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On the grammaticality of morphosyntactically reduced remnants in Polish sluicing

Abstract: This paper explores the grammaticality status of reduced sluicing remnants (i.e., remnants realized as NPs due to preposition drop) in Polish. We provide experimental evidence that reduced remnants are variously acceptable in a specific environment (where there is a prior explicit correspondent in the antecedent clause) and are as unacceptable as ungrammatical structures elsewhere. We interpret this pattern as reflecting elaboration effects (i.e., effects that the degree of elaboration of explicit correspondents has on the acceptability of reduced remnants) that follow from the cue-based retrieval theory of sentence processing. Our data support the option of treating reduced remnants as ungrammatical but sometimes acceptable and the option of treating them as grammatical but sometimes degraded, and we discuss how they fit into the current theories of clausal ellipsis.

Keywords: clausal ellipsis; cue-based retrieval; elaboration effect; merger; sluicing; sprouting; unacceptable grammaticality

1 Introduction

This paper explores the grammaticality status of reduced remnants in sluicing. The specific kind of reduction we are concerned with here is optional omission of prepositions under clausal ellipsis, as illustrated in (1)–(3).[1] To be precise, the stranded wh-phrases in (1B) and (1A$_2$) represent sluicing, while the stranded

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non-wh-phrases in (2B) and (3A$_2$) represent fragment answers. However, there is nothing riding on this distinction, because the two types of clausal ellipsis are well known to behave similarly with respect to omission of prepositions and have received similar theoretical analyses (see Culicover and Jackendoff 2005; Merchant 2004). We will henceforth refer to stranded phrases as remnants (although this is customary in the ellipsis literature only where sluicing is concerned), with the underlying assumption that our conclusions extend to stranded wh- and non-wh-phrases alike.

(1)   A$_1$:   *I went to talk with someone.*
          B: *(With) Who?*
          A$_2$:   *You know (with) who.*
          (Two and a half men)

(2)   A: *Who are you talking to.*
          B: *(To) Mitchell.*
          (Modern Family)

(3)   A$_1$:   *We traced it to a restricted account.*
          B: *Restricted by who?*
          A$_2$:   *(By) Us.*
          (COCA)

The remnants in (1)–(3) are of the merger type, contrasting with remnants of the sprouting type like (4), where omission of prepositions is illicit on the intended interpretation (see Barros 2014; Chung 2006, 2013; Weir 2014; but see below for counterexamples).

(4)   A: *I'm married. Can't say *(to) who.*

The difference between the merger type in (1)–(3) and the sprouting type in (4) lies in the implicitness of the phrases found in the antecedent clauses that correspond to each remnant. That is, the remnant in (4) corresponds to an implicit oblique argument, the PP *to someone*, and must also be realized as a PP. By the same logic, the remnants that are PPs in (1)–(3) can be viewed as corresponding to the PPs *with someone*, *Who … to*, and *to a restricted account*. When these PPs are explicit, the remnants may be realized either as unreduced (PPs) or reduced (NPs) versions of them. If viewed as representing form reduction this way, NPs can be analyzed as either fully grammatical or ungrammatical (but possibly acceptable), depending on the theoretical framework one adopts.

     Ever since Merchant (2001, 2004) reduced merger remnants have been treated as grammatical in some languages. Merchant's diagnostic of grammaticality is part

of a deletion-based analysis of remnants and relates to whether a language has preposition stranding or not. For instance, the English remnant in (1B) has an interrogative clause counterpart with preposition stranding, as in (5), which permits the remnant to be generated in its reduced form from the underlying interrogative clause through fronting followed by PF-deletion (strikethrough indicates the deleted material).

(5)   Who ~~did you go to talk with~~?

Assuming this analysis, languages without preposition stranding should permit only unreduced remnants to be generated, as in (6) from Greek (Merchant 2001: 94).

(6)   I   Anna milise me   kapjon,   alla dhe ksero   *(me) pjon.
        the Anna spoke with someone, but not I.know with   who
        'Anna spoke with someone but I don't know who.'

Subsequent research has shown that this deletion-based analysis of remnants undergenerates, because the availability of preposition stranding in a language is not a reliable diagnostic of whether reduced remnants are possible. Reduced remnants have been reported in a wide range of languages without preposition stranding: Greek and Dutch (Kluck 2011; Molimpakis 2019), Spanish (Rodrigues et al. 2009), Brazilian Portuguese (Almeida and Yoshida 2007; Rodrigues et al. 2009), French (Rodrigues et al. 2009), Bahasa Indonesia (Fortin 2007), Polish (Nykiel 2013; Szczegielniak 2008), Serbo-Croatian (Stjepanovic 2008, 2012), Emirati Arabic (Leung 2014), Amis (Wei 2011), Russian (Philippova 2014), and Czech (Caha 2011). In Rodrigues et al. (2009) a modification of Merchant (2001) is proposed, such that remnants can derive from either isomorphic interrogative clause sources or non-isomorphic sources (e.g., (short) clefts) depicted in (7B) (see also van Craenenbroeck 2010). The logic behind a cleft-based analysis is that what may look like a reduced remnant is in fact a product of a cleft clause whose pivot is the extracted wh-phrase.

(7)   A₁: I went to talk with someone.
        B: Who ~~is it~~?

Although their argument is based on data from Spanish, Brazilian Portuguese, and French, Rodrigues et al. (2009) hypothesize that all languages without preposition stranding that tolerate reduced remnants do so because non-isomorphic sources are available for deriving such remnants. Abels (2017) supports this hypothesis with data from Bulgarian. The availability of non-isomorphic sources for sluicing is not in doubt in general (see Vicente 2018 for a recent overview of the different possibilities), but it remains unclear to what extent it is successful as an explanation of the reduction facts.

To the best of our knowledge, non-isomorphic sources are unavailable for acceptable reduced remnants outside of Brazilian Portuguese, Spanish, French, and Bulgarian. In fact, this is explicitly argued in Stjepanovic (2008, 2012) for Serbo-Croatian, Nykiel (2013, 2018) for Polish, Fortin (2007) for Bahasa Indonesia, Leung (2014) for Emirati Arabic, Phillipova (2014) for Russian, and Molimpakis (2019) for Greek. Non-isomorphic sources are generally more problematic for reduced remnants in languages with overt case marking systems than those without them, because a structure like (7) would require nominative case marking on the remnant, contrary to fact. Consider the Polish remnant *kto* ('who') in (8), which is marked for nominative, as is required by the underlying cleft structure from which it is derived here. However, the antecedent requires accusative marking on the remnant, matching the case marked on the prepositional object within the PP *na kogoś* ('for someone'). This underlying cleft structure is therefore unable to supply a well-formed remnant (i.e., one marked for accusative).

(8)   *Pia czeka na kogoś,   ale nie wiem   kto   ~~to jest~~.
        Pia   waits For someone.ACC but not I.know who.NOM ~~it is~~
        'Pia is waiting for someone but I don't know who.'

It is clear that reduced remnants are acceptable in all of the languages above, but it is unclear whether they are also grammatical, at least from the viewpoint of the deletion-based analyses.

In contrast to reduced merger remnants, reduced sprouting remnants have never been treated as grammatical, although occasional counterexamples appear in the literature. The Santa Cruz Ellipsis Project (Anand 2019) cites authentic examples like (9) (and a few further English examples can be found in Nykiel (2012)).

(9)   *He says America was once a better place and that he knows it because he was there.*
        What decade?

In this example, the remnant corresponds to an implicit PP (*in some decade*), but it is realized as an NP. Anand (2019) reports that all reduced remnants in their data have implicit adjunct PPs as correspondents, suggesting that remnants whose correspondents are implicit PP arguments don't tolerate any reduction.[2] Example (10) illustrates a reduced remnant with an implicit PP argument that actually appears in the Santa Cruz Ellipsis Project data but is judged as unacceptable.

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2 The possibility of having reduced remnants like (9) could be attributed to their adjuncthood properties. We conjecture that this possibility is linked to a limited set of nominals of time, place, or direction that are categorically NPs though exhibiting distributional parallels with other adverbial categories (see Larson 1985).

