Subject island and discontinuous spellout in Russian: An experimental approach

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ABSTRACT

This paper deals with asymmetries in split DPs and PPs in mono- and bi-predicative clauses in Russian. The properties of splitting XPs were experimentally investigated in three steps of comparing acceptability: full PP movement *vs.* PP *wh* split, PP split *vs.* DP split, and full DP movement *vs.* DP *wh*-split. The results show that in simple clauses split DPs are compatible with the left branch extraction transformation while PPs are not and that in dependent clauses the discontinuous spellout transformation is the only way both types of XPs can undergo splitting. These conclusions help to explain the differences in subject and object DPs' opacity in simple and dependent clauses found in Polinsky et al. (2013) and Belova (2021a).

KEYWORDS subject island · scattered deletion · left branch extraction

1 INTRODUCTION

It is known since Ross's classical 1967 work that the syntactic status of a DP influences its transparency to A'-subextraction: subject DPs tend to prevent subextraction of elements out of them via A'-movement (1-a) while object DPs are usually transparent (1-b). This generalization is known as the Subject Island Constraint.

(1) a. *Who does [a picture of t_i] hang on the wall?
     b. Who$_i$ did you see [a picture of t_i]?

The subject island constraint is inconsistent both cross- and intralinguistically and can be violated in some cases. For the Russian language, the factors influencing the opacity of subject DPs were first experimentally investigated by Polinsky et al. (2013). The authors considered two parameters: Verb Structural Type (unaccusative, unergative, and transitive) and DP Position (preverbal or postverbal). The question was whether these factors cause asymmetries in left branch extraction, or LBE (cf. Ross 1986, Bošković 2005), of a *wh*-word *kakoj* 'what.ADJ' from DPs in dependent clauses with a *čtoby*-complementizer. The acceptability of stimuli was assessed using a 1–5 Likert scale. The examples below illustrate extraction out of an unaccusative subject (2-a), an unergative subject (2-b), a transitive subject (2-c), and an object (2-d), all with a preverbal extraction site.

(2) a. **Kakie** ty mečtaeš' [čtoby **aktjory** okazalis' na scene]?
         what.kind.of 2SG dream.PRES.2SG COMP actors appeared on stage
         'What kind of actors do you hope will appear on the stage?'
     b. **Kakie** ty mečtaeš' [čtoby **gruppy** tancevali na scene]?
         what.kind.of 2SG dream.PRES.2SG COMP groups danced on stage
         'What kind of groups do you hope will dance on the stage?'
     c. **Kakie** on prosil [čtoby **sotrudniki** blagodarili direktora]?
         what.kind.of he asked COMP employees thanked director
         'What kind of staff members did he ask to thank the director?'

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    d. **Kakie**   ty xočeš'   [čtoby **otmetki** objavil   professor]?
       what.kind.of 2SG want.PRES.2SG COMP grades   announced professor
       'What kind of grades do you want the professor to announce?'

The main findings are the following: (i) transitive sentences are rated lower than intransitive ones; (ii) extraction out of postverbal object DPs is more acceptable than out of preverbal ones, but there are no differences regarding the position of subject DPs; (iii) subject DPs form the hierarchy (3), where the symbol '>' stands for "is more transparent than". This hierarchy confirms the so-called Unaccusative Subject Advantage, which is widely attested in other languages, for example Hungarian (Surányi & Turi 2018), German (Jurka 2013), and Czech (Sturgeon et al. 2011).

(3)   Unaccusative subject > Unergative subject > Transitive subject

The vast majority of the existing body of experimental literature devoted to the subject island constraint uses cross-clausal A'-movement in stimuli (see, among others, Sprouse et al. 2012, Stepanov et al. 2018, Kush et al. 2018). It has to be mentioned, however, that the island properties of subject DPs are not limited to dependent clauses, as example (1-b) demonstrates. To compare the subextraction patterns within simple and dependent clauses, I have conducted an experimental investigation consisting of two experiments with different clause structures. The controlled factors were the same as in Polinsky et al.'s (2013) experiment: DP Type (subjects of unaccusative, unergative, and transitive verbs, and objects of transitive verbs) and DP Position in relation to a verb (preverbal and postverbal). A 1–7 Likert scale was used to collect respondents' judgments. One example of test stimuli with a preverbal extraction site is presented in (4). Surprisingly, the simple-clauses experiment did not replicate the results of Polinsky et al. (2013). For each of the four DP types, including objects, the preverbal position was found to be more transparent than the postverbal one. In the preverbal position, all three types of subjects were rated at the same level, whereas in the postverbal position, the intransitive subjects were rated the same and higher than both arguments of a transitive verb. Thus, the subjects of simple clauses demonstrated variations of transparency, but there is no Unaccusative Subject Advantage nor a clear hierarchy in their patterns (Belova 2021b).

(4)   a. **Čji**   čas nazad **gosti** ušli?
        whose.PL hour ago   guests leave.PST.PL
        'Whose guests left an hour ago?'

     b. **Čji**   čas nazad **gosti** zagovorili o   politike?
        whose.PL hour ago   guests talk.PST.PL about politics
        'Whose guests started talking politics an hour ago?'

     c. **Čji**   čas nazad **gosti** prinesli   popugaja?
        whose.PL hour ago   guests bring.PST.PL parrot
        'Whose guests brought a parrot an hour ago?'

     d. **Čjego** čas nazad **popugaja** prinesli   gosti?
        whose.M hour ago   parrot.M bring.PST.PL guests
        'Whose parrot did the guests bring an hour ago?'

Given that, I repeated the experiment with modified stimuli: DPs undergoing subextraction were placed in dependent *čtoby*-clauses. The second experiment was structurally the same as Polinsky et al.'s (2013) and aimed to see whether the transparency hierarchy of cross-clausal subextraction (3) would be borne out using the material of the simple-clauses experiment (5). The results show that it is not: the ratings of all eight experimental conditions were equally low, and subextraction out of postverbal transitive subjects was rated even lower, at the same levels as ungrammatical fillers (Belova 2021b).

(5) a. **Čji**   kadrovik xotel   [čtoby **podčin'onnyje** ostalis']?
whose.PL HR   want.PST.M COMP subordinates   stay.PST.PL
'Whose subordinates did HR want to stay?'

b. **Čji**   kadrovik xotel   [čtoby **podčin'onnyje** uvolilis']?
whose.PL HR   want.PST.M COMP subordinates   resign.PST.PL
'Whose subordinates did HR want to resign?'

c. **Čji**   kadrovik xotel   [čtoby **podčin'onnyje** podpisali
whose.PL HR   want.PST.M COMP subordinates   sign.PST.PL
zajavlenije]?
application
'Whose subordinates did HR want to sign the application?'

d. **Čji**   kadrovik xotel   [čtoby **zajavlenija** podpisal   Paša]?
whose.PL HR   want.PST.M COMP applications sign.PST.M Paša
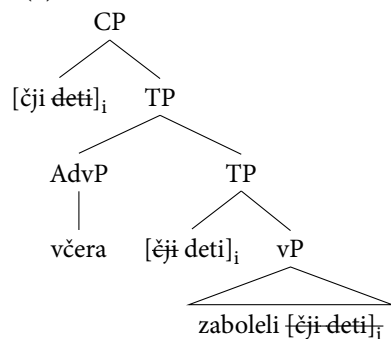'Whose applications did HR want Paša to sign?'

