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Preposition omission under English pseudogapping

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This paper maps out patterns of preposition omission under English pseudogapping, that is, outside of the usual environment in which they have previously been explored. It's possible to drop prepositions in certain environments under clausal ellipsis (sluicing and fragments), but doing so leads to a (slight) degradation in acceptability in the majority of languages except present-day English. Various accounts have been offered to explain this degradation, including a processing-based one. I test the latter's ability to serve as a fully generalizable mechanism with cross-constructional and crosslinguistic coverage that can complement existing theories of ellipsis. My corpus results are that preposition omission is (i) much rarer than retention of prepositions, closely tracking the crosslinguistic default we see in clausal ellipsis, and (ii) sensitive to the same two efficiency principles that dictate how processing pressures on the parser can be eased under clausal ellipsis. I propose that the bias against preposition omission emerges as a preference for structural parallelism that impacts pseudogapping differently than clausal ellipsis. My overall conclusion is that a fully generalizable processing-based explanation for preposition omission is supported by the current data, and I close by formulating a set of testable crosslinguistic predictions that follow from this explanation.

1 Introduction

Pseudogapping is a construction illustrated in (1)–(2).[1]

(1) Apparently Obama thinks as little of the Supreme Court as he does the private sector. (COCA 2010 NEWS: Houston Chronicle)

(2) If you are asked about your disability, respond as you would to any personal question. (COCA 1994 MAG: Accent on Living)

It leaves behind a stranded auxiliary and an additional XP after it: in (1) this is the NP *the private sector* and in (2) the PP *to any personal question*. This XP, which I will henceforth refer to as a remnant, is linked to an overt or implicit phrase in the antecedent clause. This phrase typically goes by the name correlate in the ellipsis literature and is understood in several ways. One understanding aligns its morphosyntactic specifications, particularly its syntactic category, with those of the remnant (e.g. Ross 1969; Ginzburg & Sag 2000; Merchant 2001; Kobele 2015; Abels 2017). Another understanding recognizes that the syntactic category and/or case specifications of the correlate and remnant, where relevant, may differ (e.g. Levelt & Kelter 1982; Levin 1986; Miller 2014; Wood et al. 2020; Nykiel & Kim 2022a; Nykiel et al. 2023; Poppels & Miller 2023). Given the former understanding of a correlate, we would identify *the Supreme Court* as the correlate for the remnant in (1) and some covert PP as the covert correlate for the remnant in (2). But I don't define a correlate this way here for reasons that will become clear shortly.

The presence of a correlate-remnant pair makes pseudogapping similar to other elliptical constructions that also involve correlates, such as fragments illustrated in (3), although the remnant and its overt correlate typically stand in a contrast relation to each other under pseudogapping, something that is less typical of fragments.

(3) A: What is Harvey afraid of?
B: Failing.

The similarity between pseudogapping and fragments that is addressed in this paper concerns prepositions. Compare (3) and (1): in both, the antecedent contains a PP that enables the remnant in (1) and the fragment in (3) to be realized as an NP or a PP. That is, the PP *of the Supreme Court* in (1) could be paired with either the current NP *the private sector* or the PP *of the private sector*, and similarly the discontinuous PP *of what* in (3) could be paired with either the current NP *failing* or the PP *of failing*. Without a preceding PP, NP remnants and NP fragments lose their ability to alternate with any PPs, as is clear from the constructed examples in (4) and (5).

[1] All of the examples of pseudogapping cited here are drawn from the Corpus of Contemporary American English (COCA) unless stated otherwise.

(4) That car would disappoint Harvey more than it would me/*of me/*with me.

(5) A: What is Harvey buying?
B: A car/*of a car/*with a car.

The requirement of a preceding PP also blocks implicit PPs from allowing any alternation for remnants and fragments. In (2), an NP remnant is ruled out, as is an NP fragment in (6) (I return to this pattern in section 2 and in the General discussion).

(6) A: Harvey is afraid.
B: Yes, *failing.

Thus the presence of an overt PP is critical to the alternation between NPs and PPs as remnants or fragments. To put it differently, we could neither know nor ensure that such NPs and PPs are alternants if we were linking them to some antecedent phrases word for word, and not to constituents with certain grammatical functions, that is, to PP complements to verbal, nominal or adjectival heads, or PP adjuncts.

The alternation between PPs and NPs is not isolated in raising the question of what a correlate actually is. A study of Dutch fragments by Levelt & Kelter (1982) reveals a pattern in which a PP fragment can have an NP correlate, as in (7). This is enabled, for instance, by the verb *laten* 'let' taking either an NP or a PP as its complement.

(7) A: Wie laat Paul zijn viool zien? B: Aan Toos.
A: who lets Paul his violin see B: To Toos
'A: Who does Paul show his violin to? B: Toos.' (Levelt & Kelter 1982: 80)

Miller (2014) offers English examples involving a PP as a pseudogapping remnant with an NP correlate due to the dative alternation. In (8) the verb *give* participates in the dative alternation, and hence the syntactic category difference between the remnant and the correlate.

(8) It's hard enough to take two hours out of my day to put out a legal fire — much less give the matter the same attention he would to something that's actually going to generate some cash for the company. (Miller 2014, ex. 16)

It's clear from these examples that the correlates aren't phrases with an identical syntactic category (otherwise, we would have to erroneously conclude that there are no correlates here at all), but rather arguments to the verbs *laten* and *give* that alternate with the NPs currently present in the antecedents. If the definition of a correlate should rely on an argument structure licensed by an antecedent lexical head, as these examples suggest, then it's a reasonable assumption that dropping prepositions doesn't change the fact that a resulting NP fragment or NP remnant still has a PP correlate, as this is the argument it targets in the antecedent clause. In fact, this idea

is not new, going back to Levin's (1986: 16) early work on pseudogapping, where she refers to NP remnants using the term 'deprepositionalized'. A process of deprepositionalization of sorts is, therefore, what I assume for NP remnants and NP fragments, even though the actual term I use here is P(reposition) omission, such that the correlate for the NP remnant in (1) is the PP *of the Supreme Court* and the correlate for the NP fragment in (3) is the PP *of what*. I extend this logic to adjunct correlates by treating them as PPs under P-omission. Syntactic category identity can't be a necessary part of the definition of a correlate here either because pairing a PP fragment with an NP correlate is again a possibility if an adjunct can be expressed as either syntactic category, as is the case in (9).