(10)   *I voted Republican once. *I won't say who. I cried over it.*

It appears then that implicit PP correspondents are far more resistant to reduced remnants than explicit PP correspondents are.

The reduction possibilities that are readily available for merger remnants and less so for sprouting remnants raise questions about the identity relationship between antecedent structures and remnants (or remnants along with structures that license them on the deletion-based analyses). Research on sprouting remnants has thus far concluded that whatever identity constraints we formulate must at the very least make reference to the morphosyntactic and semantic features of the correspondent, and this in turn requires reference to the lexical head that licenses the features of the correspondent (see Chung 2013; Culicover and Jackendoff 2005, 2012; Kim and Abeillé 2019; Sag and Nykiel 2011a, 2011b). We could assume with Chung (2013) that remnants are constituents in a sentential structure and that structure must match the antecedent structure in terms of the argument structure of the corresponding lexical heads. But these assumptions run into problems, because both isomorphic and non-isomorphic underlying structures have been proposed as a means to accommodate reduced forms of merger remnants in languages without preposition stranding (see Abels 2017, 2018; Barros 2014; Rodrigues et al. 2009; Thoms 2015; van Craenenbroeck 2010). As we have seen, non-isomorphic underlying structures include (short) clefts. When an underlying cleft structure is available in a language and it is the only structure available to license a reduced remnant, the argument structure of the lexical head that licenses the remnant differs from the argument structure of the corresponding lexical head in a non-cleft antecedent.[3]

As an anonymous referee points out, it may be premature to dismiss the possibility that short clefts never preserve elements of the argument structure of the lexical heads that license remnants' correspondents. Examples (11)–(12) illustrate underlying short cleft sources for the remnants *Sally* and *to Sally*. The remnant in (11) may be the PP *to Sally* or the NP *Sally,* presumably because the prepositional dative structure is used in the antecedent. The PP *to Sally* is degraded as the remnant in (12), given the double object structure in the antecedent.

(11)   *Jack gave the book to someone. Yes, it was (to) Sally.*

(12)   *Jack gave someone the book. ??Yes, it was to Sally. (cf. Yes, it was Sally.)*

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3 Chung's (2013) proposal is problematic for deletion-based analyses of clausal ellipsis more generally. The specific problem is that argument-structure mismatches, which are known to be illicit under sluicing and which Chung attempts to block, can't be blocked if we permit non-isomorphic structures as underlying sources (for more discussion see e.g., Barros and Vicente 2016; Merchant 2001, 2013; Thoms 2015).

Moreover, short clefts, like isomorphic underlying sources, don't tolerate reduced sprouting remnants (13), or any other PPs that are not syntactically licensed by the argument structure of the verbal head in the antecedent (14).

(13)   *I'm married. *Can't say who it is.*[4]

(14)   *I'm married. *Can't say for who it is.*

As these examples involve both merger and sprouting remnants, the difficulty of capturing them doesn't simply reduce to formulating an account of why sprouting disallows reduced remnants (for some accounts, see Section 5.1). What we need is a means to syntactically license the correct remnant in a short cleft structure. Note that none of the short clefts in (11)–(14) are degraded or ungrammatical in and by themselves, but some of them become degraded in the context of their anteced-ents, seemingly violating structural identity with the antecedents. It appears that the remnants are licensed by some nonlocal mechanism that takes into account the argument structure of the lexical head that licenses the correspondents, a mech-anism that is in fact reminiscent of the indirect licensing mechanism of Culicover and Jackendoff (2005) proposed as part of their non-deletion approach. This is a challenge for deletion-based analyses, which derive relevant morphosyntactic features of remnants locally from the underlying clauses.[5] We don't address this challenge any further here, focusing only on the sprouting-merger contrast.

Analyses that assume no underlying structure for remnants fare no better. These analyses posit a nonlocal relation between remnants and their correspon-dents, given that remnants are generated 'as is', that permits them to share syn-tactic category and/or case features (see Culicover and Jackendoff 2005, 2012; Ginzburg 2012; Ginzburg and Sag 2000; Jacobson 2016; Kim 2015; Sag and Nykiel 2011a, 2011b). While we can require, as do Culicover and Jackendoff (2005, 2012), that a sprouting remnant inherit the morphosyntactic features associated with its implicit correspondent's position in the argument structure of a given lexical head in the antecedent via indirect licensing, this leaves unexplained the apparently looser relationship between merger remnants and their explicit correspondents. The above analyses assume that all merger remnants are grammatical and,

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4 We owe this example to an anonymous referee.
5 Barros and Vicente (2016) address this challenge by introducing a semantic condition on rem-nants and their correspondents based on identity of semantic type. Leaving aside the question of independent motivation for the postulation of such a semantic condition, this condition appears to be insufficiently sensitive to remnants that may differ in case marking (see Wood et al. 2020 for Icelandic data) or in syntactic category (see Levelt and Kelter (1982) for Dutch data) from the correspondents in principled ways that make reference to the argument structure of the lexical heads licensing the correspondents.

if reduced, access the internal structure of explicit PPs by picking up the NPs within them. Ginzburg and Sag (2000) impose a syntactic category and case (where relevant) identity requirement on remnants and their correspondents, with the result that the correspondents for reduced remnants would in fact be NPs, and not the larger PPs. However, it is clearly necessary to relax this requirement for certain types of English remnants, such as adverbial remnants (see Ginzburg 2012). It is also necessary to relax it even for argument remnants, given that syntactic category and case identity between remnants and their correspondents doesn't hold in all cases (see fn. 5). These adjustments still leave us with the questions of what should count as a correspondent for a remnant and why reduced remnants should be allowed under merger and disallowed under sprouting. Both for this type of analysis and the one based on deletion, the picture becomes even more complicated by considerable similarities between sprouting and backward merger with respect to reduction (see Section 4.1)

To address the problems both types of analyses face, we propose that sprouting and merger be captured by a mechanism that relates them to each other via form reduction. We spell out how this proposal can be couched in the cue-based retrieval theory of sentence comprehension (Section 5). We begin by asking whether it is plausible to treat reduced remnants as not licensed by the grammar in any context but acceptable if they can be successfully interpreted. Toward this purpose, we review in Section 2 proposals that argue that certain phenomena, including instances of ellipsis, are ungrammatical but acceptable in some contexts. In Section 3, we provide evidence that there is a pronounced acceptability difference between reduced merger remnants and reduced sprouting remnants. Section 4 first reviews existing evidence for what we term elaboration effects in remnants (i.e., effects that the degree of elaboration of explicit correspondents has on the acceptability of reduced remnants) and then adds new evidence in favor of these effects. Section 5 examines the consequences that the patterns of preference observed in the data have for the grammaticality status of reduced remnants. We consider refinements to the view that reduced remnants are never licensed by the grammar, as well as the possibility that reduced remnants are grammatical and their acceptability status is mediated by the ease of interpreting them, all of which are supported by our data. Section 6 concludes.

2 Acceptable ungrammaticality

The idea that grammaticality and acceptability are not necessarily aligned is not new. For instance, Chomsky and Miller (1963) cite examples of center embedding like (15), which are well-formed but unacceptable due to the difficulty of processing them.

(15)   *The food the dog the cat scratched ate spoiled.*

Conversely, there are cases that are either syntactically ill-formed or lack a coherent semantic interpretation but still are judged acceptable. Plural attraction in (16a) and double *thats* in (16b) illustrate the former, and the comparative clause in (17) illustrates semantic incoherence.

(16)   a.   *The sheer weight of all these figures make them harder to understand.*
            (Ronald Reagan, 13 October 1982; cited in Francis 1986)
       b.   *John reminded Mary that after he was finished with his meeting that his*
            brother would be ready to leave.
            (Staum and Sag 2008: 3)

(17)   *More people have been to Russia than I have.*
         (Montalbetti 1984: 6)

Ellipsis is another area that has attracted explanations based on acceptable ungrammaticality. The notion of acceptable ungrammaticality here is tied not to any obvious syntactic or semantic ill-formedness of the constructions in question but rather to a combination of the nature of the data and the predictions of particular syntactic theories used to capture the data. To illustrate, Arregui et al. (2006) argue that structural mismatch under Verb Phrase ellipsis (VPE), depicted in (18), can be accounted for by letting the grammar generate only matching examples, while mismatch is ungrammatical but repairable by the processor.[6] In (18), the antecedent is passive, while the ellipsis site requires an active VP. The ease of repairing the voice-mismatched antecedent VP determines the acceptability of (18).

