is actually more effective to discover phenomena of small effect, although magnitude estimation and Likert scale have almost the same statistical power. Finally, we can assume that the concept of “strong island” may be different for different languages and may not be completely equivalent. Moreover, we could assume the gradual nature of the island constraints, which would help explain the gradualness of the estimates obtained — as mentioned earlier, similar assumptions were used in [Alexopoulos, Keller 2007], which now, at least more understandable.

Let us now consider the interaction of the presence of an intrusive pronoun and animacy separately for each type of the construction.

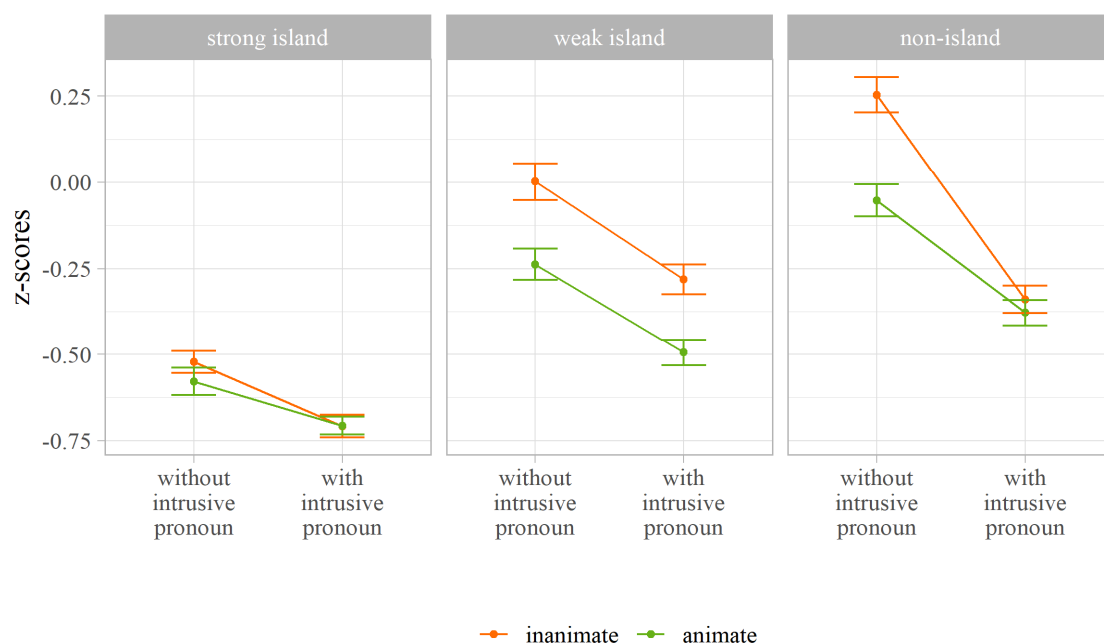


Figure 6. Interaction plot for all islands taking into account animacy of the object

Figure 6 shows the interaction plot for all island types. In center the island of relative clauses with the complementizer *čto* ‘that’ is presented. Both the presence of an intrusive pronoun and animacy lower the acceptability approximately equally, which leads to the absence of a statistically significant difference between sentences with an animate object, but without an intrusive pronoun and sentences with an inanimate object and intrusive pronoun. Each

factor equally lowers the scores relative to the “ideal” condition (an inanimate object + the absence of an intrusive pronoun), while their combination lowers the ratings by approximately the sum of their individual decreases.

On the right you can see an interaction plot for sentences with an extraction from relative clauses with *čtoby* complementizer. The picture on it differs from the *čto* complementizer only in that when there is an intrusive pronoun: the differences between sentences with an animate and inanimate object become statistically insignificant. Thus, we can assume that in the presence of an intrusive pronoun, the sentence becomes so unacceptable (which was expected for non-island structures) that animacy itself can no longer worsen or improve acceptability ratings. At the same time, if there is no intrusive pronoun, the extraction from this constriction is relatively acceptable (although its acceptability is much lower than that of acceptable fillers), which makes it possible to distinguish between sentences with an animate and inanimate object.

Plot on the left demonstrates the interaction of factors for an island of a complex noun phrase. For sentences with and without intrusive pronouns, the difference in animacy of the extracted object is insignificant. Thus, we can assume that the extraction from the island of a complex noun phrase is already ungrammatical (which is also confirmed by the statistical insignificance of the differences between sentences with an island of a complex noun phrase and ungrammatical fillers), which makes the differences between animate and inanimate objects appear insignificant, which resembles the situation for clauses with *čtoby* in the presence of an intrusive pronoun.