(9) A: What time do you close?
B: At 7 o'clock. (Chia et al. 2020: 1050)

The empirical novelty of this paper lies in pseudogapping as a different environment in which to explore P-omission. A steadily growing interest in this phenomenon has produced crosslinguistic results of limited scope, since they only relate to two constructions, fragments and sluicing (both of which are examined in detail in section 2). These results, ranging from introspective judgements to experimental data to corpus data, have challenged purely syntactic analyses of P-omission by raising questions about the grammaticality, acceptability, and actual motivation behind P-omission. One specific question that is still debated is whether languages differ in the grammaticality of P-omission or just in the strength with which they (dis)prefer it, as measured by corpus frequencies and acceptability ratings. If P-omission turns out to be grammatical but preferred or dispreferred for some reasons, then the next step is to understand what these reasons are. They are unlikely to be syntactic, so we could be forced to adopt a fresh perspective on P-omission, one with an extragrammatical component. Adding pseudogapping to the existing picture is a step in the direction of collecting more varied data from a single language, and this, indeed, makes it possible to better examine the strength of the preference for P-omission in English and compare it with the available crosslinguistic data. Drawing on English corpus data, I argue in favor of such an extragrammatical component: a uniform processing-based explanation for P-omission across constructions and languages that sees the constraints on it as an interplay of general principles of efficient language processing and construction- or language-specific biases.

The rest of this paper proceeds as follows. In section 2, I turn to constraints on P-omission known to be operative in two kinds of clausal ellipsis, fragments and sluices. I begin with syntactic analyses of P-omission and then turn to a processing-based one laid out in Nykiel & Hawkins (2020) as a set of fully generalizable mechanisms that govern how the content of elliptical utterances may be manipulated to ease processing pressures on the parser. This processing-based proposal constitutes the basis for a corpus analysis of P-omission in pseudogapping in

section 4. Before looking at corpus data, however, section 3 reviews existing theoretical accounts of pseudogapping, highlighting their predictions with regard to the grammaticality of P-omission and their ability to capture the full set of facts surrounding P-omission. Section 4 presents English corpus data showing P-omission to be less frequent than P-retention under pseudogapping and subject to the set of processing constraints identified in Nykiel & Hawkins (2020). As I argue in section 5, these findings indicate that a uniform processing account of P-omission is plausible that takes advantage of the principles of Minimize Domains and Minimize Forms defined in Hawkins (2004) on the one hand and construction- or language-specific constraints on the other to make broad generalizations about when and why P-omission occurs. I also propose that there's no reason to assume that P-omission is ungrammatical on account of its crosslinguistic profile and accruing evidence for a processing-based motivation for it. Section 6 concludes.

2 Preposition omission under clausal ellipsis

Let us consider two instances of clausal ellipsis, fragments and sluicing. We saw a fragment in example (3), repeated here for convenience as (10). A sluice is illustrated in (11). The difference between fragments and sluices is that fragments are stranded XPs with, typically, propositional semantics[2] and sluices are stranded wh-phrases with interrogative semantics.

(10) A: What is Harvey afraid of?
B: Failing.

(11) A: They're trying to protect Harvey from something.
B: What?

These examples illustrate P-omission, that is, standalone NPs that alternate with PPs (*Of failing* and *From what*, respectively). As mentioned in the Introduction, the possibility of selecting either an NP or PP here depends on whether an antecedent hosts a PP to serve as a correlate. This requirement is satisfied by the overt PP complements to *afraid* and *protect*, i.e., *of what* and *from something*, and hence the option of retaining or dropping the prepositions from the fragment and sluice. However, we lose this option both for fragments and sluices when an antecedent hosts an implicit PP in a configuration called sprouting, as in (12) (see also example (6)).

(12) A: Harvey is afraid.
B_1: Yes, *(of) failing.
B_2: *(Of) what?

[2] I use the term fragments here as a more general term for apparently nonsentential responses to questions (also known as fragment answers) and other reactions, including clarificational ones, to the preceding (non)linguistic context. For simplicity, I will also use the term fragments to refer to both sluices and fragments, unless a distinction is required.

Now the fragment and sluice must match exactly the syntactic category of the unexpressed PP that is the complement to *afraid*. This constraint (which we will also see in action in the pseudogapping data reported in section 4) illustrates that a fragment or sluice tracks corresponding arguments in its antecedent, displaying sensitivity to the morphosyntax of these arguments. Chung (2006; 2013) and Anand et al. (2023) develop syntactic analyses of this constraint, which I come back to later in this section after first discussing available syntactic analyses of P-omission.

2.1 Syntactic analyses of P-omission

The possibility of using NPs or PPs as fragments and sluices has attracted considerable attention due to its potential to reveal something about the structure of these apparently nonsentential utterances. Merchant (2001: 92) proposes the Preposition-Stranding Generalization (PSG), given in (13), for sluicing (Merchant 2004 extends the PSG to fragments).

(13) A language L will allow P-stranding in sluicing iff L allows preposition stranding under regular wh-movement.

We should clarify at this point that 'P-stranding' should be understood as P-omission, or using NPs instead of PPs. The PSG predicts that this is a severely restricted option, as restricted as preposition stranding is, appearing only in Germanic. If the PSG is accurate we have support for a theoretical possibility that sluices are constituents in sentential structures that have survived deletion, and should exhibit all the relevant properties such constituents would have. For instance, the properties of the sluice in (11) should be equivalent to those of its counterpart in the sentential structure in (14), in which preposition stranding has applied.

(14) What are they trying to protect Harvey from?

Assuming that NP sluices are derived from sentential sources via preposition-stranding movement, then they should appear only in those languages that permit such movement. This possibility is defended in work following Merchant (2001; 2004), with current debate centered around the question of whether sluices and fragments survive deletion after leftward movement (e.g. Griffiths & Lipták 2014; Weir 2014; Shen 2018) or without it (e.g. Abe 2015; Griffiths 2019; Stigliano 2022). The latter kind of analysis, assuming deletion but not movement, has difficulty predicting why or when NPs can replace PPs under clausal ellipsis (but see Griffiths 2019 for a proposal), while the former kind doesn't so long as NPs closely track the patterns we see in preposition-stranding movement, as per the PSG.