Possible reasons, methodological or sociolinguistic, leading to the differences between my experiment and Polinsky et al.'s (2013) will not be discussed in this article. Nevertheless, the results of my simple-clause and dependent-clause experiments that were conducted under the same conditions are to be addressed. One possible solution, on which I will elaborate in this article, lies in the mechanisms forming split phrases. So far, we have thought of sentences with subject elements extracted from their phrase as examples of left branch extraction. Within this approach, the derivation of sentence (6) corresponds to the structure in (7): the leftmost element of a DP *čji deti* undergoes A'-movement out of that DP.

(6) **Čji**   včera **deti** zaboleli$_i$?
whose.PL yesterday children get_sick.PST.PL
'Whose children got sick yesterday?'   (Russian)

(7)   = (6)
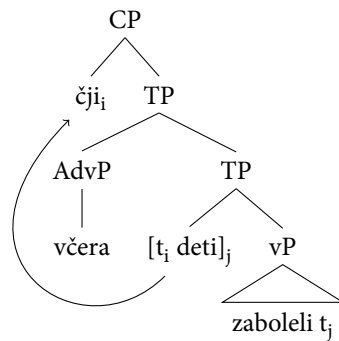
Another view is to formally analyze such split configurations using the framework of Chomsky's (1993) Copy and Deletion theory of movement. According to this framework, movement of a constituent is carried out by creating a copy of this constituent in a structurally superior position. In the normal case, all lower copies are then deleted, and only the highest one enters PF, following the Linear Correspondence Axiom (Kayne 1994). The phenomenon of so-called discontinuous spellout (DS), or scattered deletion, occurs when the deletion process partially applies to the copies (cf. Nunes 1999, 2004, Fanselow & Ćavar 2002, Bošković 2005). The constituent spelled out discontinuously appears split. The DS approach can therefore be employed to analyze sentence (6) in the way presented in (8).

(8)   = (6)

CP
├── [čji ~~deti~~]$_i$
└── TP
    ├── AdvP
    │   └── včera
    └── TP
        ├── [~~čji~~ deti]$_i$
        └── vP
            └── zaboleli [~~čji deti~~]$_i$

In this article, I argue that these two mechanisms for forming split configurations can explain the differences in the patterns of DP splits that were found in my simple-clause and dependent-clause experiments: in one case, "true" syntactic subextraction is observed, while in the other case, what looks like subextraction is, in fact, the result of discontinuous spellout. To test this hypothesis, one needs to ascertain whether it is possible to discontinuously spell out a DP that moves cross-clausally, because there is no consensus on this question in existing research on the Russian language. The methodological problem here is that it cannot be addressed experimentally in a direct manner: trees (7) and (8) above show that split DPs without complements are compatible with both the LBE and the DS analyses. Therefore, the (im)possibility of cross-clausal DS should be investigated using some other, structurally unambiguous configuration, such as split PPs. In the following section, I give a brief theoretical background about DS and justify the choice of PPs as experimental material.

2 XP-SPLITS AND DISCONTINUOUS SPELLOUT

Split DPs like those discussed in the previous section are not the only phrase type allowing discontinuous realization. Split PPs are widely attested in different languages as well: (9) shows a Serbian example where a preposition and a *wh*-word *o kojim* are separated from a nominal head *studentima* (Bašić 2004: p.63).

(9)   **O   kojim** su   oni **studentima** objavili   članak?
      about which AUX they students   published article
      'About which students did they publish an article?'   (Serbian)

Unlike DPs, split PPs configurations cannot be attributed to the LBE because the left part of the split phrase does not form a constituent, so it is not an object for A'-movement. One family of approaches proposes a purely syntactic mechanism for such splits by dividing the derivation into two steps. According to the Remnant Movement (RM) analysis, for instance, the sentence (9) is derived as follows: the NP$_i$ *studentima* (= part A) moves to Spec,FP below TP, then the PP$_j$ [$_{PP}$ *o kojim* t$_i$] (= part B), which contains the trace of part A, goes up to Spec,FocP and ends up in the left clause periphery. A generally similar approach is proposed for Russian by Sekerina (1997) under the name of the Double Movement (DM) analysis.

Nonetheless, the syntactic approaches to splitting have several weaknesses in explaining empirical Russian data set out by Pereltsvaig (2008: p.12–14) as a result of Colloquial Russian corpus research. First of all, as the RM- and DM-analyses imply A'-movement, one would expect it to operate with constituents, yet neither part A nor part B form an obligatory constituent; see *soveršenno xarakter* in (10-a). Secondly, splitting into three parts is possible (10-b). Thirdly, the analyses predict a certain neutral word order of splits: part B would move to the leftmost clause periphery, and part A would be fronted to the left as well, but not as far as part B. This prediction is borne out in Bosnian/Croatian/Serbian,

but in Russian, part A is more likely to stay postverbally *in situ* (11).

(10) a. **Nezlobivyj** u nego **soveršenno xarakter**.
          kindhearted to him absolutely   disposition
          'He has an absolutely kindhearted disposition.'
      b. **Očen'** oni **xoroshie** byli **l'udi**.
          very   they good   were people
          'They were VERY GOOD people.'

(11) a. **Nailučšemu** oni   predložili **kandidatu** poziciju.
          best   they offered   candidate job
          'It is the BEST candidate that they offered a job.'
      b. [??]**Nailučšemu** oni   **kandidatu** predložili poziciju.
          best   they candidate offered   job
          intended: 'It is the BEST candidate that they offered a job.'
      c. *****Nailučšemu** oni   predložili poziciju **kandidatu**.
          best   they offered   job   candidate
          intended: 'It is the BEST candidate that they offered a job.'   (Russian)

To provide a more adequate analysis, Pereltsvaig (2008) adapts Fanselow & Ćavar's (2002) DS approach[1]. They argue that if there is an XP = [a^p [b c]^q] containing two semantic or pragmatic features (namely [+wh], [+foc], etc.) and these features are supposed to be checked by two different heads H^p and H^q, then the normal deletion cannot realize them both, and splitting becomes the last resort option for satisfying the requirements of both heads. This conclusion is in accordance with the empirical facts that in Slavic and German, the right part of a split constituent must bear the focus feature, while the left part may be a topic or a second focus. Therefore, the configuration in (12) is derived as in (13). In this article, I will follow Pereltsvaig's (2008) line of argument and consider split PPs to be instances of DS. This is what makes them convenient materials for the intended experimental investigation.

