# Multiple Left-Branch Extraction Under Sluicing

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The general goal of this paper is to explore the interaction between multiple wh-fronting, left-branch extraction (LBE) and sluicing, with the hope of finding insights into the nature of each of the phenomena.

One of the issues I will address is why, even though LBE is available in certain multiple wh-fronting languages (e.g. Russian, Serbo-Croatian), multiple LBE is prohibited in these languages. In order to solve this puzzle, we will take a close look at the processes underlying LBE as compared to regular wh-movement. In Section 3, I will argue that LBE, unlike regular wh-movement, is head-movement to a Topic head above TP, essentially a scrambling type of move. The account builds on the unified analysis of d-linking and scrambling developed by Boeckx and Grohmann (2004) and draws on the connection between LBE and movement of d-linked wh-phrases. The conclusion that will be reached is that prohibition against multiple LBE is a result of a minimality violation (i.e. Minimal Link Condition of Chomsky (1995)).

The analysis in Section 3 will provide a ready solution to another puzzle, namely, why multiple LBE violations are not repaired by sluicing, given that sluicing is known to repair certain types of derivations. The answer will come from the fact that sluicing cannot repair minimality violations in principle, and violations of multiple LBE are analyzed as minimality violations.

## 1. The prohibition against multiple left-branch extraction

Slavic languages are known as multiple wh-fronting languages. That is, in such languages, all wh-phrases in a multiple interrogative are fronted to the periphery of the clause. This phenomenon has been widely studied by Pesetsky (1987), Rudin (1988), Bošković (1997, 1998, 2002), Stepanov (1998), all contributors in Boeckx and Grohmann (2003) among many others.

Consider Russian (1a), where both wh-phrases are fronted. On the other hand, the English style structure, as in (1b), is unacceptable, even as an echo question.

(1) a. Komy$_1$ čto$_2$ [Ivan podaril $t_1$ $t_2$]?
    whom what Ivan gave-as-present
    'Who did Ivan give what?'

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b. *Komu$_1$ [Ivan podaril $t_1$ čto]?

The situation is slightly different in questions with complex wh-phrases in that they either all front, as in (2a), or just one wh-phrase is fronted, while the rest remain in situ, as in (2b).

(2) a. Kakomu mal'čiku' kakuju igrušku Ivan podaril?
    which boy$_{DAT}$ which toy$_{ACC}$ Ivan gave-as-present
    'Which boy did Ivan give which toy?'

   b. Kakomu mal'čiku' Ivan podaril kakuju igrušku?
    which boy$_{DAT}$ Ivan gave-as-present which toy$_{ACC}$

These complex wh-phrases are usually referred to as d-linked (i.e. discourse-linked), as in Pesetsky (1987). However, the term *complex* is slightly more appropriate for the Russian wh-phrases used in this paper since these wh-phrases are ambiguous between d-linked and non-d-linked interpretations. Throughout the paper, I will use the terms *d-linked* and *complex* interchangeably to refer to complex wh-phrases, even though the reader should be aware of the slightly loose usage of the term *d-linked*.

In addition to multiple wh-fronting, the majority of Slavic languages allow LBE, with the exception of Bulgarian, mentioned in Uriagereka (1988) and Macedonian, mentioned in Bošković (2005).[1] LBE is illustrated in the Russian examples in (3a)-(3d), where various NP modifiers are extracted out of NP by virtue of wh-movement or topicalization. Pied-piping is also possible in all these cases, as in (3e).

(3) a. Kakuju on kupil [$t$ mašinu]?
    what-kind-of he bought car
    'What kind of a car did he buy?'

   b. Čju on kupil [$t$ mašinu]?
    whose he bought car
    'Whose car did he buy?'

   c. Naskol'ko doroguju on kupil [$t$ mašinu]?
    how-much expensive he bought car
    'How expensive a car did he buy?'