But the PSG's predictions are far from perfect. The list of languages in which NPs alternate with PPs as fragments although no alternation should be permitted is long and growing: Bahasa Indonesia (Fortin 2007), Spanish and Brazilian Portuguese (Almeida & Yoshida 2007; Rodrigues et al. 2009; Stigliano 2022), Serbo-Croatian (Stjepanović 2008; 2012), Czech (Caha

2011), Polish (Szczegielniak 2008; Sag & Nykiel 2011; Nykiel 2013; 2018; Nykiel & Kim 2022b), Russian (Philippova 2014), Emirati Arabic (Leung 2014), Bulgarian (Abels 2017), Greek (Molimpakis 2019), Saudi Arabic (Alshaalan & Abels 2020), Mauritian (Abeillé & Hassamal 2019), French (Hassen & Abeillé 2025). On the one hand, these data have helped garner support for a competing nontransformational approach to ellipsis that sees fragments as genuinely nonsentential utterances, with no parallels to be expected between them and corresponding sentential constituents (Ginzburg & Sag 2000; Culicover & Jackendoff 2005; Sag & Nykiel 2011; Kim 2015; Abeillé & Hassamal 2019; Abeillé & Kim 2022; Nykiel & Kim 2022a).[3] The nontransformational approach, unlike the deletion-based one, leaves no reason to think that NPs are ungrammatical while PPs are grammatical in any language. On the other hand, these data have also led researchers to look for explanations for why NPs should alternate with PPs under clausal ellipsis. These explanations range from syntactic ones whose aim is to defend the PSG along with the transformational approaches to ellipsis (e.g. Rodrigues et al. 2009; Abels 2017; Molimpakis 2019; Alshaalan & Abels 2020) to processing-based ones (Nykiel 2013; 2017; Nykiel & Hawkins 2020; Nykiel & Kim 2022b; Hassen & Abeillé 2025) whose aim is rather to advance our understanding of why NPs appear at all.

The focus has recently been on experimental and corpus data, which allows us to probe both the acceptability and frequency of P-omission across languages. The current findings are that PPs are generally better than NPs as fragments in the great majority of languages (Nykiel 2013; Merchant et al. 2013; Molimpakis 2019; Alshaalan & Abels 2020; Lemke 2021; Nykiel & Kim 2022b; Hassen & Abeillé 2025)[4] and have higher frequencies in corpus data (Nykiel 2015). An exception to these patterns is present-day English, favoring P-omission in both corpus data (Nykiel 2017; Nykiel & Hawkins 2020) and experimental data (Lemke 2021) and French, which, however, favors P-omission only in corpus data (Hassen & Abeillé 2025). There thus appears to be crosslinguistic pressure to use PPs rather than NPs. It is observed even in a preposition-stranding language like English as a pattern weakening over time in response to a growing number of multi-word verbs (see Nykiel 2014; Nykiel & Hawkins 2020). But why should such pressure exist? Two scenarios are plausible. Given the nontransformational approach to fragments, both PPs and NPs are grammatical, but there is some reason to prefer PPs over NPs in some environments. That reason could be that PPs are generally easier to process, possibly by virtue of the amount of linguistic information they encode (this is proposed in Nykiel & Hawkins 2020 and discussed

[3] Some of these proposals (e.g. Kim 2015; Nykiel & Kim 2022a) are supported by typologically varied data harvested not just from Indo-European but also Korean, the latter involving case specifications, which may be dropped under clausal ellipsis in the same circumstances that prepositions may be in Indo-European. This parallel between prepositions and case specifications is completely unexpected given deletion-based accounts of clausal ellipsis, but it can easily be accommodated on nontransformational accounts.

[4] However, there are environments where the acceptability of NPs differs unreliably from the acceptability of PPs (Nykiel 2013; Nykiel & Kim 2022b; Hassen & Abeillé 2025).

in detail in section 2.2). Given the transformational approach to fragments, we would assume that NPs are grammatical in some languages (or perhaps in some environments within a single language) and ungrammatical in others, with their degraded acceptability reflecting the pressure to avoid them in exactly those languages that fail to license them. It's clear, however, that it's not the PSG that can capture the crosslinguistic data, because the acceptability of NPs consistently falls above that of ungrammatical controls in experimental studies that have made such comparisons (Nykiel 2013; Molimpakis 2019; Alshaalan & Abels 2020; Nykiel & Kim 2022b; Hassen & Abeillé 2025). One could explore whether P-omission is a candidate for constituting yet another instance of acceptable ungrammaticality among those discussed in the literature (e.g. Wagers et al. 2009; Tanner et al. 2014; Parker & Phillips 2016; 2017), which includes an ongoing debate surrounding the acceptability and grammaticality of structural mismatches under a different elliptical construction, Verb Phrase ellipsis (VPE) (Arregui et al. 2006; Kim et al. 2011; Kim & Runner 2018; Parker 2018). In sum, all syntactic accounts face the task of explaining a disconnect between the acceptability and frequency of NPs vs. PPs and our theoretical assumptions about their grammaticality. Before we can determine how P-omission can be accommodated on existing formal theories of ellipsis, we need a better understanding of why and when exactly it is available at all. Whatever account of P-omission we articulate must also provide a motivation for the ban on P-omission under sprouting we saw in (12), as this ban appears to be the key to answering both the why and the when questions.

Only the transformational literature has offered syntactic explanations for the ban on P-omission under sprouting. The first is Chung's (2006) proposal that deletion is subject to a constraint that prevents it from targeting lexical items that are absent from the antecedent. This has the effect that a preposition may never be deleted without an antecedent hosting an overt PP headed by the same preposition. Another explanation is a follow-up on this constraint but additionally incorporates some syntactic identity between the structure of a sluice and its antecedent. Chung (2013) proposes a requirement that the lexical head licensing the features of an NP sluice be the same as the lexical head licensing the features of its correlate (an argument structure identity constraint is also placed on the relevant predicates in the antecedent and the elided clause). This again has the desired effect of ruling out NP sluices that would be licensed by prepositional heads that are missing from the structure of the antecedents. Building on Rudin (2019), Anand et al. (2023) also defend the idea that argument-structure identity must obtain between the structures of a sluice and its antecedent, but they define identity over constituents smaller than entire antecedent clauses. For them, the relevant unit is what they call an 'argument domain', the largest phrase with an event-based semantics located within an extended projection and containing a lexical head and all of its arguments. Identity is calculated over the members of an argument domain located within the deleted material (out of which a sluice moves) and the members of a corresponding argument domain within the sluice's antecedent. To see how this

analysis handles sprouting and P-omission, consider the underlying structure for the ill-formed NP sluice in (12), repeated here as (15).