(12) **Protiv sovetskoj** on vystupal   **vlasti**.
      against Soviet   he demonstrated regime
      'It is against the Soviet regime that he demonstrated.'   (Russian)

(13) a. [$_{PP}$ Protiv [$_{DP}$ sovetskoj vlasti] on vystupal [$_{PP}$ protiv [$_{DP}$ sovetskoj vlasti]].
      b. [$_{PP}$ Protiv [$_{DP}$ sovetskoj ~~vlasti~~] on vystupal [$_{PP}$ ~~protiv~~ [$_{DP}$ ~~sovetskoj~~ vlasti]].

Now let us turn to the properties of Russian split phrases that can be found in the literature to date, in particular, whether long-distance DS is possible. Among Slavic languages, such cross-clausal splits are attested in Bosnian/Croatian/Serbian (Bašić 2004: p.30):

(14) **Koji** si čuo da je **auto** slupao?
      which AUX heard that AUX car   crashed
      'Which car did you hear he crashed?'   (Serbian)

Regarding the Russian language, the fullest list of constraints applying to phrase splitting is presented in the aforementioned work, Sekerina (1997: p.168–190). The author experimentally investigates split scrambling constructions and finds the following tendencies, including a ban on splitting across clause boundaries (15-b):

(15) a. Single modifier constraint: multiple (attributive) adjectives prevent splitting;
      b. Short-distance constraint: long-distance splitting is impossible;
      c. Periphery constraint: the two parts of a split phrase must occur at the left- and right-edges of the clause;

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[1]It is worth mentioning, however, that this is not the first application of the DS approach to Russian data: see Junghanns & Zybatow (1997) for an analysis of split configurations with contrastive focus.

d.   One-split-per-clause constraint: only one split constituent is allowed per clause;

e.   Preposition-first constraint: split PPs can only occur if some part of the complement of P remains adjacent to P and no part of the complement of P precedes the preposition.

However, Pereltsvaig (2008: p.22–24) argues that only (15-d) and (partially) (15-e) are supported by the colloquial Russian data, and there are counterexamples to each of the other constraints attested both in the corpus and in informal surveys of native speakers. Long-distance splits with different types of A'-movement are shown in (16) (all three examples from Pereltsvaig 2008: p.22–24, (33a)–(33c))):

(16)   a.   Ja xoču, papa, znaeš,   **kakoj** [$_{CP}$čtob ty   mne   **toporik** kupil]?
         I   want Daddy you.know what.M   that you me.DAT hatchet bought
         'Daddy, you know what kind of hatchet I want you to buy for me?'

       b.   Popytaemsja **terminologičeskuju** [$_{CP}$čtoby **jasnost'** v   nix   vnesti...]
         we.will.try   terminological   that clarity   into them make
         'We will try to put some terminological clarity into them...'

       c.   Net, menja dejstviteľno interesuet, **tvoj** [$_{CP}$kuda delsja   **Mishka**]?
         no   me   really   interests   your   where have.got.to Mishka
         'No, I am really curious where your Mishka has got to.'   (Russian)

Thus, there is no agreement on the properties of interclausal phrase splitting in Russian and no detailed investigation of this exact question. It is also hard to set any preliminary expectations. On the one hand, discontinuous spellout is a more resource-costly operation than full spellout (as it requires two iterations of deletion instead of one; see Nunes 1999). When combined with long-distance dependencies, also resource-demanding, it can possibly cause unresolvable parsing difficulties, leading to unacceptability. On the other hand, the interpretation difficulty is gradual, so even if such constructions are rare but grammatically allowable, they can still be acceptable up to a point. An experimental investigation involving a large sample of Russian native speakers is a suitable strategy for a research question of this kind.

3 EXPERIMENTAL RESEARCH

Let us summarize the premises and aims for the following experiments. My previous research showed pattern differences between intraclausal and cross-clausal extraction of a *wh*-word *čej* out of subject and object DPs. My hypothesis links these differences with two separate splitting mechanisms: I suppose that in simple clauses, one observes "true" LBE, while in biclausal configurations, *wh*-constituents move in their entirety but are spelled out discontinuously. The phenomenon of interclausal discontinuous spellout in Russian is under-described, so additional experiments are needed to determine the borders of its acceptability. However, the assumption put forward is impossible to test using DPs because of their compatibility with either the LBE or the DS analyses: both approaches give the same predictions about how derived sentences would look. For this reason, PPs were chosen as the experimental material for testing acceptability of long-distance splits.

What measuring tools should be used to capture the (un)acceptability of cross-clausal phrase splitting? This is a difficult question to answer: a direct comparison of splitting in monoclausal *vs.* biclausal stimuli may not be illustrative. According to the Reductionist framework (cf. Kluender & Kutas 1993, Phillips 2013), which assumes that the unacceptability of a certain configuration might be due to not only the grammar but also cognitive resources, one can expect biclausal stimuli to obtain lower ratings just because they are more complex, hence longer and harder to process. Therefore, a decline between monoclausal and biclausal split sentences would presumably be observed, but

some kind of baseline is required to estimate the degree to which splitting influences it. I chose sentences with fully *wh*-moved phrases for such a baseline. In that manner, two experimental factors (simple/biclausal sentence, full/discontinuous spellout) each have two levels, one of which is expected to lower acceptability. Thus, one condition combines two "lowering" factor levels (discontinuous spellout + biclausal sentence). If the ratings of this condition are similar to the sum of both factor levels, then linear additivity is observed and no parser overload is stated. On the contrary, if the ratings of this condition are significantly lower than the ratings of the factors separately, then the interaction between the factors is superadditive. The superadditivity indicates one of two possible reasons for unacceptability: either the configuration in question is banned by the grammar or it requires more resources than the cognitive system has. To sum up: the ratings of cross-clausal DS are expected to be the lowest, but this in itself is not a sign of unacceptability. Only the superadditive interaction between the factors would signal either grammatical restriction or parser overload caused by the corresponding condition.

There are two ways to identify the superadditivity effect (cf. Maxwell & Delaney 2003, Sprouse et al. 2012). The first one is visual: the lines of the interaction plot might be parallel, or one of them might decline more than the other. The second one is digital and uses the so-called differences-in-differences measure, or DD. The DD score is calculated according to formula (17), where *a*, *b*, *c*, and *d* stand for the mean z-scores of corresponding experimental conditions. A positive DD score signals the presence of superadditivity. Although there is no set quantitative threshold, a DD score in the range of 0.75–1.25 is considered to be sufficient for postulating an effect in prior research, e.g. Kush et al. (2018).