(18)   *The dessert was praised by the customer after the critic did already.*
         (Arregui et al. 2006, Ex. 16)

Kim and Runner (2018) have demonstrated a stronger penalty for voice mismatch under VPE than in the nonelliptical counterparts. This penalty persists although it's clear that an elliptical clause, whether passive or active, is not ill-formed in and of itself and that it is possible to generate voice-mismatched pairs of elliptical clauses and antecedents (see Merchant 2013 for a proposal). Decisions of grammaticality can go in either direction when the data are open to the possibility that the status of voice mismatch is due to factors lying external to the grammar, such as the processor's ability to assign an interpretation to an otherwise ungrammatical ellipsis.

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6 But see Kim et al. (2011) for the opposing view, that structural mismatch is grammatical under VPE but may become degraded due to processing difficulty.

A similar case is represented by island-repairing clausal ellipsis. Even though the common view is that island repair under clausal ellipsis leads to a grammatical result (Merchant 2001, 2008), Frazier (2009) argues that it doesn't. Her argument is based on the pronounced difference between merger and sprouting remnants with respect to island repair. For instance, it is harder for sprouting (19) to reach into an island than it is for merger (20).

(19)   *They hired someone who won but I can't remember what.*
        (Frazier 2009: 90)

(20)   *They hired someone who won something but I can't remember what.*
        (Frazier 2009: 90)[7]

Frazier and Clifton (2005) demonstrate experimentally that this acceptability difference is indeed real, providing support for Chung et al. (1995) original observation that sprouting remnants can't repair island violations.[8] The difference can be explained, Frazier (2009) argues, if we assume that island violations are never grammatical under clausal ellipsis but are acceptable in some contexts, such as merger.[9]

In sum, ellipsis comes with strong preferences whose violation incurs a penalty, but can improve in some contexts. If we have reason to believe that

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7 There is an alternative way of analyzing examples like (20) and those in fn. 9, namely as involving short sources corresponding to the size of the island, as shown in (i) (see Barros et al. 2014; Griffiths and Lipták 2014; Merchant 2001).

(i)   *They hired someone who won something but I can't remember what ~~they won~~.*

       If this analysis is on the right track, then (20) can't be argued to be island-repairing. However, the contrast between (19) and (20) first documented by Frazier and Clifton (2005) remains in need of explanation.

8 See Griffiths and Lipták (2014) for an analogous observation about fragment answers.

9 Some counterexamples to Chung et al.'s (1995) observation have been reported. To illustrate, Culicover and Jackendoff (2005: 258) adduce, among others, the island-violating examples of sprouting remnants in (i)–(iv).

(i)   *Bob found a plumber who fixed the sink, but I'm not sure with what.*
(ii)   A: *Does eating at a baseball game interest you?*
       B: *Depends on what.*
(iii) A: *They persuaded Kennedy and some other senator to jointly sponsor the legislation.*
       B: *Yeah, Hatch.*
(iv)   A: *For John to flirt at the party would be scandalous.*
       B: *Even with his wife?*
       Thus, it is not impossible even for sprouting remnants to reach into islands. Culicover and Jackendoff (2005) suggest that the acceptability of sprouting remnants whose correspondents are located inside islands is mediated by extragrammatical (i.e., pragmatic or logical) factors.

these improvements are due to factors that lie external to the grammar, then an account of when and where they are observed is intended as a complement to, but not a replacement for, the existing theoretical accounts of ellipsis. Our purpose in the remainder of this paper is to explore how far we can take such a complementary account, and specifically, to what extent it is adequate to assume that extragrammatical factors raise the status of reduced remnants from ungrammatical to variously acceptable. In the next section we turn to the merger-sprouting distinction, demonstrating a sharp acceptability difference between them.

3 Experiment 1: merger remnants versus sprouting remnants

This section investigates to what extent there is an acceptability difference between morphosyntactic form reduction in merger remnants compared to morphosyntactic form reduction in sprouting remnants. We use Polish data here and in the remaining experiments, also taking advantage of the prior availability of relevant experimental results for this language.

In an acceptability judgment experiment, we tested the hypothesis that sprouting should incur a more severe penalty for form reduction in remnants than merger does, as suggested by the data discussed in the Introduction. We added controls in the form of corresponding questions, with or without preposition stranding, so as to be able to compare explicitly acceptability ratings for reduced and unreduced remnants with acceptability ratings for preposition stranding and preposition pied-piping in interrogative clauses.

3.1 Method and procedure

We created 12 sets of experimental items crossing Construction (sprouting, merger, question), and P-stranding (PP, NP). The label NP refers to remnants realized as NPs and to instances of preposition stranding in interrogatives, while the label PP refers to remnants appearing as PPs and to instances of pied-piping in interrogatives. For all items, prepositional objects were indefinite pronouns and bare wh-phrases in remnants. A sample set appears in (21)–(23) (The full set of experimental items can be found in Appendix 1).

(21) a. *Studenci   narzekają,   ale   nie   wiem   na   kogo*.
          students   complain   but   not   I.know   about   who.ACC
          'The students have been complaining, but I don't know about who.'
      b. *Studenci   narzekają,   ale   nie   wiem   kogo*.
          students   complain   but   not   I.know   who.ACC
          'The students have been complaining, but I don't know who.'

(22) a. *Studenci narzekają na   kogoś,   ale nie wiem   na   kogo*.
          students complain about someone.ACC but not I.know about who.ACC
          'The students have been complaining about someone, but I don't know
          about who.'
      b. *Studenci Narzekają na   kogoś,   ale nie wiem   kogo*.
          students complain about someone.ACC but not I.know who.ACC
          'The students have been complaining about someone, but I don't know who.'

(23) a. *Kogo   narzekają   studenci   na?*
          who.ACC   complain   students   about
          'Who have the students been complaining about?'
      b. *Na   Kogo   narzekaia   studenci?*
          about   who.ACC   complain   students
          'About who have the students been complaining?'

The items were rotated across six stimulus lists in a Latin square design. There were 12 items in each list, interspersed with 24 fillers. Acceptability ratings were delivered on a 7-point scale (1 being the least acceptable/natural). Sixty six University of Silesia students, all native Polish speakers, participated in the experiment.

3.2 Results and discussion

We fitted a generalized additive mixed-effects model that included Construction and P-stranding as fixed effects to the data (using the package mgcv). The maximal model that was justified and converged included random intercepts for participants and items (the model results can be found in Appendix 2). The contrasts reported below are significant at $p < 0.05$.

We observed a main effect of Construction: merger (mean score: 5.73) received better ratings than sprouting (mean score: 4.99), but ratings for sprouting were not different than ratings for questions (mean score: 4.89). There was also a main effect of P-stranding, where PPs (mean score: 6.31) were better than NPs (mean score: 4.09). In addition, there was a Construction-P-stranding interaction such that the

penalty for using NPs as remnants was larger under sprouting (mean score: 3.43) than under merger (mean score: 5.55), but the penalty for using NPs as remnants under sprouting did not differ from the penalty for stranding prepositions in questions (mean score: 3.31). According to planned comparisons, ratings for PPs were higher than ratings for NPs under merger ($\beta = 0.2$, SE = 0.07, $t = 2.53$, $p < 0.05$), a finding also reported in Nykiel (2013).

These results support the hypothesis that the penalty for form reduction of remnants is indeed larger under sprouting than under merger. They also speak in favor of the usual assumption that remnant reduction is ungrammatical under sprouting, as evidenced by an unreliable difference in ratings between preposition stranding in questions and NPs serving as remnants in sprouting. We conclude from these results that having explicit correspondents translates into an acceptability advantage for reduced remnants. However, note that even this advantage does not entirely eliminate the penalty for reduced remnants: there remains a reliable difference between NPs and PP serving as merger remnants. In the next section, we review the contexts in which the acceptability of reduced remnants is above the level represented by reduced sprouting remnants.