As can be seen in Figure 7, in the absence of an intrusive pronoun, the acceptability judgments change depending on the construction from which the extraction is made: for an island of a complex noun phrase — a strong island — the scores are the lowest, and there is also no difference between sentences with an animate and an inanimate object. This is followed by sentences in which the differences between animate and inanimate objects are statistically significant: sentences with *čto*, which is a supposedly weak island — sentences with *čtoby*, that are not supposed to be an island.

If the intrusive pronoun is present, in addition to the general lowering of the scores, we also observe the loss of distinction between the conditions with an animate and inanimate object for sentences with *čtoby*.

Thus, in addition to the fact that intrusive pronouns obviously do not increase the acceptability of sentences with or without island violations, the results of the Likert scale experiment may also indicate the relationship between

the possibility of extraction from a certain structure and the ability to identify statistically significant differences between the extraction of an animate and inanimate object. The main effect of animacy, consequently, is the absence of distinction between sentences with an animate and inanimate object, but without an intrusive pronoun, and sentences with an inanimate object and intrusive pronoun, which is observed for all three constructions from which the object was extracted. So, we can see this as the equal influence of animacy and intrusive pronouns on acceptability ratings. Moreover, if the presence of an intrusive pronoun always significantly worsens the acceptability judgments, animacy worsens them only when the construction is relatively acceptable.

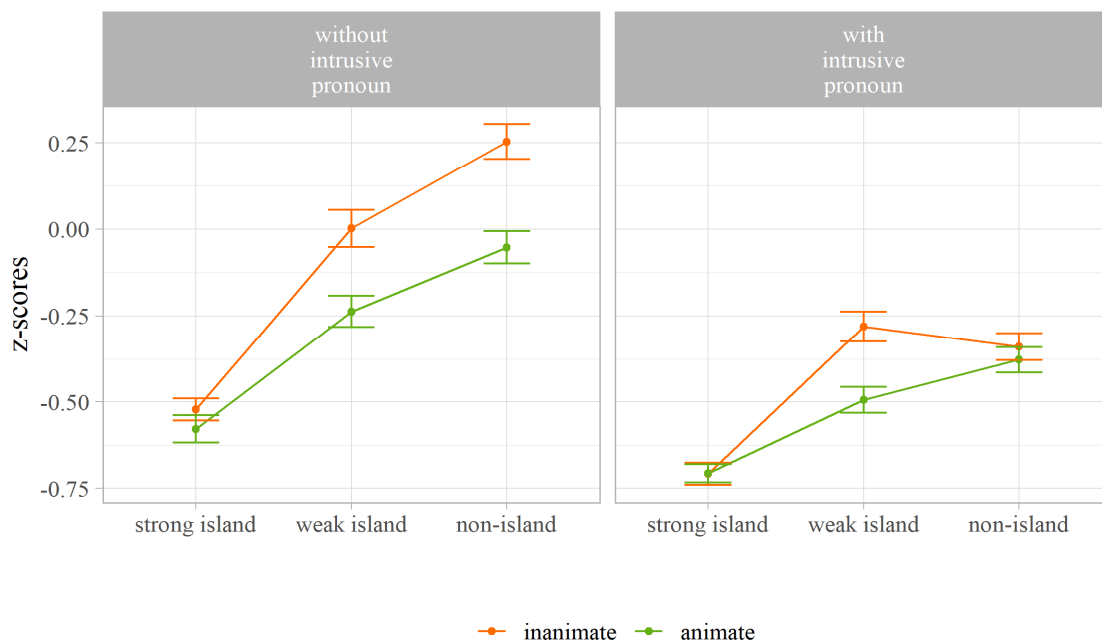


Figure 7. Sentences with and without intrusive pronouns

This can lead us to the same understanding of “island strength” as it is in [Alexopoulou, Keller 2007] — more as a gradual concept than a discrete one. Discrete definition of weak and strong islands has been developed by many different authors since the appearance of this term (e.g. [Ross 1967], [Cinque 1990], [Pesetsky 1987], [Rizzi 1990], [Lyutikova, Gerasimova 2021]). According to this definition weak islands are transparent only for some constituents, but not to others, while strong islands prohibit all extractions. At the same time, recent research shows that weak islands do not truly allow extraction of “allowed” constituents — its acceptability is not maximal, but intermediate (e.g. [Kush et al. 2017; Sprouse et al. 2016], see also [Atkinson et al. 2016; Villata et al. 2016]).

This goes in line with the graduality of the acceptability judgments. The first urge is to postulate the graduality of grammar itself. We won't be alone in it. With the development of experimental methods and methods of statistical analysis, *gradient grammar theories* are developing fast nowadays. Some of them account only for grammatical constraints, e.g., *linear optimality theory*, presented in [Keller 2009]. Others consider also cognitive load, for example *self-organized sentence processing grammar derived model* or SOSP-GD (see the most recent work on islands in this framework [Vilata, Tabor in press]). Finally, some studies exclude grammar and reduce gradience in acceptability to the difference of processing of different constructions (e.g., [Deane 1991; Hofmesiter, Sag 2010]).