(17) $DD = (b - d) - (a - c)$

The present experimental study consists of three steps. Firstly, split PPs are compared with fully *wh*-moved phrases in simple and bipredicative sentences (section 3.1). Second, the same design is used with DPs to see if the PP-experiment results are consistent with DP material (section 3.2). Lastly, I compare whether split DPs in simple and bipredicative configurations have the same rating pattern as split PPs (section 3.3). All three experiments had a fully crossed design and included two independent variables with two levels each, which are presented in (18).

Experiment	Var. 1 (Clause Structure)	Var. 2
Split *vs.* full PP	simple / bipredicative	discontinuous / full spellout
Split *vs.* full DP	simple / bipredicative	discontinuous / full spellout
Split PP vs. DP	simple / bipredicative	DP / PP

(18) appears to the left of the table.

Each experiment underwent the same preparatory process. Eight sentences were made for every experimental condition, resulting in a total of 32 test stimuli, which were then distributed on eight experimental lists according to the Latin square design. Alongside the test stimuli, each experimental list contained 32 fillers; hence, one list consisted of 64 stimuli. Half of the fillers were ungrammatical; the level of their acceptability was set based on introspection (as a native Russian speaker) and an informal survey of several native speakers (linguistic students). Different fillers were created for each experiment, however, they all had the same structure. Grammatical ("good") fillers consisted of simple and complex sentences with purpose dependent clauses with A'-subextraction of (full) object DPs and PPs (19). Ungrammatical ("bad") fillers contained excessive auxiliary verbs, excessive prepositions, and/or errors in aspect and tense coherence between matrix and dependent predicates (20). Examples of test sentences for each experiment are listed in the corresponding subsections below.

(19) a. Kakuju muzyku Aľa slušajet, čtoby podn'ať nastrojenie?
     what.F music.F Alya listen.PRES.3SG COMP raise.INF mood
     'What kind of music does Alya listen to to cheer up?'

   b. Pod čjo meroprijatije Inna arendovala kafe?
      under whose.N event.N Inna rent.PST.F café
      'For whose event did Inna rent a cafe?'

   c. Na kakoj avtobus Vaľa sadits'a, čtoby dojexať do instituta?
      On what.M bus.M Valya sit.PRES.3SG COMP reach.INF until institute
      'Which bus does Valya take to get to the institute?'

(20) a. *Kakije skazki byla Alisa pročitala?
     what.PL tale.PL AUX.PST.F Alisa read.PST.F

   b. *V čej sup Tas'a varit, čtoby budet
      in whose.M soup.M Tasya boil.PRES.3SG COMP AUX.FUT.3SG
      obedať?
      have.lunch.INF

   c. *Na čju gitaru Darina isportila?
      on whose.F guitar.F Darina ruin.PST.F

The stimuli were presented in written form and accompanied by a Likert scale of 1–7, where 1 stood for "a bad sentence" and 7 stood for "a good sentence". The visual modality and the lack of context may seem damaging for the stimuli's interpretability, but this method was chosen so that the results of these experiments could be applied to those of my subject-object subextraction experiments ((4) and (5)), which, in turn, were designed to be compared with Polinsky et al.'s (2013) (2).

Each participant completed a brief questionnaire about their sociolinguistic profile, including their age, gender, education level, cities of birth and residence, whether they have a linguistic education, and whether they consent to personal data processing. After the questionnaire, the participants rated three practice filler sentences, grammatical and ungrammatical, to get used to the scale.

The experiments were created on the platform IbexFarm (Drummond 2011) and spread through social networks and the crowdsourcing resource Yandex.Toloka. The statistical processing of the collected data was performed using R software[2]. The first step of statistical analysis consisted of the normalization (z-transformation) of ratings in order to minimize any individual scale biases. After that, I fitted linear mixed models to predict z-scores with the experimental factors. In these models, respondents' IDs and sentence numbers were used as random slopes.

3.1 EXPERIMENT 1. PPS: FULL *VS.* DISCONTINUOUS SPELLOUT

The first experiment aims to assess the acceptability of split PPs in comparison with full *wh*-extraction in simple and bipredicative clauses in Russian. The hypothesis is that cross-clausal DS will be rated the lowest among all conditions; however, it can be postulated as impossible in Russian only if the interaction between the factors of spellout type and clause type is superadditive.

3.1.1 EXPERIMENT 1: DESIGN

The following independent variables were manipulated: Clause Structure (two levels: simple/dependent) and Spellout Type (two levels: full/discontinuous). Four matrix predicates taking *čtoby*-clauses as their complements were used: *xotet'* 'to want', *nastaivat'* 'to insist', *dobivat's'a* 'to seek, to pursue', and *mečtat'* 'to dream (of)'. I also chose four prepositions compatible with accusative nouns: *na* 'on, at', *v* 'in', *za* 'behind, for', and *pod*

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[2]www.r-project.org

'under'. All nouns in PPs were inanimate, and all PPs were located postverbally. One example of the four conditions is given below (21):

(21)   a.   **Na kakuju kartinu**   Peťa posmotrel?
           on what.F painting.F.ACC Petya look.at.PST.M
           'Which painting did Petya look at?' (Full + simple clause)
       b.   **Na kakuju** Peťa posmotrel   **kartinu**?
           on what.F Petya look.at.PST.M painting.F.ACC
           'Which painting did Petya look at?' (Discontinuous + simple clause)
       c.   **Na kakuju kartinu**   Vas'a xočet,   čtoby Peťa
           on what.F painting.F.ACC Vasya want.PRES.3SG COMP Petya
           posmotrel?
           look.at.PST.M
           'Which painting does Vasya want Petya to look at?' (Full + dependent clause)
       d.   **Na kakuju** Vas'a xočet,   čtoby Peťa posmotrel
           on what.F Vasya want.PRES.3SG COMP Petya look.at.PST.M
           kartinu?
           painting.F.ACC
           'Which painting does Vasya want Petya to look at?' (Discontinuous + dependent clause)