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[1] Both Uriagereka (1988) and Bošković (2005) attribute the absence of LBE in Bulgarian and Macedonian to the presence of the overt articles in these languages. Bošković (2005) also briefly considers an alternative account that relies on the absence of scrambling in these languages.

d. Doroguju,  on kupil [*t* mašinu].
       expensive, he bought  car
       'An expensive car, he bought.'

    e. [Kakuju mašinu]$_1$ on  kupil  $t_1$?

LBE is not that common crosslinguistically, which motivated Ross (1967) to treat left branches as islands (i.e. opaque domains for extraction). It is beyond the scope of this paper to examine what allows or disallows LBE in a given language. For recent work on that, see Corver (1990, 1992), Kennedy and Merchant (2000) and Bošković (2005). The point to keep in mind here is that there are languages, like Russian and Serbo-Croatian, that allow both multiple wh-fronting and LBE. This raises the question whether multiple LBE is possible.
    As the data in (4) from Russian shows, multiple instances of LBE in the same derivation are not possible.

    (4) a. *Kakoj$_1$ čju$_2$ [$t_1$ alter] kupil [$t_2$ mašinu]?
           which  whose  actor  bought   car
           'Which actor bought whose car?'

       b. *Naskol'ko  bogatyj naskol'ko   doroguju [$t_1$ aktër] kupil [$t_2$ mašinu]?
          how-much rich      how-much expensive   actor  bought  car
          'How rich an actor bought how expensive a car?'

    The same prohibition against multiple LBE has been observed for Serbo-Croatian, another multiple wh-fronting language, by Fernandez-Salgueiro (2005). It will be the goal of this paper to investigate the nature of this mysterious prohibition.

## 2. Multiple LBE under sluicing
Sluicing is a phenomenon of IP-ellipsis, first explored and named by Ross (1969).[2] It represents a construction where there is an interrogative clause with only a wh-element pronounced. It occurs in embedded clauses, (5), as well as in main clauses, (6).

    (5) a. John bought something but I don't know what [John bought *t*]

    (6) *A:*  John loves somebody
        *B:*  Who?

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[2] For a recent extensive study of sluicing, see Merchant (2001) and the references provided there.

I will assume the basic analysis of sluicing as a result of wh-movement out of IP followed by IP-deletion at PF. In this, I am following the line of research in Ross (1969), Lasnik (1999) and Merchant (2001), among others. On this approach, the relevant derivation proceeds as in (7).[3]

(7) *Step 1:* John bought something. I wonder [CP what [IP John bought *t*]

    *Step 2:* John bought something. I wonder [CP what [IP ~~John bought *t*~~]

Russian, like many languages, allows both embedded and main clause sluicing, as demonstrated in (8a) and (8b) respectively.

(8) a. Ivan kupil  čto-to,    no ja ne  pomnju    čto [~~Ivan kupil *t*~~]
       Ivan bought something but  I   not remember what   Ivan bought
       'Ivan bought something. I wonder what.'

    b. *A:* Ivan kupil   čto-to.
        Ivan bought something

      *B:* Čto [~~Ivan kupil *t*~~]?
        what   Ivan bought

In addition to sluicing with a single wh-remnant, Russian also allows sluicing with multiple wh-remnants, as in (9). The availability of such structures in Russian is not surprising, since Russian is a multiple wh-fronting language.

(9) Každyj   priglasil kogo-to   na tanec, no ja ne  pomnju   kto kogo
     everyone invited    someone  to dance  but I  not remember who whom
     'Everyone  invited  someone  to  a  dance  but  I  don't  remember  who (invited) whom'

Sluicing is compatible with LBE, as pointed out by Merchant (2001). in This can be seen in Russian (10). Moreover, not only is sluicing is allowed in LBE constructions in languages that allow LBE. Merchant (2001) shows that sluicing is also attested in LBE structures in languages that prohibit LBE. This is illustrated in the English examples from Merchant (2001) in (11).