4 Elaboration effects

This section begins by reviewing research that supports the analysis of the acceptability of reduced remnants as sensitive to the degrees of explicitness of their correspondents. As the next step, we add further experimental data to strengthen this point.

The use of prepositions in Polish remnants provides clear support for what we term elaboration effects. We have already seen that when remnants' correspondents are implicit, that is, when elaboration is at its lowest, then reduced remnants are severely degraded. When correspondents are explicit phrases, the acceptability of reduced remnants has been shown to be gradient when several degrees of elaboration are considered. Nykiel (2013) demonstrated these effects using three kinds of explicit correspondents, from the most elaborated (longest) to the least elaborated (shortest). The basic distinction is between lexical NPs and indefinite pronouns serving as prepositional objects, as in (24) and (25) (Nykiel 2013: 88).

(24) *Byłaś   ubrana w jakąś sukienkę   tamtej nocy, ale nie pamiętam*
      you.were   dressed in some dress.ACC that   night but not I.remember
      jaką.
      which.ACC
      'You were dressed in some dress that night, but I don't remember which.'

(25) *Byłaś   ubrana w coś   tamtej nocy, ale nie pamiętam*
      you.were dressed in something.ACC that   night but not I.remember
      co.
      what.ACC
      'You were dressed in something that night, but I don't remember what.'

But there also is an intermediate degree of elaboration, where what serves as a prepositional object is an indefinite pronoun modified by an adjective, as in (26).

(26) *Byłaś   ubrana w coś   czerwonego tamtej nocy, ale nie pamiętam*
      you.were dressed in something red.ACC   that   night but not I.remember
      co.
      what.ACC
      'You were dressed in something that night, but I don't remember what.'

These three kinds of correspondent impact the acceptability of reduced remnants as expected: in an experiment comparing the three kinds of correspondents, (24) received the highest ratings and (25) the lowest, with (26) rated as better than (25) and worse than (24).[10] Furthermore, only the highest level of elaboration (lexical NPs) entirely eliminated an acceptability difference between reduced and unreduced remnants (i.e., there was no statistically significant difference between reduced and unreduced remnants).

Merger remnants are well known to show elaboration effects, both in Polish (see also Sag and Nykiel 2011a; Szczegielniak 2008) and crosslinguistically (Caha 2011 for Czech; Nykiel 2015, 2017; Nykiel and Hawkins 2020 for English; Rodrigues et al. 2009 for Spanish and French). A possible explanation for why these effects arise is that the likelihood of a remnant's form getting reduced increases with the syntactic and semantic richness of the correspondent. It's commonly accepted that in anaphor processing the processor retrieves a stored representation for an anaphor's antecedent at the point at which it encounters the anaphor (e.g., Ariel 1990; Gernsbacher 1989; McKoon and Ratcliff 1980). There is evidence that the retrieval process benefits from certain properties of stored representations, such as their semantic richness, that is, the amount of semantic information attached to them (Almor 1999, 2004; Cowles and Garnham 2005). For instance, the lexical NP *a dinner party* is semantically richer, syntactically more complex, and longer in words than the indefinite pronoun *something*. These properties of lexical NPs mean they will receive stronger mental representations

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10 We refrain from annotating examples (24)–(26) with any grammaticality judgments here, relying instead on the acceptability ratings reported in the literature. We do so in order to remain as neutral as possible until Section 5, where we consider possible interpretations of these data with respect to grammaticality.

when processed that are more accessible for future retrieval than mental representations for indefinite pronouns (Craik and Tulving 1975; Fisher and Craik 1980; Karimi and Ferreira 2016; Marks 1987). Karimi et al. (2014) provide evidence for elaboration effects in nominal anaphora: antecedents that receive stronger mental representations due to their semantic and syntactic richness tend to be subsequently retrieved with pronominal anaphors rather than lexical-NP anaphors. Thus the form of an anaphor is impacted by the semantic and/or syntactic richness of its antecedent in the sense that a more reduced (that is, one that carries less semantic and/or syntactic detail) anaphor is preferred for a more elaborated (= longer in words) antecedent. For instance, (27)–(28) illustrate a contrast between a long and short antecedent represented by NP_2 and the possible pronominal or lexical-NP continuations picking up NP_2 as the antecedent (Karimi et al. 2014: 995).

(27)   *[$_{NP1}$ The actor] walked away from [$_{NP2}$ the actress who was frustrated and visibly up set about the night's disastrous performance]. She/the actress …*

(28)   *[$_{NP1}$The actor] walked away from [$_{NP2}$ the actress]. She/the actress …*

Karimi et al. (2014) demonstrate that there are more pronominal continuations in items like (27) than in items like (28). This difference in pronominal use can be explained by the greater degree of elaboration of the antecedent in (27).

Turning back to the examples in (24)–(26), the key word-length differences are between (24) and (25) and between (26) and (25). The correspondent in (24) will always be longer than the correspondent in (25), and similarly, the correspondent in (26) will always be longer than the correspondent in (25). A length difference of one word correctly predicts the observed behavior of these remnants. The acceptability difference between the remnants in (24) and (26) is less clear, since they are the same length and comparable in terms of semantic content. This difference suggests that modified indefinite pronouns represent some intermediate level of correspondent elaboration lying between lexical NPs and bare indefinite pronouns, but it's beyond the scope of this paper to explore this pattern any further (one could, for instance, design a separate experiment where correspondents like *in some red dress* are compared with correspondents like *in something red,* where the former is a proper subset of the latter). The important point here is that reduced remnants show sensitivity to different degrees of elaboration of their correspondents.

Before leaving this section, let us briefly consider why it is form reduction we are dealing with when NPs appear as remnants. The form of an NP is restricted by the case governed by the dropped preposition. Example (29) illustrates the

impossibility of marking other cases on the remnant than the accusative marked on the prepositional object within the correspondent.[11]

(29) *Nowe   produkty   są   testowane przez ekspertów,   ale nie wiem*
      new   products   are   tested   by   experts.ACC but not I.know
      jakich/   *jakimi/   *jacy.
      which.ACC/ what.ACC
      'New products are tested by experts but I don't know which.'

There is thus good reason to believe that merger remnants, like nominal anaphors, can have reduced and unreduced variants.

4.1 Experiment 2: backward merger

A highly relevant finding reported in Nykiel (2013) is that elaboration effects disappear under backward merger.[12] In backward merger the order of correspondent and remnant is the opposite of that in forward merger, as in (30) from Nykiel (2013: 91). This order has the consequence that a remnant's correspondent is processed only after the remnant has been processed, making backward merger appropriate for testing the reality of elaboration effects.

(30) *Nie pamiętam które,   ale Anna odpowiedziała na jakieś pytanie*
      not I.remember which.ACC but Anna answered   PREP some question.ACC
      'I don't remember which, but Anna answered some question.'

Example (30) contrasts with (31), which features an indefinite pronoun as part of the correspondent instead of a semantically richer lexical NP.

(31) *Nie pamiętam co,   ale Anna odpowiedziała na   coś*
      not I.remember what.ACC but Anna answered   PREP something.ACC
      'I don't remember what, but Anna answered something.'

When reduced remnants were compared in these two environments their acceptability ratings didn't differ, that is, reduced remnants incurred a penalty across-the-board relative to unreduced remnants. If reduced remnants were grammatical, their severe degradation under backward merger would be surprising since backward merger differs from forward merger in the linear order of correspondents and remnants, but leaves the syntactic structure otherwise intact. Nykiel's (2013)

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11 Molimpakis (2019) makes the same point about Greek sluicing, providing experimental data in its support.
12 What we term here 'backward merger' is called 'reverse sluicing' in Gullifer (2004) when no distinction is being made between merger and sprouting.

results are consistent with the view that the acceptability of reduced remnants varies as a function of the degree of elaboration of their correspondents and that elaboration effects are confined to the configuration where a correspondent precedes a remnant. But a question not addressed before is whether reduced remnants under backward merger are as bad as ungrammatical structures. We would in fact expect a similar degree of degradation for both, if preceding overt PP correspondents are required to support reduced remnants. We examine this expectation in Experiment 2, comparing backward merger with interrogatives and with forward merger.