3.1.2 EXPERIMENT 1: RESULTS

The experiment was completed by 133 native Russian speakers (78 women) ranging in age from 14 to 65 (mean = 32, SD = 10.9); 32 respondents claimed to have a linguistic education. The results of the first experiment are shown in interaction plot 1. Table (22) presents mean values, standard deviations, and standard errors of z-scores for each experimental condition (numbers in brackets represent corresponding values of raw scale ratings).
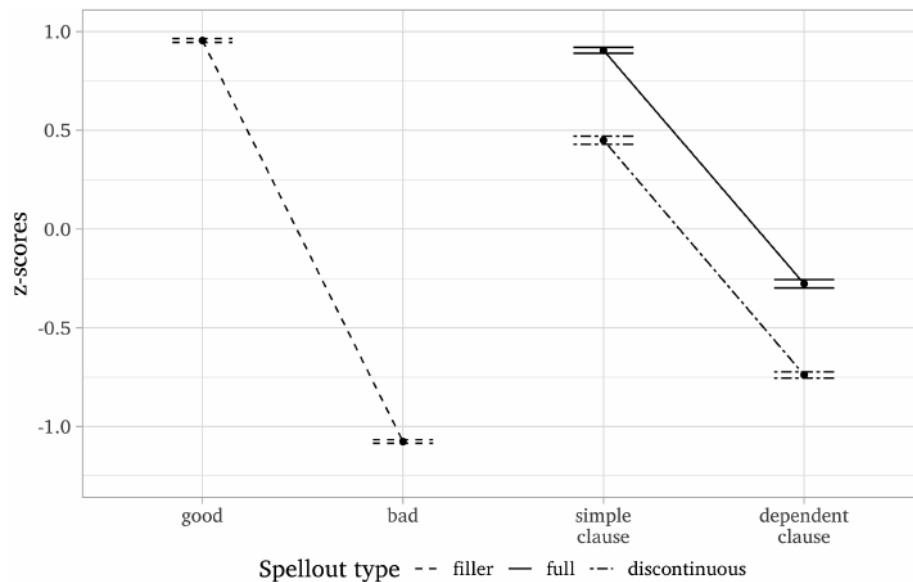

Figure 1: PP full *vs* discontinuous spellout

(22)

Condition	Mean	SD	SE
a. Full + simple clause	0.905 (6.15)	0.475 (1.27)	0.014 (0.04)
b. Disc + simple clause	0.450 (5.06)	0.653 (1.8)	0.021 (0.057)
c. Full + dependent clause	-0.277 (3.29)	0.671 (1.91)	0.021 (0.06)
d. Disc + dependent clause	-0.739 (2.19)	0.503 (1.5)	0.016 (0.046)

Before addressing the DD score, let us take a look at the inferential statistics to determine the significance of the manipulated factors. The linear mixed model contains the following formula of random slopes: (1 + position | respondent) + (1 | sentence)). The model's total explanatory power is substantial (conditional R^2 = 0.63), and the part related to the fixed effects alone (marginal R^2) is of 0.54. It demonstrates the statistical significance of Clause Structure (β = 1.18, SE = 0.05, p < 0.01) Spellout Type (β = -0.46, SE = 0.04, p < 0.01) but not their interaction (β = 0.01, SE = 0.06, p = 0.836).

As can be seen in plot 1, the additivity in this case seems to be linear: the two lines are close to being parallel. The DD score confirms this: DD = 0.007. Although a positive DD-coefficient is considered an indicator of superadditivity, the value obtained is extremely low. Moreover, ratings of cross-clausal DS are significantly higher than those of ungrammatical fillers (two-sided t-test for independent samples, t = -18.858, df = 1727.3, p < 0.01). In bipredicative clauses, discontinuous and full spellout of moving prepositional phrases are clearly distinguishable. On the whole, the results of the first experiment show that neither the grammar nor the parser component forbid cross-clausal DS.

3.2 EXPERIMENT 2. DPS: FULL *VS.* DISCONTINUOUS SPELLOUT

In experiment 1, PPs were chosen instead of DPs because the latter are compatible with both syntactic (subextraction) and phonological (discontinuous spellout) analyses, causing inconvenience for an experimental investigation. Meanwhile, the final goal is to explain the differences in DP splitting in simple and bipredicative sentences. The first experiment demonstrated the absence of a critical ban on cross-clausal DS, but this conclusion cannot be generalized without an experimental verification of the (dis)similarity between acceptability patterns of split PPs and DPs. In other words, it is not self-evident whether split DPs, in comparison with fully dislocated phrases in simple and bipredicative sentences, evince linear additivity like split PPs. Hence, the second experiment aims to measure the overall acceptability of cross-clausal DP splitting using the same methodology as in the first experiment. For the hypothesis about the possibility of discontinuous spellout of a DP moving across clausal boundaries to be confirmed, no superadditive interaction should be recorded between the factors of Spellout Type and Clause Structure.

One more factor needs to be taken into consideration. Polinsky et al. (2013) and Belova (2021b) conducted experiments with different *wh*-words: *kakoj* 'what.ADJ' and *čej* 'whose'. Despite there being no previous research providing a basis for expecting an impact of *wh*-word type on LBE in Russian, I decided to test this as an additional parameter.

3.2.1 EXPERIMENT 2: DESIGN

The design of the second experiment replicated that of the first one. The following independent variables were manipulated: Clause Structure (two levels: simple/dependent) and Spellout Type (two levels: full/discontinuous). *Wh*-word Type was added as a control variable, so half of the stimuli featured the *wh*-word *čej* ('whose'), while the other half contained the '*wh*-word *kakoj* ('what.ADJ'). The status of a control variable does not allow treating it like an independent variable, and the corresponding results will be sketchy. In the meantime, while assessing the ratings of the independent variables, the levels of the control variables are believed to compensate each other and not compromise the

overall rating levels of the experimental conditions. Furthermore, the total number of stimuli used – 32 – is a twofold minimum required (that is, 4 * 4 = 16 sentences), so the number of observations is expected to be reliable to process, specifically to calculate DD-scores for stimuli with different *wh*-words separately. (23) shows an example of four experimental conditions containing the *wh*-word *kakoj*.

(23)   a.   **Kakuju kvartiru**   Sťopa snʼal?
             what.F   apartment.F Styopa rent.PST.M
             'Which apartment did Styopa rent?' (Full + simple clause)
        b.   **Kakuju** Sťopa snʼal   **kvartiru?**
             what.F   Styopa rent.PST.M apartment.F
             'Which apartment did Styopa rent?' (Discontinuous + simple clause)
        c.   **Kakuju kvartiru**   Kirill xočet,   čtoby Sťopa snʼal?
             what.F   apartment.F Kirill want.PRES.3SG COMP Styopa rentPST.M
             'Which apartment does Kirill want Styopa to rent?' (Full + dependent clause)
        d.   **Kakuju** Kirill xočet,   čtoby Sťopa snʼal   **kvartiru?**
             what.F   Kirill want.PRES.3SG COMP Styopa rent.PST.M apartment.F
             'Which apartment does Kirill want Styopa to rent?' (Discontinuous + dependent clause)