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[3] There are alternative LF-copying analyses of ellipsis, as advocated by Lobeck (1991, 1995), Chung, Ladusaw and McCloskey (1995) among others, as well as strictly semantic approaches, as developed in Dalrymple et al. (1991), Jacobson (1992), Hardt (1993, 1999) and Shieber et al. (1996). See Ross (1969) and Merchant (2001) for extensive arguments against such approaches. See also Stjepanović (2003) for the problems the LF-copying analysis faces with respect to multiple sluicing.

(10) Ona kupila dorogujy mašinu, no ja ne pomnju naskol'ko doroguju
     she bought expensive car but I not remember how expensive
     'She bought an expensive car but I don't know how expensive'

(11) a. She wants a detailed list, but I don't know how detailed.

     b. She bought an {expensive/fast} car, but I don't know how expensive.

Thus, sluicing is able to repair LBE violations (among other island violations, as explored in Ross (1969), Lasnik (1999, 2000) and Merchant (2001)). However, as the data in (12) shows, sluicing does not repair the violations of multiple LBE.

(12) *Dovol'no bogatyj actër kupil dovol'no dorogujy mašinu, no ja ne
     rather rich actor bought rather expensive car but I not

     pomnju naskol'ko bogatyj naskol'ko doroguju [~~t actër kupil t mašinu~~]
     remember how rich how expensive actor bought car

     'A rather rich actor bought a rather expensive car but I don't remember
     how rich an actor bought how expensive a car'

There is a potentially interfering factor in Russian since it is a kind of language that allows NP-ellipsis with attributive adjectives, as in (13a). Therefore, it is important to determine whether there is indeed LBE taking place in (10) and (12) or, perhaps, NP-ellipsis is masking the pied-piping of the whole category under sluicing. Fortunately, there is a way to tell apart these two possibilities, even under sluicing. NP-ellipsis with attributive adjectives in Russian requires an adjective to be present in the antecedent, as the contrast between (13) and (14), shows.[4]

(13) On kupil doroguju mašinu, a ja tol'ko mogu sebe pozvolit' dešëvuju [e]
     he bought expensive car and I only can myself afford cheap
     'He bought an expensive car and I can only afford a cheap one'

(14) a. *Ona ne prosto doktor, ona xorošij [e]!
     she not just doctor$_{MASC}$, she good$_{MASC}$
     'Not only is she a doctor, she is a good one!'

     b. Ona ne prosto doktor, ona xorošij doktor!
     she not just doctor$_{MASC}$, she good$_{MASC}$ doctor

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[4] The example in (14) is based on one of an ungrammatical English example in Merchant (2001:167).

This requirement on NP-ellipsis holds as long as there is a clause boundary between the ellipsis site and the antecedent. That is, the sentence in (15) is fine due to the fact that the antecedent and the elided NPs are clausemates.

(15) Ona doktor,     i   xorošij   [doktor]!
        she doctor$_{MASC}$, and good$_{MASC}$
        'She is a doctor, and an excellent one!'

Developing a theory of why this constraint and its locality hold is beyond the scope of this paper. At this point, let me merely present an observation that there is such a constraint on NP-ellipsis in Russian.[5] Now, sluicing naturally works across clauses since it is IP-ellipsis, which makes it a perfect candidate for testing its sensitivity to the constraint above. As it turns out, sluicing, at least in Russian, is not sensitive to this constraint:[6]

(16)  a. Ivan kupil   mašinu, no  ja ne znaju naskol'ko novuju
          Ivan bought car      but I  not know how       new
          'Ivan bought a car but I don't know how new a car'

      b. Ivan vstretil actrisu, no ja ne  znaju naskol'ko izvestnuju
          Ivan met     actress but I not know how       famous
          'Ivan met an actress but I don't know how famous an actress'

The corresponding examples with NP-ellipsis in (17) and (18) are strongly degraded (the italicized text indicates deaccenting of the repeated material):