(15) A: Harvey is afraid.
B: *What <is Harvey afraid of>?

In deriving the sluice, we leave the preposition *of* behind at the ellipsis site, with the result that the argument domain it belongs to fails to fully match any argument domain in the antecedent because implicit phrases are not represented at all in syntactic structure on Anand et al.'s analysis. If, however, we pied-pipe the preposition with its complement *what*, forming a PP sluice, we eliminate the problematic mismatch at the ellipsis site. We would also not run into any mismatch-related difficulties if the antecedent contained an overt correlate for the NP sluice, since then a matching preposition would be present in the antecedent.

However, Anand et al.'s proposal faces two problems. First, their analysis, like Merchant's (2001), relies on preposition-stranding movement to derive NP sluices, a move that compromises its accuracy as soon as NP sluices appear in languages without preposition stranding. Second, transformational accounts of P-omission have a tradition of postulating several kinds of underlying structure for NP sluices to avoid preposition-stranding violations. Besides the structure identical to its antecedent, a sluice may be embedded in a copular clause or a short cleft, neither of which involves illicit preposition stranding (e.g. Rodrigues et al. 2009; Van Craenenbroeck 2010; Vicente 2018). These structures are depicted in (16)–(17) for the NP sluice with an overt correlate in (11).

(16) What <is it that they're trying to protect Harvey from>?

(17) What <is it>?

There is an obvious tension between Anand et al.'s argument-structure identity requirements and permitting copular clauses and short clefts, which can never satisfy such requirements, as sources for NP sluices. Thus, the transformational work on sprouting hasn't brought us closer to formulating a satisfactory syntactic explanation for P-omission, even though it has highlighted a general need for argument structure-based parallelism between fragments and their antecedents whenever fragments are linked to correlates that are arguments to some lexical heads.[5]

[5] There is general agreement that correlates are often adjuncts (see e.g. Nykiel & Hawkins 2020 and Anand et al. 2023 for corpus data), including under pseudogapping (see Stump 1977 for this point regarding pseudogapping). But because the grammar imposes no morphosyntactic constraints on adjuncts, there is no requirement that corresponding fragments be sensitive to any morphosyntactic information encoded by their adjunct correlates, although they may be. Adjunct correlates are incorporated into the corpus analysis to be presented in section 4 as level 0 dependency items.

2.2 Processing-based analysis of P-omission

The limited success of purely syntactic analyses of P-omission has led to a processing-based strand of research due to Nykiel & Hawkins (2020). The basic idea behind their proposal is that P-omission is grammatical (this is currently fully in line with the nontransformational approach to ellipsis and partially so with the transformational one) and that it serves as a way of shortening fragments in easy-to-process environments by removing contextually given information in the form of prepositions, much the same way that NP fragments can be shortened by avoiding repetition of their head nouns, as in (18).

(18) A: I'm going to a wedding.
B: Whose (wedding)?

This idea is tied to our current understanding of how fragments are processed online. They encode semantic and morphosyntactic cues for the parser to use in the process of locating their correlates, after which they can be integrated into the propositions expressed by their antecedents (Culicover & Jackendoff 2005; 2012; Culicover 2016; Goldberg & Perek 2019; Harris & Carlson 2019; Nykiel et al. 2023). The initial search for the correlate is executed by a direct-access mechanism, that is, by comparing a fragment's properties against all extant memory representations simultaneously until the target is successfully identified, as Martin & McElree (2011) have proposed. The general process of resolving dependencies between current and previously encountered memory representations by engaging a direct-access mechanism is central to cue-based theories of sentence processing (Caplan & Waters 2013; Lewis & Vasishth 2005; Lewis et al. 2006; McElree 2000; McElree et al. 2003; Van Dyke 2011; Van Dyke & Johns 2012). These theories are cue-based in the sense that they don't assume any serial search through existing memory representations and that successful retrieval relies on the information supplied by the constituent that initiates the retrieval (a retrieval probe). The retrieval probe carries information whose diagnosticity is defined in relative terms. If the retrieval probe is completely or partially similar only to the target, and there are no distractors with similar features, then the target is distinct and more easily accessible during retrieval. But if the retrieval probe, the target, and distractors all share some features, the cue diagnosticity of the retrieval probe is reduced, leading to potential cue overload, that is, failure to retrieve the target (Watkins & Watkins 1975; Nairne 2002; Öztekin & McElree 2007; Martin 2018). While we still don't know with complete certainty what linguistic information is used as retrieval cues, there is evidence that it's semantic, syntactic, and morphological (Parker et al. 2017). With this background in place, we can conclude that a fragment's properties affect the success of the search for its correlate, but Nykiel & Hawkins (2020) argue that it is the properties of both the fragment and correlate that matter. Before proceeding, we should briefly look at the processing of expressions with different linguistic content.

Research on memory retrieval has documented a difference between the processing of lexical NPs as semantically and syntactically contentful expressions and the processing of less contenful expressions like pronouns. This difference is due to lexical NPs receiving mental representations that are more readily available for future retrieval (Craik & Lockhart 1972; Gallo et al. 2008; Hofmeister 2007; 2008; 2011; Hofmeister et al. 2007; Hofmeister et al. 2013; Karimi et al. 2014). In other words, the more contentful an expression is the more of an accessibility boost it receives on being processed. Differences in the accessibility of expressions are also connected to the manner in which we tend to refer to them. Highly accessible expressions are picked up by anaphors with less content (e.g. pronouns) and low-accessibility expressions are preferably picked up by anaphors with more content (e.g. lexical NPs) (Ariel 1990; Gundel et al. 1993; Karimi et al. 2014; Troyer et al. 2016; Nykiel et al. 2023). This is so regardless of whether we link accessibility to future retrieval from memory, as we do here, or to current availability for retrieval, as do Ariel (1990) and Gundel et al. (1993). These insights will be helpful in our discussion of how correlates impact the amount of linguistic information that fragments encode below and later in section 4.1.