3.2.2 EXPERIMENT 2: RESULTS

The second experiment was completed by 128 native Russian speakers (82 women) from 16 to 73 years old (mean = 29.76, SD = 11.7); 29 respondents claimed to have a linguistic education. The results are shown below in interaction plot 2. The mean values, standard deviations, and standard errors of z-scores and the raw scores for every experimental condition are listed in table (24).
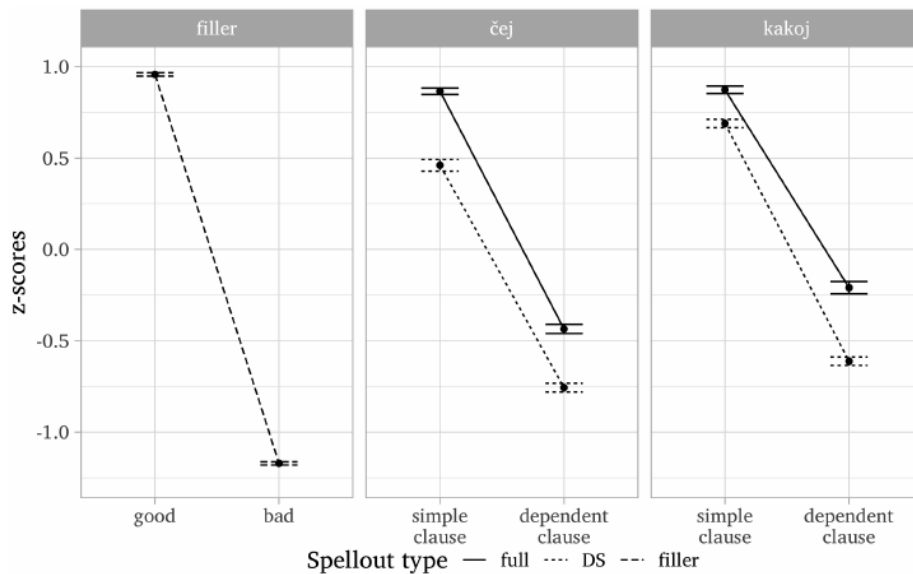

Figure 2: DP full *vs.* discontinuous spellout

(24)

	Condition	Mean	SD	SE
čej	a. Full + simple	0.868 (6.26)	0.411 (1.16)	0.017 (0.049)
	b. Disc + simple	0.454 (5.16)	0.646 (1.78)	0.031 (0.086)
	c. Full + dependent	-0.435 (3.05)	0.599 (1.83)	0.025 (0.075)
	d. Disc + dependent	-0.758 (2.24)	0.503 (1.57)	0.024 (0.076)
kakoj	a. Full + simple	0.861 (6.15)	0.424 (1.18)	0.02 (0.057)
	b. Disc + simple	0.693 (5.84)	0.531 (1.49)	0.022 (0.062)
	c. Full + dependent	-0.204 (3.58)	0.629 (1.99)	0.033 (0.062)
	d. Disc + dependent	-0.614 (2.63)	0.552 (1.72)	0.023 (0.071)

Wh-word Type was included in the linear mixed model as one of the random effects: (1 | sentence) + (1 + clause type + spellout type + clause type : spellout type | respondent) + (1 | *wh*-word). The total explanatory power of the model is substantial (conditional $R^2 = 0.72$), and the part related to the fixed effects alone (marginal R^2) is of 0.55. Both Clause Structure ($\beta = 1.237$, SE = 0.046, p < 0.01) and Spellout Type factors ($\beta = 0.324$, SE = 0.036, p < 0.01) but not their interaction ($\beta = -0.08$, SE = 0.06, p = 0.224) appeared to be statistically significant — just like in the first experiment.

The visual difference between the two types of *wh*-words is clear: the lines in the *čej*-graph seem to be parallel, while in the *kakoj*-graph a decline is observed, resembling a superadditive pattern. DD scores confirm this assumption: DD = -0.084 for stimuli with *čej* and DD = 0.218 for those with *kakoj*. The latter number is positive; however, it is lower than the critical level that was used in previous works, such as Kush et al. (2018). This inconsistency seems to be due to some kind of intrinsic property of sentences with *kakoj*: there is no reason to postulate that it is possible to discontinuously spell out *čej*-phrases but not *kakoj*-phrases. One piece of circumstantial evidence in favor of this assumption is that even the lowest-rated test conditions are more acceptable than ungrammatical fillers (two-tailed t-test for independent samples: t = -29.629, df = 1431.1, p < 0.01 for *čej*; t = -33.008, df = 1347.8, p < 0.01 for *kakoj*).

Hence, the acceptability patterns of split and dislocated DPs mimic those of PPs, at least for the *wh*-word *čej* that both experiments had in common. Splitting a phrase between a dependent and a matrix clause is less acceptable than every other alternative, but not forbidden. Nevertheless, the results of the second experiment are not sufficient to draw conclusions about the mechanisms forming split configurations: split DPs are still ambiguous in view of theoretical approaches.

3.3 EXPERIMENT 3. DISCONTINUOUS SPELLOUT OF PPS *VS.* DPS

The final step in this study is to compare the "behavior" of split PPs and DPs in two types of clauses. To do so, I need to make the type of phrase (preposition/determiner) an independent variable, which makes it possible to statistically assess differences in the acceptability of XP-splits. I assume that if there are no such differences, then split DPs and PPs are formed by the same underlying mechanisms.

3.3.1 EXPERIMENT 3: DESIGN

The experimental design tested two independent variables: Phrase Type (two levels: PP/DP) and Clause Structure (two levels: simple/dependent). Besides, the second experiment demonstrated the difference in rating levels of stimuli with the *wh*-words *čej* and *kakoj*, so *Wh*-word Type was added as a control variable. The experimental sentences contained the same four matrix predicates and the same four prepositions as in the first experiment. DPs undergoing split were direct objects in the accusative case. All nouns in DPs and PPs were inanimate. Phrases of both types were located in the postverbal clause-final position. A sample token set is presented in (25).