(17) *Ivan kupil   mašinu, no  ja ne znaju [naskol'ko novuju [e]] *Ivan kupil.*
          Ivan bought car      but I  not know how       new       Ivan bought
          'Ivan bought a car but I don't know how new a car *Ivan bought.*'

(18) *Ivan vstretil actrisu, no ja ne  znaju [naskol'ko izvestnuju [e]] *Ivan*
          Ivan met    actress  but I  not know how       famous      Ivan

     *vstretil.*
      met
      'Ivan met an actress but I don't know how famous an actress *Ivan met.*'

Thus, it is possible to make sure that we indeed have LBE under sluicing, if we use an appropriate antecedent. The absence of an adjective in the antecedent will ensure that we are dealing with true LBE. The sentence in (19) is carefully controlled for this factor and is unacceptable. It contrasts with the acceptability of its counterpart involving pied-piping in (20).

(19) *Včera      odin actër kupil    mašinu, no ja ne pomnju
     yesterday one  actor   bought car      but I  not remember

     naskol'ko bogatyj naskol'ko doroguju [t actër   kupil   t mašinu]
     how        rich     how       expensive actor bought   car

     'Yesterday, an actor bought a car but I don't remember how
      rich an actor bought how expensive a car'

(20)  Včera      odin actër kupil    mašinu, no ja ne pomnju
      yesterday one  actor   bought car      but I  not remember

      naskol'ko bogatyj actër naskol'ko doroguju   mašinu [t kupil t]
      how        rich     actor how       expensive car           bought

      'Yesterday, an actor bought a car but I don't remember how
       rich an actor bought how expensive a car'

Thus, the observation that language allows multiple wh-fronting but not multiple LBE and that sluicing cannot salvage the derivation involving multiple LBE are in need of explanation, to which I turn in the next section.

## 3. LBE as head-adjunction to Top$^0$

*3.1. D-linking and LBE*
LBE, by nature, takes place only out of complex wh-phrases, since only those wh-phrases have left branches. Therefore, it might be fruitful to take a look at the syntactic behavior of such complex wh-phrases.

Recall that complex wh-phrases in Russian can remain in situ as long as one of them is fronted, as in (21) below, repeated from (2). This is different from bare wh-phrases, which must all front in Slavic.

(21)  a. Kakomu mal'čiku' kakuju igrušku Ivan podaril?
         which    boy$_{DAT}$    which toy$_{ACC}$ Ivan gave-as-present

      b. Kakomu mal'čiku' Ivan  podaril            kakuju igrušku?
         which    boy$_{DAT}$ Ivan gave-as-present which toy$_{ACC}$
         'Which boy did Ivan give which toy?'

Bošković (2002) argues that obligatory multiple wh-fronting is not triggered by checking a [+wh] feature of $C^0$ but rather is a result of the wh-phrases being inherently focused and moving to a focus position.[7] Bošković further suggests that d-linked wh-phrases are associated with presuppositions (old information) and hence are not focused. This allows d-linked wh-phrases to stay in-situ, as in (21b).

One of the difficulties of this account is that it works for the wh-phrases that are truly d-linked. However, recall from Section 1 that, the term *complex*, as compared to *d-linked*, is slightly more appropriate for the Russian wh-phrases used in this paper since these wh-phrases are ambiguous between the d-linked reading and the non-d-linked one. Yet, they can remain in situ even on the non-d-linked reading.

Another question raised by Bošković (2002)'s account is why multiple fronting of d-linked wh-phrases is possible. The requirement to front at least one wh-phrase could be due to clausal typing, as in Cheng (1991). But it is not clear why would the option of fronting all d-linked wh-phrases would exist at all.