4.1.1 Method and procedure

Similar to Experiment 1, we created 12 sets of experimental items crossing Construction (forward merger, backward merger, question) with P-stranding (PP, NP). The experimental items were the same as those in Experiment 1, except that we replaced the sprouting conditions with backward merger conditions. All prepositional objects within the correspondents and in interrogatives were indefinite pronouns. A sample set appears in (32)–(34).

(32) a. *Studenci narzekają na   kogoś,   ale nie wiem na   kogo*
         students complain about somebody.ACC but not I.know about who.ACC
         'The students have been complaining about somebody, but I don't know about who.'

     b. *Studenci narzekają na   kogoś,   ale nie wiem   kogo*
         students complain about somebody.ACC but not I.know who.ACC
         'The students have been complaining about somebody, but I don't know who.'

(33) a. *Nie wiem na   kogo, ale studenci narzekają na   kogoś.*
         not I.know about who.ACC but students complain about somebody.ACC
         'I don't know who, but the students have been complaining about somebody.'

     b. *Nie wiem   kogo,   ale studenci narzekają na   kogoś*
         not I.know who.ACC but students complain about somebody.ACC
         'I don't know who but the students have been complaining about somebody.'

(34) a. *Kogo   narzekają   studenci   na?*
         who   complain   students   about
         'Who have the students been complaining about?'

b. *Na   kogo   narzekają   studenci?*
    about   who   complain   students
    'About who have the students been complaining?'

The items were rotated across six stimulus lists in a Latin square design. Each list contained 12 items interspersed with 24 fillers. As before, acceptability ratings were delivered on a 7-point scale (1 being the least acceptable/natural) by 68 students at University of Silesia, all native Polish speakers. The full list of items for this experiment can be found in Appendix 1.

4.1.2 Results

We fitted the data to a generalized additive mixed-effects model that included Construction and P-stranding as fixed effects (using the package mgcv). The maximal model that was justified and converged included random intercepts for participants and items (the model results can be found in Appendix 2). The contrasts reported below are significant at $p < 0.05$.

We observed a main effect of P-stranding, with PPs (mean score: 5.84) being significantly better than NPs (mean score: 4.05). There was also a main effect of Construction such that questions (mean score: 4.89) were judged worse than forward merger (mean score: 5.73) but not worse than backward merger (mean score: 4.22). A Construction-P-stranding interaction revealed that the penalty for stranding prepositions in questions (mean score: 3.31) was higher than both the penalty for using NPs under forward merger (mean score: 5.55) and the penalty for using NPs under backward merger (mean score: 3.4). Planned comparisons furthermore revealed that NPs under forward merger were better than preposition stranding in questions ($\beta = 0.97$, SE = 0.07, $t = 12.47$, $p < 0.0001$) and that NPs under backward merger were not different than preposition stranding in questions ($\beta = -0.01$, SE = 0.07, $t = -0.16$, $p = 0.86$). At the same time, PPs under forward merger were not worse than preposition pied-piping in questions ($\beta = -0.5$, SE = 0.07, $t = 2.06$, $p = 0.05$) and PPs under backward merger were significantly worse than preposition pied-piping in questions ($\beta = -0.6$, SE = 0.07, $t = -7.82$, $p < 0.0001$). This last finding indicates that unreduced remnants incur a penalty under backward merger that is not observed for preposition pied-piping in questions and explains why the penalty for preposition stranding in questions is greater than the penalty for using reduced remnants in backward merger.

These results demonstrate clearly that backward merger incurs a penalty for form reduction of remnants that reaches the same level of unacceptability as preposition stranding in interrogatives. We conclude therefore that backward

merger is not only unaffected by elaboration effects but also behaves similarly to sprouting with respect to form reduction.

4.2 Experiment 3: preposition length

This section offers further support for elaboration effects in Polish, but this time it is prepositions that are elaborated to various degrees. So far, we have not considered the possibility that the length of a preposition that a correspondent features may impact the acceptability of reduced remnants. But if elaboration effects can be induced by the number of words a prepositional object within a correspondent consists of, then it is also a logical possibility that they can be induced by the number of syllables a preposition consists of, if prepositional objects are held constant. Preposition length is briefly addressed in Sag and Nykiel (2011a) in their discussion of Polish remnants, and is in fact shown by Philippova (2014) to affect the acceptability of reduced remnants in Russian. To illustrate, the monosyllabic preposition *k* ('with') in (35) lowers acceptability ratings for reduced remnants compared to the longer preposition *nakanune* ('on the eve of') in (36) (Philippova 2014: 141).

(35)   *Petr sdelal Maše predloženije nakanune kakogo = to   prazdnika,*
         Petr did   Mary proposal   on-eve   what.GEN = INDF holiday.GEN
         no   ja   zabyl kakogo.
         but I   forgot which.GEN
         'Mary bought this dress for some holiday but I don't remember which.'

(36)   *Petr sdelal Maše predloženije nakanune kakogo = to   prazdnika,*
         Petr did   Mary proposal   on-eve   what.GEN = INDF holiday.GEN
         no   ja   zabyl kakogo.
         but I   forgot which.GEN
         'Peter proposed to Mary on the eve of some holiday but I forgot which.'

Following up on this literature, we present the results of an acceptability judgment study that support the hypothesis that elaboration effects may be triggered by prepositions. Our prediction here is that elaborated, and hence semantically richer, prepositions could induce the same effects that elaborated prepositional objects do, because they possibly give rise to stronger mental representations for PP correspondents that they are part of. It would then follow that reduced remnants should be more acceptable in environments like (36) than in environments like (35).

4.2.1 Method and procedure

We created 12 sets of experimental items crossing Elaboration (short or long prepositions) with Remnant Form (NP or PP). A sample set appears in (37)–(38). The short prepositions were always monosyllabic, while the long prepositions were at least two syllables long. All prepositional objects within the correspondents were indefinite pronouns.

(37) a. *Poszła   do kogoś,   ale nie pamiętam   kogo.*
         she.went to somebody.GEN but not I.remember who.GEN
         'She went to somebody, but I don't remember who.'

    b. *Poszła   do kogoś,   ale nie pamiętam   do kogo.*
         she.went to somebody.GEN but not I.remember to who.GEN
         'She went to somebody, but I don't remember who.'

(38) a. *Poszła   zamiast   kogoś,   ale nie pamiętam   kogo.*
         she.went instead of somebody.GEN but not I.remember who.GEN
         'She went instead of somebody, but I don't remember who.'

    b. *Poszła   zamiast   kogoś,   ale nie pamiętam zamiast kogo.*
         she.went instead of somebody.GEN but not I.remember instead of who.GEN
         'She went instead of somebody, but I don't remember instead of who.'

The items were rotated across four stimulus lists in a Latin square design. Each list contained 12 items interspersed with 24 fillers. Acceptability ratings were delivered on a 7-point scale (1 being the least acceptable/natural) by 40 University of Silesia students, all native Polish speakers. All experimental items for this experiment can be found in Appendix 1.

4.2.2 Results and discussion

We fitted the data to a generalized additive mixed-effects model that included Elaboration and Remnant Form as fixed effects (using the package mgcv). The maximal model that was justified and converged included random intercepts for participants and items (the model's outcome can be found in Appendix 2). The contrasts reported below are significant at $p < 0.05$.

    We observed a main effect of Remnant Form, such that unreduced remnants (mean score: 6.1) were better than reduced ones (mean score: 4.85). There was another main effect of Elaboration, with the short-preposition conditions (mean score: 5.2) rated worse than the long-preposition conditions (mean score: 5.55). The two main effects were quantified by a significant interaction, which was due to reduced remnants being rated significantly better in the long-preposition

condition (mean score: 5.11) than in the short-preposition condition (mean score: 4.59).