Nykiel & Hawkins' (2020) purpose is to account for both why and when P-omission is available. They take as their starting point the sprouting pattern we have already seen. A fragment linked to an implicit argument must satisfy the requirements imposed on that argument by the lexical head that selects it. This is possible because implicit arguments, regardless of whether they are taken to be actually present in syntactic structure,[6] are activated in online processing as part of the full lexical entry for a licensing head and are available as correlates (see Culicover & Jackendoff 2005: 260–262 for extensive justification of this position). P-omission isn't permitted if an implicit argument is a PP. If it was permitted, it would lead to the fragment being a smaller constituent than the required PP. But we can expand the fragment beyond a PP. These options are depicted in (19) (see also Weir 2017 for discussion of such expanded fragments).

(19) A: Were you worried?
B. *What?/About what?/Worried about what? (Nykiel & Hawkins 2020: 241)

Nykiel & Hawkins (2020) argue that, given the fragment's task to efficiently point to a PP argument here, it is a processing advantage for it to encode the same syntactic category, as is including even more information by repeating antecedent material beyond the PP (the advantage of including redundant material in sluices has previously been documented by Harris 2015).

[6] The question of whether or not implicit arguments should be represented in the syntax has been debated. For instance, we saw earlier in this section that Anand et al. 2023 don't represent them at all when analyzing sprouting, but Nykiel & Kim (2022a) do. More generally, nontransformational analyses of fragments couched in the framework of Head-Driven Phrase Structure Grammar represent implicit arguments in the syntax as noncanonical signs, i.e. signs without internal structure (see e.g. Ginzburg & Sag 2000; Kim 2015; Nykiel & Kim 2022a).

Meanwhile, P-omission introduces potentially misleading cues: a different syntactic category than the PP we're looking for and no repeated antecedent material whatsoever. The question this raises is why an overt PP argument in the antecedent should come with the options of both shortening a fragment to an NP and expanding it to a larger phrase than a PP, as shown in (20), without compromising the reliability of the fragment's retrieval cues.

(20) A: Were you worried about something?
B. What?/About what?/Worried about what?

The answer lies in the accessibility of the PP argument being pointed to. Whenever it's an implicit phrase, it lacks form and content, which renders its mental representation minimally accessible for future retrieval, according to the definition of accessibility we adopt here. That being so, the implicit PP is difficult to access and the burden is on the fragment to supply cues that are sufficient for linking it to that PP. We would expect expanded fragments to appear more frequently under sprouting than elsewhere, since the redundant information they provide can ease the processing difficulty in this context. If the fragment's task is instead to point to an overt PP, which can be thought of as more accessible and, therefore, easier to access than any implicit PP on account of its content, fewer retrieval cues will be required of the fragment.

That possible changes to the form of fragments are a response to the context in which we find them follows from the principle of Minimize Forms (MiF) (Hawkins 2004: 31), given in (21).

(21) Minimize Forms
The human processor prefers to minimize the formal complexity of each linguistic form F (its phoneme, morpheme, word, or phrasal units) and the number of forms with unique conventionalized property assignments, thereby assigning more properties to fewer forms. These minimizations apply in proportion to the ease with which a given property P can be assigned in processing to a given F.

Hawkins (2004; 2014) invokes MiF to explain various kinds of principled reduction, including some kinds of ellipsis. Nykiel & Hawkins (2020) invoke MiF as a principle dictating how the form of fragments rests on the ease with which their correlates can be accessed. For P-omission, MiF predicts that fragments may optionally carry less content by dropping prepositions if they are easy to pair with their correlates. But if correlates already have low levels of accessibility, P-omission removes redundant, and potentially helpful, material, impoverishing the set of retrieval cues that fragments encode, and hence is dispreferred. The fact that the processing of sluices with implicit correlates is indeed more demanding than the processing of sluices with overt correlates has been independently supported through experimental studies (Frazier & Clifton 1998; Dickey & Bunger 2011). That being so, the actual ban on P-omission under sprouting can be seen as the limiting case of MiF, with the grammar having stepped in to rule out a strongly dispreferred structure

and thereby to ensure that fragments remain interpretable. In other words, we are assuming, following Hawkins (2004; 2014), that preferences governing syntactic variation interact with the grammar by being able to give rise to grammatical constraints that enforce structures that are strongly preferred or ban structures that are strongly dispreferred (see Hawkins 2014: 78–85 for more examples and discussion of how preferred structures can conventionalize into grammatical principles as dispreferred ones turn into grammatical violations). Recognizing the possibility that the grammar has responded to processing pressures, Nykiel & Kim (2022a: 92) follow up by formulating a grammatical constraint they term *No Form Minimization*, as in (22), to block P-omission under sprouting.

(22) No Form Minimization
The application of MiF is blocked if the resulting minimal fragment corresponds to a subconstituent of an implicit argument in the antecedent.

The processing-based motivation behind (22) is made clear by the explicit reference to MiF.

Beyond sprouting, Nykiel & Hawkins (2020) find support for the predictions of MiF in three kinds of context for fragments, of which I only discuss the one that is also relevant for pseudogapping (but see Nykiel & Hawkins 2020: 422–423, 432 for the entire set of contexts). There is a split between indefinite pronouns and lexical NPs when they serve as prepositional objects within PP correlates. Examples (23)–(24) from Nykiel & Hawkins (2020: 422) illustrate the two kinds of prepositional objects for sluices.

(23) A: I went to talk to someone.
B: Who?

(24) A: I went to talk to an old friend.
B: Who?/Which friend?

In Nykiel & Hawkins' corpus data, P-omission is more frequent in sluices like (24) than in sluices like (23), because, they argue, a lexical NP (*an old friend* in (24)) is more contentful and accessible than an indefinite pronoun (*someone* in (23)). Crosslinguistic work reports the same pattern of preference in introspective judgments (see Caha 2011 for Czech, Rodrigues et al. 2009 for Brazilian Portuguese, Spanish, and French, and Stjepanović 2008 for Serbo-Croatian) and in experimental studies of fragments (see Sag & Nykiel 2011, Nykiel 2013 and Nykiel & Kim 2022b for Polish, and Hassen & Abeillé 2025 for French).

With MiF in place, Nykiel & Hawkins (2020) can account for the availability of P-omission in the languages in which it's been reported, along with its more limited distribution compared to the distribution of corresponding PP fragments. But there are two factors that boost the frequency of P-omission if a language satisfies certain conditions, as does present-day English. These factors

are numerous word-external dependencies between prepositions and other lexical categories and structural parallelism. I discuss them in turn.