Although our results may not fully speak in favor of any of these theories, it can be evidence that island constraints are really more gradual, than discrete phenomena. Otherwise, from the traditional point of view we should have said that *čto* construction is “peninsula” — it is somehow better than CNP and worse than *čtoby* construction regarding the object extraction. Without any statements pro or contra any of different approaches (since it lies outside the scope of our work) we will just note this graduality as another one fact to consider regarding the nature of island constraints.

Thus, the use of various experimental methods shows the same results: the presence of intrusive pronouns in island structures not only shows no evidence of “repairment” or amelioration of an illicit island extraction, but also makes the sentences less acceptable. This is true for the data obtained using all methods.

At the same time, when using a Likert scale for all the structures studied, an effect of animacy on the acceptability was found — sentences where an inanimate object was extracted, on average, were rated higher than sentences with an animate object. It is noteworthy that the ability to detect statistically significant differences between sentences with an animate and inanimate object correlates with the predicted acceptability of conditions. Thus, for sentences with the object extraction from a relative clause with a *čtoby* ‘so that’ we could expect that intrusive pronouns should definitely worsen acceptability, since this structure is not island and, as a result, does not need “repair”. Despite the fact that the presence of an intrusive pronoun worsened the acceptability judgments in all structures, in sentences with *čtoby* the presence of an intrusive pronoun made it impossible to distinguish between sentences with an animate and inanimate object (although the scores of these conditions turned out to be significantly higher than in non-grammatical fillers). Interestingly, this also correlates with the results of Experiment 2, which revealed differences in animacy only for constructs with *čto* ‘that’.

At the same time, the object extraction from the island of a complex noun phrase, which is deliberately unacceptable, did not allow us to reveal differences in the scores of the extraction of an animate and inanimate object both in the presence of an intrusive pronoun and in its absence (formally, these conditions were judged significantly worse than conditions without an intrusive pronouns, but in fact both are unacceptable as they are statistically indistinguishable from non-grammatical fillers). Thus, for unacceptable sentences, it again turns out to be impossible to reveal the differences in judgments for animate and inanimate objects.

As for sentences with *čto*, in respect of which there is no unequivocal opinion as to whether they are island structures, then, apparently, if we consider it a weak island in the same sense as [Alexopoulou, Keller 2007], then we get the whole picture. In this case, for strong islands it is impossible to find a statistically significant difference between sentences with the extraction of an animate and inanimate object, for weak islands this difference is available both in the presence of an intrusive pronoun and in its absence (apparently, its presence lowers the ratings not strongly enough), in the case, if the structure is not an island, this distinction is found when the intrusive pronoun is absent, and not when the intrusive pronoun is present. This can be summarized in Table 8.

Table 8. The ability to detect the difference between the scores of stimuli with the extraction of an animate and inanimate object in different island structures in the presence/absence of an intrusive pronoun

	Weak island	Strong island	Non-island
With intrusive pronoun	—	+	+
Without intrusive pronoun	—	+	—

Of course, the data obtained can show this dependence of the possibility of statistically significant differentiation for the extracted objects' animacy on the type of structure and for some other reason — after all, initially, animacy was only an interfering variable and the lack of stimulus material could play a cruel joke with us. In this regard, it seems important to conduct similar studies for other structures, for which we already have assumptions, whether they are strong islands, weak islands, or non-islands, in order to investigate whether this correlation really depends on the type of island structure. If this correlation is observed there, too, we will get a fairly convenient tool for determining the type of structure. Non-declinable complementizers, which are expected to be more acceptable, than declinable ones, are also to check in the future. Another

promising direction seems to be conducting similar experiments with audio stimuli, due to the fact that the construction with intrusive pronouns is more characteristic of colloquial speech. It also seems important to check the influence of the embedding depth of the structure from which the extension occurs. This, however, like other aspects and cases of the use of intrusive pronouns, requires further research, the beginning of which was laid by this work.

5. Conclusion

In this pilot experimental study of intrusive pronouns, we set a goal to check whether they ameliorate the island violations or not. We conducted two experiments, using Likert scale and forced-choice methods. Considering strong, weak and non-island constructions, our data shows that intrusive pronouns lower acceptability of sentences in all conditions. However, if we consider animacy as a main factor, we can use acceptability patterns as an indicator of construction type, although it is to check in full-scale research.

Abbreviations

ACC — accusative case; GEN — genitive case; INS — instrumental case; LOC — locative case; PL — plural.

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