These results are entirely unsurprising under the assumptions we make here, that is, that elaboration effects can be induced by manipulations of the length of prepositions hosted by PPs within antecedents. Because these manipulations leave the syntax of the constructions in question unaltered, the elaboration effects we observed support the involvement of processing-based constraints that modulate the acceptability of reduced remnants.

5 General discussion

We began this investigation by asking whether reduced remnants could be viewed as not licensed by the grammar, although acceptable under certain circumstances, and hence representing acceptable ungrammaticality. We considered this question in the context of existing reports on the acceptability of reduced and unreduced remnants, primarily in Polish, but also cross-linguistically, and in the context of novel experimental data. The patterns we found in these data are the following: (1) reduced remnants incur a greater penalty under sprouting than under merger, (2) acceptability judgments about reduced remnants under merger are gradient and depend on how elaborated remnants' PP correspondents are, and (3) effects to do with the degree of elaboration of PP correspondents disappear if the order of the correspondents and remnants is reversed, as in backward merger. Importantly, we have also seen that the penalty for using reduced remnants under backward merger and under sprouting is equal to the penalty incurred by ungrammatical structures. These patterns reveal that the acceptability of reduced remnants depends on a specific context – the prior appearance of overt PP correspondents.

Because the data surrounding form reduction of remnants are gradient (with the lower bound represented by sprouting and backward merger), we might approach them in two ways: as ungrammatical but sometimes acceptable or as grammatical but sometimes degraded. We discuss these options below. To anticipate this discussion, our current experimental results are broadly consistent with both options. The first option (acceptable ungrammaticality) is more plausible on the deletion-based analyses of clausal ellipsis than the non-deletion ones. The second option is only in line with the non-deletion-analyses, but we don't yet have sufficient evidence to evaluate it with complete certainty.

5.1 Reduced remnants are ungrammatical but sometimes acceptable

Imagine that we impose a constraint on remnants such that they must match the syntactic category of the oblique argument they correspond to in the antecedent. Doing so has the advantage that the behavior of sprouting and backward merger remnants is captured without additional stipulations. We furthermore permit the grammar to interact with independently motivated processing constraints on anaphora, such that the realization of remnants is modulated by the degree of elaboration of their correspondents (Section 5.2 spells out the details of how form reduction of remnants and elaboration effects follow from cue-based retrieval). On this view, form reduction of remnants is not licensed by the grammar, but can become acceptable if the right conditions obtain. This explains why nonstructural manipulations (e.g., the length or semantic content of a correspondent) can alter the acceptability of reduced remnants and why reduced remnants are rarely as acceptable as unreduced remnants (as documented in detail in Nykiel 2013). Note the parallel between the acceptability of reduced remnants and the acceptability of remnants whose correspondents are located inside islands, which we discussed in Section 2. In both cases, a severe degradation in acceptability is associated with remnants whose correspondents are implicit, while other remnants are acceptable to various degrees.

But such a constraint is too strong. First, the theoretical analyses that posit underlying sentential structure for remnants don't treat all reduced remnants as ungrammatical. Recall that Rodrigues et al. (2009) argue for an extension to Merchant's (2001) account that permits cleft-based sources for sluicing where reduced remnants don't undergo illicit extraction out of PPs. Their argument is constructed on the basis of reduced remnants exhibiting behavior that patterns together with pivots of clefts in Spanish and Brazilian Portuguese. However, ungrammaticality is still predicted for reduced remnants in Polish (and for several other languages discussed in Section 1), for which no cleft-based sources are available. The current results lend support to the idea that reduced remnants could be viewed as instances of acceptable ungrammaticality in these languages. One way of testing this line of argument would be to better explore the acceptability status of reduced remnants in languages like Spanish and Brazilian Portuguese, the prediction being that if fully grammatical cleft-based sources indeed underlie them they should always be as acceptable as unreduced remnants under both backward and forward merger (leaving aside any processing difficulty that backward merger may independently incur).

A key component of deletion-based analyses is a crosslinguistic explanation for the impossibility of reducing remnants under sprouting. Syntactic proposals can be found in e.g., Chung (2006) and Barros and Vicente (2016). An interesting idea offered by the latter is that implicit arguments, unlike explicit ones, are syntactic simplexes and therefore unable to be extracted out of (blocking prepositional objects from extraction out of PPs). But, given that sprouting and backward merger behave alike in the current data with respect to remnant reduction (see Sections 3 and 4.1), it is important to recognize the psycholinguistics of implicit arguments in addition to their syntax: they are harder to process under clausal ellipsis than explicit arguments, as psycholinguistic research has shown (Dickey and Bunger 2011; Frazier and Clifton 1998).

5.2 Reduced remnants are grammatical but sometimes degraded

This line of argument is fully consistent with the non-deletion analyses of clausal ellipsis. Its ingredients rely heavily on assumptions about how remnants (and, more generally, anaphors) are efficiently processed online. Specifically, the purpose is to explain why reduced remnants are severely degraded under sprouting and backward merger, if they are grammatical. Toward this purpose, let us review the key ideas behind cue-based retrieval, a sentence processing theory that has been successfully tested on ellipsis (these ideas apply equally to the acceptable ungrammaticality option as an explanation for the gradient acceptability of reduced remnants under merger).

Cue-based retrieval is known to engage a direct-access mechanism during the processing of context-dependent elements. The processing of such elements requires the parser to retrieve a match for them from among previously stored memory representations, and this is done by simultaneously accessing all available memory representations rather than a serial search through them (Caplan and Waters 2013; Lewis and Vasishth 2005; Lewis et al. 2006; McElree 2000; McElree et al. 2003; Van Dyke 2011; Van Dyke and Johns 2012; see also Parker et al. 2017 for an overview). This kind of retrieval is the more efficient the more reliable retrieval cues are supplied by the probe that triggers the search for the target representation. In other words, cue-based retrieval depends on the diagnosticity of the retrieval cues carried by the probe. Should the diagnosticity of the retrieval cues be low (i.e., several memory representations partially match the features of the probe), interference effects might arise such that some non-target memory representation may be temporarily retrieved in place of the target, leading to a processing

slowdown (Martin 2018; Nairne 2002; Öztekin and McElree 2007; Watkins and Watkins 1975).

The processing of sluicing has already been shown to be consistent with cue-based retrieval. Martin and McElree (2011) have demonstrated that sluicing engages a direct-access mechanism, and Harris (2015) has provided evidence that the processing of sluicing is facilitated when additional information is attached to a remnant. The latter finding is important because it speaks in favor of remnants being carriers of retrieval cues. To see this, consider the contrast in (39) from Harris (2015: 5).

(39)   a.   *Some tourists sampled the wines but I've forgotten which ones.*
        b.   *Some tourists sampled the wines but I've forgotten which tourists.*

While the remnant *which ones* in (39a) is ambiguous between *wines* and *tourists,* the remnant in (39b) is not. Harris (2015) shows that more explicit remnants like (39b) are read faster than remnants like (39a), a processing difference that can be attributed to the greater diagnosticity of the retrieval cues supplied by more explicit remnants. Given these findings, the difference between reduced and unreduced remnants discussed here can be seen as also lying in the diagnosticity of the retrieval cues each type of remnant supplies. An unreduced remnant points the parser directly to the matching PP in the antecedent, with the preposition repeated in the remnant guiding this process. In contrast, a reduced remnant points the parser to any NP in the antecedent, of which there may be several (we leave aside other information that a remnant may encode, such as gender, case or animacy). If, however, the remnant's correspondent is an elaborated phrase, it will have a strong mental representation (as discussed in Section 4), making it easier to retrieve, and will arguably be more resistant to interference effects regardless of the diagnosticity of the retrieval cues supplied by the remnant.