Word-external dependencies between prepositions and lexical categories like verbs, nouns, and adjectives are what Nykiel & Hawkins (2020) single out as the cause for the crosslinguistically unusual behavior of present-day English, that is, its failure to favor PPs over NPs as fragments. Word-external dependencies can vary in number (the total number of dependent combinations a language possesses) and strength (whether only the preposition in a combination depends on the other category or whether both depend on each other), and, as Nykiel & Hawkins (2020) argue, they impact the human parser's ability to successfully assign all the relevant properties to a PP fragment when it's first encountered and before the process of searching for its correlate begins. Example (25) from Nykiel & Hawkins (2020: 424) (their original NP fragment has been turned into a PP here) illustrates the processing difficulty associated with a preposition that can't be interpreted within the bounds of the PP in which it's embedded and which constitutes the fragment, requiring simultaneous access to a verb located in the antecedent VP.

(25) A: And you're depending on what?
B: On people going into the booth and changing their minds.

This is because the preposition *on* and the verb *depend* are involved in a two-way dependency, i.e., they depend on each other for their interpretation. Including the preposition *on* in the fragment here forces the parser to reach into the antecedent VP in order to retrieve the preposition's semantics. This differs from the scenario where a preposition is semantically independent and can be assigned all of its semantic and syntactic properties within a fragment before the resolution proceeds any further, as shown by the A_2-fragment in (26) from Nykiel & Hawkins (2020: 420).

(26) A_1: I'm making a bed.
B. For who(m)?
A_2: For the aliens.

In Nykiel & Hawkins' (2020: 419) terminology, the distance over which the constituents of a fragment are assigned their relevant properties is a lexical domain. That domain is coterminous with a fragment for all semantically independent prepositions, but stretches beyond the fragment in (25). With numerous verb-preposition dependencies in English (both Nykiel & Hawkins 2020 and Hawkins 2000 put the rate of semantically dependent combinations in corpus data at approximately 50%), Nykiel & Hawkins (2020) find that English fragments don't contain those prepositions that would disrupt independent processability of PPs. This finding indicates that it's the larger VP domain that pushes in favor of P-omission in English fragments, in effect working against the PP domain, which normally ensures that all constituents of a PP are adjacent to each

other, making their locally determined properties easily processable within that PP. The VP and PP domains compete with each other, as Nykiel & Hawkins (2020) argue, and the reason that the VP domain wins in English fragments is the high number of semantically dependent verb-preposition combinations. If it wasn't for that, a bias against P-omission would be observed, as it has been in several of the world's languages, because then the PP domain would exert stronger influence over fragments than the VP domain (in addition to the effects of MiF).

Distance effects, whether associated with the VP or the PP domain, are in line with the principle of Minimize Domains (MiD) first defined in Hawkins (2004: 31) and given in (27).

(27) The human processor prefers to minimize the connected sequences of linguistic forms and their conventionally associated syntactic and semantic properties in which relations of combination and/or dependency are processed. The degree of this preference is proportional to the number of relations whose domains can be minimized in competing sequences or structures, and to the extent of the minimization difference in each domain.

MiD predicts that linguistic forms are preferably assigned all their semantic and syntactic properties over as minimal distances as possible, but we are specifically interested in semantic properties here. The primary area of application for MiD have been word-order preferences in contexts where alternative orderings of constituents are available. If combinations of semantically dependent constituents are involved, those orderings are favored that allow fastest recognition of all relevant semantically dependent constituents (Hawkins 2000; Lohse et al. 2004). As noted above, the distance over which it's possible to compute such word-external dependencies between constituents is a lexical domain, originally defined in Hawkins (2004: 117). To illustrate, compare the VPs hosting the particle verb *look up* in (28) and (29) (see Lohse et al. 2004: 246).

(28) Joe looked the number of the ticket up.

(29) Joe looked up the number of the ticket.

Notice first that the particle's interpretation is not literal but word-externally dependent on the verb, and, therefore, the parser requires simultaneous access to the verb to interpret the particle. The lexical domain required for interpreting the verb and the particle is seven words in (28), as the parser needs to process the intervening NP before reaching the sentence-final particle. In contrast, the parser requires only two words to compute the meaning of the verb and particle in (29). Thus the ordering in (29) shortens the lexical domain needed for computing the semantically dependent verb-particle combination by five words, being favored over (28). Nykiel & Hawkins' (2020) results demonstrate that the application of MiD extends to fragments, and that the VP domain dominates over the PP domain there.

The second factor that boosts P-omission is structural parallelism (or structural priming), a general mechanism promoting reuse of previously encountered structure. Speakers tend to repeat structures they have themselves produced earlier (Bock 1986) or heard others producing (Bock et al. 2007), including as a form of linguistic co-operation between speakers in dialogue (Branigan et al. 2000). Structural parallelism is known to operate over a range of elliptical constructions, such as gapping (Carlson 2002; Kim et al. 2020; Overfelt 2024; Orth & Yoshida 2025), pseudogapping (Poppels & Miller 2023), sluicing and fragments (Frazier & Clifton 1998; Dickey & Bunger 2011; Nykiel 2017; Nykiel et al. 2023), VPE (Kim & Runner 2018; Parker 2018), and *much less* ellipsis (Carlson & Harris 2018; Harris & Carlson 2019). All of these constructions are consistent in favoring matching (morpho)syntax in antecedents and ellipsis sites, even though they vary in the kind of mismatch they tolerate and in the ease with which they tolerate mismatch. Gapping, for instance, appears to be the least able to tolerate any mismatch (e.g. Overfelt 2024; Orth & Yoshida 2025), whereas VPE is quite flexible (e.g. Kim & Runner 2018). Structural parallelism effects have also been observed outside of ellipsis, often in conjunction with coordination (Frazier et al. 1984; Frazier et al. 2000; Sturt et al. 2010; Poirier et al. 2012), but not necessarily so (Dubey et al. 2005; Callahan et al. 2010).

The structural parallelism effects we are concerned with here are induced by overt correlates' ability to be continuous or discontinuous PPs. A continuous PP correlate (*of what*), with both constituents adjacent, is shown in (30) from Nykiel & Hawkins (2020: 431).

(30) A: We're products of what?
B: A cultural process.

A discontinuous one is depicted in (31), also from Nykiel & Hawkins (2020: 431). Here the preposition is stranded.