(25) a. **Čju**   Peťa uvidel   **kartinu**?
      whose.F Petya see.PST.M painting.F.ACC
      'Whose painting did Peťa see?' (DP + simple clause)

  b. **Na čju**   Peťa posmotrel   **kartinu**?
      on whose.F Petya look.at.PST.M painting.F.ACC
      'Whose painting did Petya look at' (PP + simple clause)

  c. **Čju**   Vaśa xočet,   čtoby Peťa uvidel   **kartinu**?
      whose.F Vasya want.PRES.3SG COMP Petya see.PST.M painting.F.ACC
      'Whose painting does Vasya want Petya to see?' (DP + dependent clause)

  d. **Na čju**   Vaśa xočet,   čtoby Peťa posmotrel
      on whose.F Vasya want.PRES.3SG COMP Petya look.at.PST.M
      kartinu?
      painting.F.ACC
      'Whose painting does Vasya want Petya to look at?' (PP + dependent
      clause)

3.3.2 EXPERIMENT 3: RESULTS

The third experiment was completed by 129 native Russian speakers (65 women) ranging in age from 14 to 61 (mean = 34, SD = 10.6); 16 respondents claimed to have a linguistic education. The results are presented in interaction plot 3. In table (26), you can see the mean values, standard deviations, and standard errors of z-scores (and raw ratings) for each experimental condition. In contrast to the second experiment, there is no need to calculate DD scores in this one, so the statistical values are not divided by the *wh*-word.
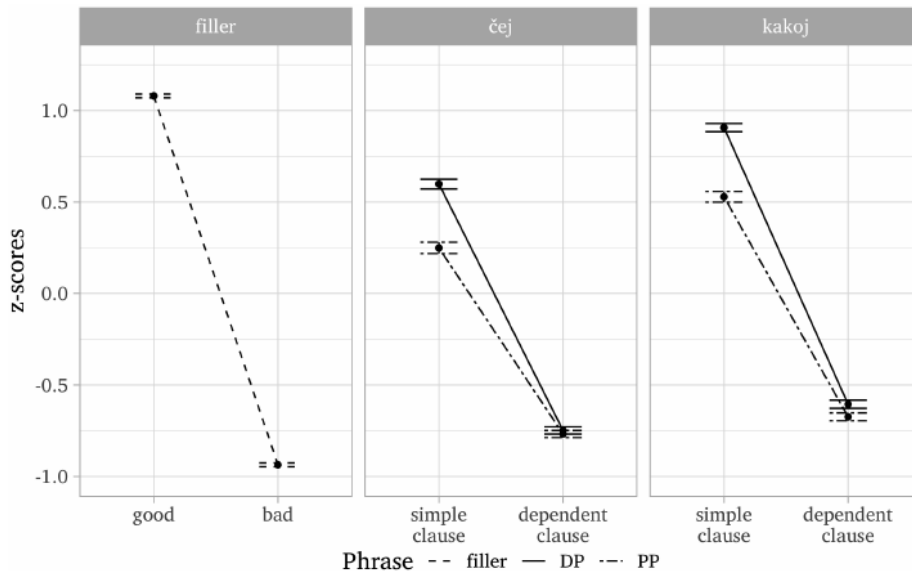

Figure 3: Discontinuous spellout PP *vs* DP

(26)

Condition	Mean	SD	SE
a. DP + simple clause	0.754 (5.51)	0.572 (1.58)	0.018 (0.025)
b. PP + simple clause	0.388 (4.64)	0.677 (1.89)	0.022 (0.06)
c. DP + dependent clause	-0.677 (2.11)	0.474 (1.43)	0.015 (0.045)
d. PP + dependent clause	-0.721 (2.01)	0.463 (1.41)	0.015 (0.045)

The fitted linear mixed model included the following random slopes: (1 + clause type + phrase type | respondent) + (1 | sentence) + (1 | *wh*-word). The model's total explanatory

power is substantial (conditional R^2 = 0.69) and the part related to the fixed effects alone (marginal R^2) is 0.57. Within this model, the effect of Clause Structure is significant (β = 1.41, SE = 0.05, p < 0.01), whereas the effect of Phrase Type is not (β = -0.06, SE = 0.03832, p = 0.147). Their interaction is also statistically significant (β = -0.306, SE = 0.053, p < 0.01). The post hoc Tukey's pairwise comparison finds significant differences between two phrase types in simple clauses (p < 0.01) but not dependent clauses (p = 0.271). Concerning *Wh*-word Type, it is clear that although *kakoj* got higher ratings, two facets evince identical splitting patterns. Therefore, the two types of phrases are not distinguishable when split across clause boundaries, but when located in simple clauses, split DPs are more acceptable than split PPs.

3.4 EXPERIMENTS: SUMMARY

In this study, three Acceptability judgment task experiments were conducted to answer two research questions: the possibility of cross-clausal discontinuous spellout and the comparison of the patterns of splitting of DPs and PPs in simple and bipredicative sentences. Acceptability ratings provided by Russian native speakers reveal the following: (i) in every configuration used, all split stimuli are rated significantly higher than un-grammatical fillers; (ii) a split in a dependent clause cannot be posited as a superadditive condition for either DPs or PPs, hence, it is possible; (iii) DPs and PPs behave similarly when split between a dependent and a matrix clause, but in simple clauses, split DPs are rated higher than split PPs.

4 DISCUSSION

Let us address both research questions in light of the experimental conclusions. The hypothesis concerning the possibility of cross-clausal DS was based on the notion of superadditivity: if such a phenomenon occurs, then either a grammatical or a cognitive ban is imposed on the configuration in question. Otherwise, such configurations are resource-demanding but not forbidden. PPs and DPs with the *wh*-word *čej* demonstrate a lack of superadditive interaction between clause structure and spellout type, thereby allowing me to conclude that DS across clausal boundaries in Russian is acceptable but with a rating level "transposed" down from that of full *wh*-dislocation. The results of DPs with the *wh*-word *kakoj* appear to be more challenging, as the split in bipredicative clauses is rated superadditively lower. The lack of difference in split patterns between two *wh*-words in the third experiment indicates that the reason for the ratings decrease should be sought in some interfering factors.

The second question pertains to the comparison of the splitting of two types of phrases in simple and bipredicative sentences. The research hypothesis claimed that similarity in acceptability ratings would reflect similarity in splitting mechanisms. This is borne out only partially, in dependent clauses. One alternative explanation is that all movements across clause boundaries cause the floor effect, i.e., the test configurations are so slightly acceptable that possible factors cease to make any difference. Yet this does not hold: the ratings of the cross-clausal split in the third experiment have "room to fall" as they are much higher than those of ungrammatical fillers. In such conditions, it seems unlikely that the full match of DPs and PPs in dependent clauses in both *čej*- and *kakoj*-stimuli is the result of coincidence. Therefore, I suppose that the splitting mechanisms must be different for the two types of sentences as well as for the two types of phrases. In dependent clauses, there has to be one way of splitting shared by both DPs and PPs, which would lead to equal acceptability. As there is only one possible option for PPs, this is discontinuous spellout (and not LBE). Conversely, in simple clauses, there can be two potential splitting means, resulting in different acceptability rates. Again, PPs are only compatible with DS, so there is no choice. Split DPs can be analyzed through two mechanisms; thereby, higher ratings may reflect that, unlike PPs, they underwent "true"

syntactic subextraction. This observation is consistent with Nunes's 1999 statement that discontinuous spellout is more costly regarding the parser's resources than full spellout. Thus, in the presence of two possible split transformations, DPs "choose" the one that is less penalized. The fact that postverbal object DPs in dependent clauses should not be opaque to subextraction as they are in their *in situ* complement position also acts in favor of the proposed hypothesis. Ratings of split DPs this low cannot be explained within the LBE approach.