Fernandez-Salgueiro (2005), in his analysis of the prohibition against multiple LBE in Serbo-Croatian, adopts Bošković (2002)'s proposal about non-focused status of d-linked wh-phrases. Fernandez-Salgueiro (2005) further suggests that, when wh-phrases are not focused, $C^0$ with a strong [+wh] feature is merged overtly in main clauses. Since [+wh] feature is the only feature that triggers movement of d-linked wh-phrases and LBE takes place out of d-linked wh-phrases, multiple LBE is impossible.

First, this account faces the same problems Bošković (2002)'s account faces, as described above. In addition, attributing the movement of d-linked wh-phrases to the strong [+wh] feature of $C^0$ goes against a robust crosslinguistic generalization of Pesetsky (1987) that d-linked wh-phrases do not exhibit superiority effects. This can be demonstrated in English d-linked multiple questions as in (22).

(22) Which book did which student buy?

Moreover, the account faces a conceptual difficulty of relating the absence of focus on one element and an overt/covert merger of another. Thus, let us explore an alternative analysis in the next subsection.

### 3.2 Toward an alternative analysis
Boeckx and Grohmann (2004) argue for a unified analysis of scrambling and movement of d-linked wh-phrases, based on a number of shared properties by these types of movement, one of which is optionality of movement, as observed above. The result of that study is that d-linked wh-phrases are essentially scrambled.

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[7] The account is primarily based on the distribution of superiority effects and the correlation of wh-fronting and focus-fronting of non-wh-elements in Slavic.

Boeckx and Grohmann (2004) view this process as topicalization (i.e. movement to Topic Phrase), assuming that d-linking is associated with old information. However, it does not seem crucial at the moment what the precise target position is. If we want to extend this analysis to all complex wh-phrases, including non-d-linked ones, the nature of the target position of movement might need to be reconsidered. This, however, does not affect the basic intuition behind the proposal, namely, that the same processes govern movement of complex wh-phrases and scrambling.

Boeckx and Grohmann (2004) are concerned only with fronting of a single d-linked wh-phrase. Thus, we need to determine whether multiple d-linked wh-phrases, when undergoing fronting, move to different Topic Phrases or a single Topic Phrase. At least for Russian, a standard test of inserting intervening material between the two wh-phrases produces acceptable strings, as in (23) below, suggesting that the movement in question is to the multiple projections.

(23) *Kakoj student*, po tvojemu mneniju, *kakuju knigu* kupil?
　　　which student on your　　opinion　which book bought
　　　'Which student, according to you, bought which book?'

Given this result, it seems plausible to analyze multiple d-linked wh-fronting as movement to two different TopPs, as in (24).

(24) [$_{TopP}$ kakoj student [$_{TopP}$ kakuju knigu [ *t* kupil *t* ]
　　　　which student　　which book　　bought
　　　　'Which student bought which book?'

Now, in order to slightly distinguish LBE from the movement of complex wh-phrases, I propose that LBE is actually not phrasal movement as in (24) above, but rather head-movement adjoining to $Top^0$. Such a derivation is demonstrated in (25) for single LBE.

(25) [$_{TopP}$ [$_{Top}$ kakuju　$Top^0$] [Ivan kupil　*t* knigu]]?
　　　　　　what/what-kind Ivan bought　book
　　　　　　'What/what kind of book did Ivan buy?'

Let us now consider the derivation for multiple LBE in (26), which we expect to be impossible. In Step 1, the first $Top^0$ is merged into the structure and one of the left-branches *kakomu* adjoins to it (i.e. via head-adjunction). In Step 2, another $Top^0$ is merged. However, Step 3 is impossible: attracting *kakoj*, which is a head, by the higher $Top^0$ is impossible over the intervening head *kakomu* adjoined to the lower $Top^0$.