(31) A: When you think of a wedding cake, what do you think of?
B: Marriage.

Nykiel & Hawkins (2020) report a much stronger preference for P-omission for discontinuous correlates like (31) than for continuous correlates like (30), connecting it to speakers reusing the same structure in fragments as they have encountered in the correlates (see also Nykiel 2017 for more discussion of structural parallelism in English fragments). It's important to note that structural parallelism promotes P-omission here because English permits preposition stranding in interrogative clauses, making available not just continuous but also discontinuous PPs as correlates. We could only expect to see structural parallelism promote P-omission in a language without preposition stranding if P-omission has reduced fragments from PPs to NPs, causing subsequent fragments to surface as NPs, as well.

I turn now to predictions that MiF, MiD and structural parallelism make for P-omission under pseudogapping.

2.2.1 Predictions of MiF, MiD, and structural priming for pseudogapping

Nykiel & Hawkins' (2020) proposal makes three sets of predictions for P-omission under pseudogapping on the basis of MiF, MiD, and structural parallelism. First, MiF predicts that: (1) implicit PP correlates don't allow P-omission, and (2) that correlates realized as overt PPs and hosting lexical NPs as prepositional complements are accessible phrases, constituting an easy-to-process environment in which P-omission is expected. Because the majority of overt correlates in fact contain lexical NPs under pseudogapping (see example (1)), this should lead to high frequencies of P-omission by MiF. In section 4 we will see support for the first of MiF's predictions, but, surprisingly, not for the second.

The second set of predictions is associated with MiD, which could apply to pseudogapping just as it does to fragments, given that semantically dependent and independent combinations of verbs and prepositions are present in the dataset to be described in section 4. Recall that MiD makes separate predictions for the VP domain and the PP domain in fragments, and as pressures coming from each of these domains aren't always aligned, there will be competition. I confirm that MiD applies to pseudogapping, although with less force within the VP domain than it does to fragments in the sense that it's only the strongest level of semantic dependency that reliably impacts P-omission. I attribute this pattern, in part, to stronger competition from the PP domain than what we see in fragments. I propose a way of probing the PP domain directly by coding the data for antecedent attachment site. As we will see in section 4.1.1, over two thirds of remnants have correlates that function as daughters to main verbs (to the verb *care* in (32)) or as VP adjuncts (to the VP *look handsome to her* in (33)) in antecedent structures. The remnants in (32) and (33) are interpreted as having the corresponding functions, which is mediated by the auxiliaries in the right conjuncts looking back to the appropriate main verb in (32) and VP in (33).

(32) He may think you're rejecting it because you care about vanity more than you do him.

(33) Renn looks as handsome to her at fifty-two as he did at twenty-six.

But correlates for some remnants are embedded deeper in antecedent structures. This is illustrated in (34) and (35).

(34) Certainly you find more so-called serious writers trying their hands at ghost stories than you do stories about vampires.

(35) The NASP represents a greater proportion of school psychologists than the American Medical Association does physicians.

The remnant in (34) is linked to a correlate whose grammatical function is that of a complement to the verb *try* embedded under the higher verb *find*. If we were to reconstruct this structure at the ellipsis site, we would get (36).

(36) Certainly you find more so-called serious writers trying their hands at ghost stories than you find so-called serious writers trying their hands at stories about vampires.

Similarly, the correlate for the remnant in (35) is a complement to the noun *proportion*, not to the higher verb *represent*. MiD predicts a processing advantage to keeping the constituents of any PP remnant adjacent but doing so here specifically ensures that the remnant's semantics and grammatical function, at a minimum, can be interpreted as accurately as possible within its own bounds. This is the step that will allow for subsequent identification of the correlate and resolution of the semantics of the entire clause that hosts the remnant. Misinterpretation is likely in the event of P-omission, both because the set of grammatical functions compatible with any NP exceeds the set of grammatical functions compatible with a PP, and because the presence of multiple lexical heads in an antecedent could compound the difficulty of resolving the grammatical function of an NP remnant.[7] For instance, the NP remnant in (34) is in potential danger of being misanalyzed as a verbal complement rather than part of a PP that serves as complement to a verb that will ultimately turn out to be embedded below the highest verb (notice, however, that much of the work is done by the semantics in this example, with the same head noun *stories* present in both the correlate and remnant). Yet another plausible reason for misinterpreting an NP remnant's grammatical function that is suggested by my data (see the frequency counts in **Table 2** in section 4.1.1 showing that as many as 82 % of all remnants have correlates attached at the highest verb) is simply that a lower attachment site for a remnant's correlate violates the expectation that that site should normally be at the highest verb. Section 4 will provide evidence for avoidance of P-omission for remnants with correlates embedded more deeply than for remnants with correlates serving as VP adjuncts or daughters to higher verbs. But this also suggests that avoidance of P-omission has a disambiguating role under pseudogapping, a role

[7] My focus here is strictly on MiD's predictions for a PP as opposed to a VP, but it's possible, as an alternative, to think of an increased number of sites that a remnant could be attached as compromising the accessibility of the target site (i.e. the correlate) by introducing potential interference from competitors. Since we invoke the accessibility of the remnant's correlate, this alternative brings us to MiF's, rather than MiD's, predictions. An anonymous referee suggests that the accessibility of a correlate in this context could be quantified as the number of available attachment sites calculated for every antecedent. While I agree with the referee's general idea, it doesn't seem straightforward for the purposes of a statistical analysis to include the count of available attachment sites as a factor cutting across NP and PP remnant cases, as their attachment sites may overlap only partially or not at all. One would therefore need to count available attachment sites separately for NP remnants and for PP remnants. I believe that including distance (in words) between a remnant and its correlate as a factor, as discussed further down the page, serves a similar purpose to what the referee has in mind.

which Nykiel & Hawkins (2020) didn't report for fragments. I return to this issue in the General discussion.