This approach makes several crosslinguistic predictions. Under the assumption that anaphor processing is similar across languages, we would expect reduced remnants to appear in favorable conditions (i.e., when they have elaborated correspondents). This expectation appears to be on the right track as far as the availability of reduced remnants is concerned. Recall from Section 1 that reduced remnants have been reported under merger in a wider range of languages than those listed in Merchant (2001). Furthermore, there is experimental evidence that reduced remnants are overall more degraded than unreduced remnants in German (Lemke 2016; Merchant et al. 2013) and in Greek (Molimpakis 2019) in line with the pattern reported for Polish here and with the assumption that unreduced remnants carry more reliable retrieval cues (but also in line with the assumption that reduced remnants are ungrammatical in these languages). Finally, we wish to note that reduced remnants are not just remnants missing prepositions. Korean permits

reduction of syntactic and semantic case marking on remnants just in case their correspondents are explicit phrases (compare (40a) and (40b)), mirroring the sensitivity of prepositions to the merger-sprouting distinction we saw above (see Kim 2015: 267).

(40)   a.   *Mimi-ka   nwukwunka-lopwuthe senmwul-ul   pat-ass-nuntey,*
            Mimi-NOM   someone-from   present-ACC   receive-PST-but
            nwukwu- (lopwuthe)- i- nci   molu-keyss-ta.
            who-(from)-COP-QUE   not.know-PRES-DECL
            'Mimi received a present from someone, but I don't know from who.'
       b.   *Mimi-ka   senmwul-ul   pat-ass-nuntey,*
            Mimi-NOM   present-ACC   receive-PST-but
            nwukwu-*(lopwuthe)-i-nci   molu-keyss-ta.
            who-*(from)-COP-QUE   not.know-PRES-DECL
            'Mimi received a present, but I don't know from whom.'

Korean thus strengthens the possibility that remnants are universally subject to processing-based constraints.

To make this approach viable under the non-deletion analyses of clausal ellipsis we would need solid evidence that sprouting is more difficult to process than merger and that backward merger is more difficult to process than forward merger. Evidence to this effect would make it plausible that the processing difficulty associated with sprouting and backward merger is, partially or completely, due to the lack of preceding explicit correspondents for remnants and leads to a strong preference for unreduced remnants. We could further argue that the grammar has responded to this preference by conventionalizing it as a grammatical ban against remnant reduction under sprouting and backward merger (for more examples of such conventionalization, see Hawkins' (2004, 2014) Performance-Grammar Correspondence Hypothesis). We offer these possibilities as hypotheses for future research but wish to note that there already is evidence that sprouting is harder to process than merger (see Section 5.1), as expected.

6 Conclusion

We have discussed empirical evidence that supports the ideas that (1) reduced remnants could be treated as ungrammatical but acceptable when certain conditions obtain, and (2) they could be treated as grammatical but degraded when certain conditions are not satisfied. We have offered support for a pronounced acceptability difference between reduced remnants of the sprouting type and reduced remnants of the merger type, and for independently motivated elaboration effects that arise only in remnants of the merger type. To account for the full

range of data, we have proposed that the grammar interacts with processing-based principles. This is a potentially crosslinguistically valid explanation for the behavior of remnants which derives the possibility of form reduction of remnants from their anaphoric properties. But we leave it open whether the task of processing principles is to raise the status of reduced remnants from ungrammatical to acceptable or whether it is to lower it from grammatical to degraded. We have argued that our data exclude neither option but more research it needed.

Appendix 1 Experimental items

Experiments 1–2 items (the construction- and P-stranding-related manipulations are enclosed in curly brackets). For the backward merger conditions in Experiment 2, the order of forward merger clauses was reversed.

1. *Studenci narzekają (na kogoś)   ale nie wiem {na   kogo,   kogo}*
   Students complain (about someone.ACC) but not I.know {about who.ACC, who.ACC}
   'The students have been complaining (about someone), but I don't know about whom'

2. *Stracili   kontakt (z   kimś),   ale nie pamiętam   {z kim,*
   they.lost   touch   (with someone.INSTR) but not I.remember {with who.INSTR,
   kim}.
   who.INSTR}
   'They lost touch (with someone) but I don't remember with who/who.'

3. *Anna   długo się   żegnała   (z kimś),   ale   nie*
   Anna   long REFL   said.goodbye   (with someone.INSTR) but   not
   widziałem {z   kim,   kim}.
   I.saw   {with who.INSTR, who.INSTR}
   'Anna was saying goodbye (to someone) for a long time, but I didn't see to who/who.'

4. *Dyrektor wywiera presje   (na kogoś),   ale nie wiadomo {na kogo,*
   manager   puts   pressure (on someone.ACC)   but not knownon {on who.ACC,
   kogo}.
   who.ACC}
   'The manager is putting pressure on someone but none one knows on who/who.'

5. *Daniel ma alergię (na coś),*   *ale nie pamiętam*
   Daniel has allergy (to something.ACC) but not I.remember
   {na   co,   co}.
   {to   what.ACC, what.ACC}
   'Daniel has an allergy (to something), but I don't remember to what/what.'

6. *Czekali   dwie godziny (na coś),*   *ale nie wiem   {na co,*
   they.waited two   hours   (for something.ACC) but not I.know {for what.ACC,
   co}.
   what.ACC}
   'They waited (for something) for 2 h but I don't know for what/what.'

7. *Wszyscy   byli   zadowoleni (z   czegoś),*   *ale nie wiem   {z*
   all   were   happy   (with something.GEN) but not I.know {with
   czego,   czego}.
   what.GEN, what.GEN}
   'All were happy (with something) but I don't know with what/what.'

8. *Adam   dostał SMSa (od   kogoś),*   *ale nie wiem   {od   kogo,*
   Adam   got   SMS (from someone.GEN) but not I.know {from who.GEN,
   kogo}.
   who. GEN}
   'Adam got a text message (from someone) but I don't know from who/who.'

9. *Kiedyś   byłem zazdrosny (o kogoś),*   *ale nie pamiętam {o kogo,*
   once   I.was jealous   (of someone.ACC) but not I.remember {of who.ACC,
   kogo}.
   who.ACC}
   'I was once jealous (of someone) but I don't remember of who/who.'

10. Adrian   miał sen   (o   czymś),*   *ale nie pamięta*
    Adrian   had dream (about something.INSTR) but not he.remembers
    {o   *czym,*
    {about what.INSTR,
    czym}.
    what.INSTR}
    'Arian had a dream (about something) but he doesn't remember about what/
    what.'

11. *Dwie nastolatki zostały   oskarżone (o   coś),   ale nie wiadomo*
    two   teenagers were   charged   (with something.ACC) but not known
    {o   co,   co}.
    {with what.ACC, what.ACC}
    'Two teenagers were charged (with something) but it's unknown what/with what.'

12. *Mama i   Tata długo   rozmawiali   (o   czymś),*
    Mom   and Dad long   talked   (about   something.INSTR)
    ale nie wiem   {o   czym,   czym}.
    but not I.know {about what.INTSR, what.INSTR}
    'Mom and Dad talked (about something) for a long time but I don't know about what/what.'

13. *{Na   kogo,   kogo}   narzekają   studenci   (na)?*
    about   who.ACC,   who.ACC} complain   students   (about)
    'Who are the students complaining about?'

14. *{Z   kim,   kim}   stracili   kontakt   (z)?*
    {with   who.INSTR,   who.INSTR} they.lost   touch   (with)
    'Who did they lose touch with?'

15. *{Z   kim,   kim}   Anna długo się   żegnała   (z)?*
    {with who.INSTR, who.INSTR} Anna long   REFL said.goodbye (with)
    'Who was Anna saying goodbye to for a long time?'

16. *{Na   kogo,   kogo}   dyrektor   wywiera   presję   (na)?*
    {on   who.ACC,   who.ACC} manager   puts   pressure   (on)
    'Who is the manager putting pressure on?'

17. *{Na   co,   co}   Daniel   ma   alergię   (na)?*
    {to   what.ACC,   what.ACC} Daniel   has   allergy   (to)
    'What does Daniel have an allergy to?'

18. *{Na   co,   co}   czekali   dwie   godziny   (na)?*
    {for   what.ACC,   what.ACC} they.waited   two   hours   (for)
    'What did they wait for 2 h?'

19. *{Z   czego,   czego}   wszyscy   byli   zadowoleni   (z)?*
    {with   what.GEN,   what.GEN} all   were   happy   (with)
    'What were all happy with?'