(26) *Step1:* [$_{TopP}$ [$_{Top}$ kakomu Top$^0$] [ Ivan zadal [$t$ studentu] [kakoj vopros]]]

                    which            Ivan asked    student    which question

        *Step 2:* [$_{TopP}$ Top$^0$ [$_{TopP}$ [$_{Top}$ kakomu Top$^0$] [ Ivan zadal [$t$ studentu] [kakoj

                vopros]]]]

        *Step 3:* *[$_{TopP}$ [$_{Top}$ kakoj$_2$ Top$^0$] [$_{TopP}$ [$_{Top}$ kakomu$_1$ Top$^0$] [ Ivan zadal [$t_1$

                studentu] [$t_2$ vopros]]]]

      'Which student did Ivan ask which question?'

This leads to the conclusion that multiple LBE is impossible due to a minimality violation, assuming the formulation of minimality as in the Minimal Link Condition (MLC) of Chomsky (1995).

## 4. Prediction for sluicing

Recall from Section 2, that sluicing does not repair the derivation with multiple LBE. The badness of the non-elliptical example in (27a) remains under sluicing in (27b).

(27) a. *Včera     odin actër  kupil   mašinu, no ja ne pomnju
        yesterday one actor  bought  car     but I not remember

        naskol'ko bogatyj naskol'ko doroguju [$t$ actër  kupil  $t$ mašinu]
        how      rich      how       expensive actor bought    car

    b. *Včera     odin actër  kupil   mašinu, no ja ne pomnju
        yesterday one actor  bought  car     but I not remember

        naskol'ko bogatyj naskol'ko doroguju [~~$t$ actër  kupil  $t$ mašinu~~]
        how      rich      how       expensive actor bought    car

      'Yesterday, an actor bought a car but I don't remember how rich an actor bought how expensive a car'

We are now in the position to hypothesize why sluicing cannot repair the violations of this kind. If the source of unacceptability of multiple LBE is in minimality and minimality is a derivational constraint encoded into the definition of Attract (Chomsky 1995), such violation cannot technically exist in a derivation and therefore cannot be repaired by deletion. It is a direct prediction of the analysis developed above.

An intriguing consequence of treating LBE as head-movement is that *how+Adjective*-phrases are heads in Russian. This would be possible if the degree adverb *naskol'ko* (*'how'*) and an adjective like *dorogoj ('expensive')* originate adjoined to each other. Another possibility is that the adjective raises and adjoins to the degree adverb via head adjunction, such that they form a complex head at the time of extraction. This is reminiscent of Merchant (2002)'s analysis of swiping in Germanic languages, where he treats it as head-movement of wh-element to $P^0$ (i.e. preposition). Corver (1990) also suggests a head-movement analysis for certain LBE structures involving prepositions.

There is some evidence that such treatment of *how+Adjective*-phrases in Russian is on the right track. The contrast in (28) demonstrates that the sentence with clearly phrasal material in the extracted left-branch is degraded.

(28)  a. Naskol'ko vernogo  Maria  vstretila [*t* mužčinu]
           how        faithful Maria  met          man
           'How faithful a man have Maria meet?'

      b. ??Naskol'ko vernogo svojej žene/strane    Ivan vstretil mužčinu?
            how        faithful his    wife/country Ivan met      man
            'How faithful to his wife/country have Ivan met a man?'

## 5. Concluding Remarks

To summarize, we have explored the nature of the prohibition against multiple LBE in multiple wh-fronting languages which allow single LBE. The suggested analysis of LBE as head-movement presents a way to derive the prohibition in question from minimality (MLC), independently motivated in our system. This in turn provides the answer to the question of why sluicing does not repair derivations involving multiple instances of LBE, since sluicing can only repair the violations that could actually take place in a derivation (and the encoding of such violation should be left for further possible repair by deletion). Since LBE violations are MLC violations and MLC is a purely derivational constraint, sluicing cannot salvage the derivation.

The proposed account, associating LBE with scrambling, might tell us something about the nature of the unavailability of LBE in certain languages. It has been observed by Bošković (2005) that languages allowing LBE are all heavily scrambling languages. Thus, we might be on to something!

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