A similar approach to Slavic data that incorporates two transformations for different configurations can be found in Fanselow & Ćavar (2002). In Croatian, PPs (27-a) and dative DPs (27-b) cannot be split if they stay in their base, viz. postverbal, position. In turn, accusative DPs can undergo splitting even when following the verb (27-c). The authors argue that discontinuous spellout is only applied when a constituent moves preverbally to specifier positions linked to operator features. When staying postverbal, only accusative DPs can be subject to "normal" subextraction as they are not islands, and some kind of remnant movement or LBE is observed.

(27)   a.   ***Na kakav** je Ivan bacio   loptu **krov**?
             on what   is Ivan thrown ball   roof
             'On what roof did Ivan throw a ball'?
        b.   ***Čijoj**   je Ivan dao   knjigu **sestri**?
             whose is Ivan given book   to.sister
             'Whose sister has Ivan given the book to?'
        c.   **Čiju**   je Ivan vidio **sestru**?
             whose is Ivan seen sister
             'Whose sister has Ivan seen?'   (Croatian)

The bigger goal of this research was to explain the results of the experiments devoted to the subject-object subextraction asymmetry that were described in the introduction, §1. Let us recollect the patterns of splitting of structurally different DPs in simple (4) and dependent (5) clauses. In simple clauses, each of the four types of DP (unaccusative, unergative, transitive subject, and transitive object) is more transparent when located preverbally than postverbally. In the preverbal position, all three types of subjects are rated the same. In the postverbal position, the two intransitive subjects are rated the same and higher than transitive subjects. In turn, in bipredicative clauses, the factor of position is not significant, splitting of all four types of DP is rated similarly slightly acceptable, and transitive subjects in the postverbal position get even lower ratings, at the same level as ungrammatical fillers. Basing my arguments on the conclusions about the nature of splitting, I argue that the pattern mismatch in subject splitting in simple and dependent clauses boils down to two different mechanisms, namely the LBE and the DS, respectively.

If split configurations in simple clauses are formed with syntactic subextraction, then one can expect them to be regulated by syntactic or information-structural constraints that can address corresponding properties of DPs creating the transparency hierarchy. DS, for its part, does not predict any differences in DP opacity regarding argument structure or its information-structural status. Hence, at least in the case of DPs with *wh*-word *čej*, I propose the following analysis of split asymmetry. In simple clauses, the most unexpected results were demonstrated by object DPs, as they happened to be more transparent in their derived topic position and not *in situ*. This implies the influence of information structure on the opacity of DPs, not their syntactic status. The greater acceptability of subextraction from the topical preverbal position may be related to the tendency to maximally narrow the sentence's focus down to one *wh*-word. Since *wh*-words bear the focus feature by their nature, the best configuration allowing such subextraction is the one in which all other clausal elements are included in the topic (which in Russian is normally preverbal).

The contrasts in DP opacity in bipredicative clauses must have some other causes.

Belova (2021a) discovered that when presented without context and with non-basic (O)VS word order, affirmative stimuli with all three types of verbal structure received lower ratings in both simple and dependent *čtoby*-clauses. In the experiment containing *wh*-subextraction within a simple clause, this penalty is also observed, but in dependent clauses it seems to be neutralized. There must be some factors that raise the acceptability of splitting subject and object DPs in their derived positions so that they achieve the same level as their SV(O) counterparts, except for the postverbal transitive subject, which gets even more penalized. Splitting is thus more acceptable in transitive stimuli if the DP is preverbal. One possible explanation for this phenomenon is cognitive: the structure that includes a DP intruding with two parts of a split constituent is more resource-demanding than one that does not. Similar observations are made in Barbosa & de Cat (2019: p.14) for French data where topicalized object DPs interfering in a *wh*-chain lower the acceptability more dramatically than subject DPs (28). Nevertheless, it should be noted that no firm conclusions can be drawn without an experimental investigation using online methods, such as self-paced reading, capable of capturing cognitive load.

(28)   a.   ???Voici   les médailles que, les athlètes, ils   sont fiers
             PRESENTATIVE the medals   that the athletes they are   proud
             d'avoir   remportées.
             to=have.INF won
             'These are the medals the athletes are proud to have won.'
       b.   *Voici   les athlètes qui, les médailles d'or,   les   ont
             PRESENTATIVE the athletes who the medals   of=gold them have
             remportées.
             won
             'These are the athletes who, the gold medals, have won.'   (French)

In the case of intransitive stimuli, the order VS must increase the acceptability of splitting. This is in accordance with the Periphery Constraint postulated in Sekerina (1997) for Russian split scrambling PPs: to balance the parsing difficulty, the syntactic analyzer tends to locate the parts of a split constituent in the most prominent positions, so one part is drawn to the left clause periphery and the other, to the right one. Therefore, cognitive bases can be (preliminarily) proposed for the patterns of both transitive and intransitive stimuli, which seems plausible in view of the discontinuous spellout approach to the formation of splits in bipredicative sentences, but demands a more rigorous experimental investigation.

5   CONCLUSION

The main goal of this paper was to explain the non-uniformity of DP opacity to supposed *wh*-subextraction in simple and bipredicative clauses. I contend that when moving within a clause or crossing clause boundaries, DPs go through different mechanisms that result in split configurations. The three-step experimental research showed that *wh*-LBE and discontinuous spellout of subject and object DPs are restricted to mono- and biclausal structures, respectively. Two experiments with PP and DP materials revealed that the cross-clausal phrase split had no critical acceptability decrease when compared to the intraclausal one and full phrase dislocation. Then the results of the third experiment demonstrated the similarity in PP and DP splitting in bipredicative sentences but differences in ratings in simple clauses. The PP's incompatibility with syntactic subextraction approaches allowed postulating two different splitting transformations that DPs in dependent and simple clauses undergo. This is not the first evidence that LBE and discontinuous spellout can co-occur and be somehow distributed between different configurations (see Fanselow & Ćavar 2002). Hence, the syntactic conditions compatible with subextraction and those compatible with discontinuous spellout seem promising to investigate both intra- and cross-linguistically.

ACKNOWLEDGMENTS

ABBREVIATIONS

2	second person	LBE	left branch extraction
AUX	auxilliary	M	masculine
COMP	complementizer	N	neuter
DD	differences-in-differences	PL	plural
	measure	PRES	present tense
DM	double movement	PST	past tense
DS	discontinuous spellout	RM	remnant movement
F	feminine	SG	singular
FUT	future		

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