20. *{Od   kogo,   kogo}   Adam   dostał   SMSa   (od)?*
    {from   who.GEN,   who.GEN}   Adam   got   SMS   (from)
    'Who did Adam get a text message from?'

21. *{O   kogo,   kogo}   kiedyś   byłem   zazdrosny   (o)?*
    {of   who.ACC,   who.ACC}   once   I.was   jealous   (of)
    'Who was I once jealous of?'

22. *{O   czym,   czym}   Adrian   miał   sen   (o)?*
    {about   what.INSTR,   what.INSTR}   Adrian   had   dream   (about)
    'What did Arian had a dream about?'

23. *{O   co,   co}   dwie nastolatki zostały oskarżone (o)?*
    {with what.ACC, what.ACC} two   teenagers were   charged   (with)
    'What were two teenagers charged with?'

24. *{O   czym,   czym}   Mama i   Tata długo rozmawiali (o)?*
    {about what.INTSR, what.INSTR} Mom   and Dad long   talked   (about)
    'What did Mom and Dad talk about for a long time?'

Experiment 3 items (the Elaboration- and Remnant form-related manipulations are enclosed in curly brackets)

1. *Poszła   {do   kogoś,   zamiast kogoś},   ale nie*
   she.went   {to   someone.GEN, instead.of someone.GEN} but not
   kogo,   kogo,   zamiast   kogo,   kogo}.
   who.GEN,   who.GEN,   intsead.of   who.GEN,   who.GEN}
   pamiętam   {do
   I.remember {to
   'She went to someone/instead of someone but I don't remember to who/instead of who.'

2. *Jestem   {u   kogoś,   przeciw   komuś},   ale nie*
   I.am   {with   someone.LOC, against   someone.DAT} but not
   kogo,   kogo,   przeciw   komu,   komu}.
   who.LOC,   who.LOC,   against   who.DAT,   who.DAT}.
   powiem   {u
   I.will.say {with
   'I am with someone/against someone but I won't say with who/against who.'

3. *{Zatrudniono,   zwolniono} go   {dla   kogoś,   wskutek*
   {was hired,   was fired} he {for   someone.GEN, because.of
   nie   wiadomo   {dla kogo,   kogo,   wskutek
   not   known   {for who.GEN,   who.GEN,   because.of
   czegoś}   ale
   something.GEN}   but
   czego,   czego}.
   what.GEN,   what.GEN}
   'He was hired/fired for someone/because of something but it's unknown for
   who/because of what.'

4. *Historyjka   ostrzega {o   czymś,   przed czymś},*
   story   warns   {about   something.INSTR, against something.INSTR}
   wiem   {o   czym,   czym,   przed czym,
   I. know   {about   what.INSTR, what.INSTR,   against what.INSTR,
   ale   nie
   but   not
   czym}.
   what.INSTR}
   'The story warns about/against something but I don't know about/against what.'

5. *Uciekł   {z   kimś,   przed   kimś},*
   he.ran.away {with   someone.INSTR, from   someone.INSTR}
   kim,   kim,   przed   kim,   kim}.
   who.INSTR, who.INSTR, from   who.INTSR, who.INSTR}
   ale   nie   wiem   {z
   but   not   I.know   {with
   'He ran away with/from someone but I don't know with/from who.'

6. *Głosowali {na   kogoś,   przeciw komuś},   ale nie*
   they.voted {for   someone.ACC, against   someone.DAT} but not
   kogo,   przeciw komu,   komu}.
   who.ACC,   against who.DAT,   who.DAT}
   wiem   {na   kogo,
   I.know   {for   who.ACC,
   'They voted for/against someone but I don't know for/against who.'

7. *Kłamali {o   kimś,   wobec   kogoś},   ale*
   they.lied {about   someone.INSTR, in.front.of someone.GEN} but
   {o   kim,   kim,   wobec   kogo,   kogo}.

{about   who.INSTR, who.INSTR,   in.front.of who.GEN,   who.GEN}
nie   pamiętam
not   I.remember
'They lied about/in front of someone but I don't know about/in front of who.'

8. *Oczekują   posłuszeństwa {od   kogoś,   zamiast   czegoś},*
    they.expect obedience   {from   someone.GEN, instead.of something.GEN}
    pamiętam {od   kogo,   kogo,   zamiast   czego},
    I.remember {from   who.GEN, who.GEN,   instead.of what.GEN,
    ale   nie
    but   not
    what.GEN}
    'They expect obedience from someone/instead of something, but I don't remember from who/instead of what.'

9. *Trafiłam tam {z kimś,   przed   kimś},   ale*
    I.got there   {with someone.INSTR, before   someone.LOC} but
    {z   kim,   kim,   przed   kim,
    {with   who.INSTR,   who.INSTR, before   who.LOC,
    nie   pamiętam
    not   I.remember
    kim}.
    who.LOC}.
    'I got there with/before someone, but I don't remember with/before who.'

10. *Sporządziłam listę {u   kogoś,   według   czegoś},*
     I.made   list {at   someone.GEN, according.to something.GEN}
     pamiętam   {u kogo,   kogo,   według   czego,
     I.remember   {at who.GEN, who.GEN,   according.to what.GEN,
     ale   nie
     but   not
     czego}.
     what.GEN}
     'I made the list at someone's house/according to something but I don't remember at whose house/according to what.'

11. *Zmierzałem, zawiodłem} {do   kogoś,   przez   kogoś}*
     {I.walked,   I.failed}   {to   someone.GEN, because.of someone.GEN}

pamiętam	*{do*	*kogo,*	*kogo,*		*przez*	*kogo,*
I.remember	{to	who.GEN,	who.GEN,		because.of	who.GEN,
ale	*nie*					
but	not					
kogo}.						
who.GEN}						

'I walked/failed towards/because of someone but I don't remember towards/ because of whom.'

12.
Przeszli	*jezdnię*	*{za*	*kimś,*		*obok*	*kogoś}*
they.crossed	road	{behind	someone.LOC,	next.to	someone.GEN}	
psmiętam	*{za*	*kim,*	*kim,*		*obok*	*kogo,*
I.remember	{behind	who.LOC,	who.LOC,		next.to	who.GEN,
ale	*nie*					
but	not					
kogo}.						
who.GEN}						

'They crossed the road behind/next to someone but I don't remember behind/ next to who.'

Appendix 2 Outcomes of models developed in Experiments 1–3

Experiment 1

Table 1: Model fixed factors.

Fixed factors	Estimate	SE	*t*-Value	*p*-Value
Intercept	1.56	0.05	26.68	<0.0001
Construction merger	0.83	0.07	10.57	<0.0001
Construction question	−0.43	0.07	−1.7	0.08
P-stranding PP	1.12	0.07	14.47	<0.0001
Construction × P stranding interaction: question × PP	0.86	0.1	1.82	0.05
Construction × P stranding interaction: merger × PP	−0.96	0.1	−8.92	<0.0001

Table 2: Model random factors.

Random factors	SD
Participants intercept	0
Items intercept	0.06
Residual	0.58

Experiment 2

Table 3: Model fixed factors.

Fixed factors	Estimate	SE	t-Value	p-Value
Intercept	1.42	0.06	22.83	<0.0001
Construction: forward merger	0.96	0.07	12.63	<0.0001
Construction: backward merger	−0.01	0.07	−0.16	0.86
P stranding: PP	1.38	0.07	18.64	<0.0001
Construction × P stranding interaction: forward merger × PP	−1.22	0.1	−11.66	<0.0001
Construction × P stranding interaction: backward merger × PP	−0.58	0.1	−5.51	<0.0001

Table 4: Model random factors.

Random factors	SD
Participants intercept	0
Items intercept	0.18
Residual	0.56

Experiment 3

Table 5: Model fixed factors.

Fixed factor	Estimate	SE	t-Value	p-Value
Intercept	2.17	0.06	32.34	<0.0001
Elaboration: short P	−0.21	0.08	−2.41	<0.05
Remnant form: PP	0.38	0.08	4.28	<0.0001

Table 6: Model random factors.

Random factors	SD
Participants intercept	0.3
Items intercept	0.3
Residual	0.69

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