A further MiD-related possibility, which I owe to an anonymous referee, is that we could observe actual distance effects within the VP domain if prepositions are not omitted. MiD predicts two scenarios here. If the distance between a remnant and an antecedent subcategorizing head (i.e. the lexical head that subcategorizes the correlate) doesn't matter, and it needn't, then MiD only cares about whether the parser has to look outside a remnant to interpret it, no matter how far into the antecedent it has to reach. But if distance matters we should find differences in the length of intervening material for semantically dependent vs independent prepositions in the items with PP remnants. That is, while PP remnants with semantically dependent prepositions violate MiD, shorter stretches of intervening material should be less offensive. We can expect PP remnants with independent prepositions to tolerate longer stretches of intervening material since they don't violate MiD in any way. By contrast, no such differences are predicted for remnants affected by P-omission, which no longer incur any processing disruption within the VP domain regardless of the length of the material separating them from any constituents in the antecedents. I offer support for the latter scenario in section 4.

Distance effects could also be tied to antecedent accessibility, following from MiF instead of MiD. The direct-access mechanism that Martin & McElree (2011) assume for ellipsis resolution doesn't involve a serial search through antecedents but is likely to show interference effects, as we saw in section 2.2. Martin & McElree (2011) confirmed this in observing equal processing speeds for distant vs near antecedents at the same time that they observed a degradation in the accuracy of comprehending distant antecedents compared to near ones. They attributed these results to interference that any cue-based search for an antecedent is prone to: it incurs a penalty for having to pick out the target memory representation from among several competing representations with partially or completely overlapping features, especially if the information supplied at the retrieval site is insufficiently diagnostic of the target. If we only find that increased distance between any remnants and antecedent subcategorizing heads actually discourages P-omission, which would plausibly be due to degraded retrieval cues, we will have additional support for MiF's predictions surrounding the accessibility of antecedents. In section 4 we will see support for this MiF prediction, as well.

Finally, the set of predictions associated with structural parallelism translates into a clear disadvantage for P-omission under pseudogapping. To see that structural parallelism works against P-omission across the board here, recall that it's disfavored when correlates are continuous PPs, as are all overt correlates in my dataset. They are continuous PPs embedded in declarative clauses, which suggests that pseudogapping remnants will have a tendency to be PPs, as well. In fact, Nykiel & Hawkins' (2020) statistical analysis demonstrates that structural parallelism

provides a stronger motivation for P-omission than accessibility-based differences between correlates but weaker than differences based on word-external dependencies. We will see in section 4 that the overall frequency of P-omission falls at 40.9% under pseudogapping, while Nykiel & Hawkins (2020) put it at 69.6% in fragments. These figures indicate that structural parallelism cancels out some of the support for P-omission that both MiF and MiD predict under pseudogapping.

The next section presents an overview of syntactic analyses of pseudogapping. As we will see, current transformational analyses likely undergenerate by connecting P-omission to preposition-stranding movement the same way it is done for fragments and have no account yet of how sprouting interacts with P-omission. Nontransformational analyses, on the other hand, accurately predict the availability of P-omission, but not its interaction with sprouting. Thus there is good reason to think that Nykiel & Hawkins' (2020) proposal can help solve these problems if integrated into a syntactic analysis.

3 Theoretical analyses of pseudogapping

Pseudogapping has attracted both transformational and nontransformational analyses, as have other elliptical constructions. I briefly review the leading ideas behind them while keeping in mind the question that theories of pseudogapping face with respect to P-omission, namely, how do we capture the fact that PPs and NPs alternate as remnants, but only if their correlates are overt PPs. We will start, however, by reviewing early remarks on the grammaticality of P-omission under pseudogapping.

When P-omission is addressed in the pseudogapping literature, it's not taken to be uniformly grammatical in English. Van Riemsdijk (1978) argues that P-omission is ruled out under pseudogapping, while Levin (1986) and Lasnik (1999) defend a correspondence between P-omission and prepositional passive (or pseudopassive), such that only prepositions that are reanalyzable as part of a single V-P constituent may be omitted under pseudogapping and stranded under prepositional passive. Examples (37)–(38) illustrate grammatical pseudogapping with P-omission and grammatical prepositional passive and examples (39)–(40) illustrate their ungrammatical counterparts where the prepositions don't form constituents with the verbs (these examples and judgments are Lasnik's 1999: 145).

(37) John spoke to Bill and Mary should Susan.

(38) Bill was spoken to by John.

(39) *John swam beside Bill and Mary did Susan.

(40) *Bill was swum beside by John.

These judgments are interesting for three reasons. First, they indicate a disconnect with English fragments, for which P-omission has never been argued to be ungrammatical so long as they have overt correlates. Second, Miller (2014: 81–82) cites authentic counter-examples to the correlation between P-omission under pseudogapping and prepositional passive, as in (41)–(42). The remnants are NPs, while prepositional passive is ruled out in both examples.

(41) It [= the wind] blows through me as it would an abandoned house.

(42) In other words, walk into a seafood market as you would a fresh flower market, with your eyes, nose, ears and hands all on full alert.

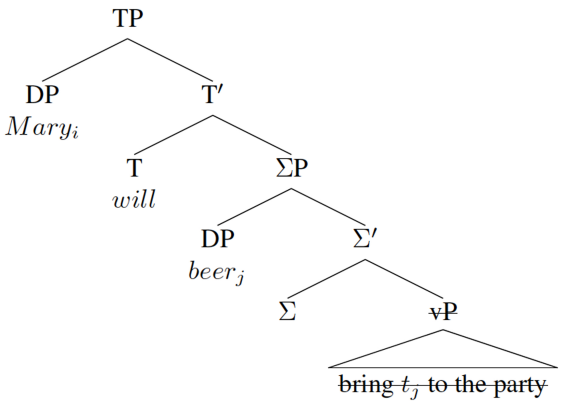
Third, Lasnik's (1999) idea of reanalysis overlaps with a word-external dependency between P and V. The combination *speak* and *to* would be classified as a level 1 dependency, while there would be no dependency between *swim* and *beside*, *blow* and *through*, and *walk* and *into* (see section 4.1.1). As we saw in the previous section, the presence of a word-external dependency facilitates P-omission in fragments, and we will see in section 4 that it facilitates P-omission under pseudogapping. Section 4 will make it clear that Lasnik's (1999) judgments are much more likely to be tapping into preferences for or against P-omission that are captured by MiD than into the grammaticality of P-omission.

3.1 Transformational analyses

Transformational analyses posit movement that evacuates a remnant out of a VP followed by deletion of all remaining material inside that VP, with deletion being subject to syntactic identity with an antecedent (Jayaseelan 1990; Lasnik 1999; Gengel 2013; Thoms 2016). It has been debated what kind of movement this should be, the theoretical possibilities for English ranging from heavy NP shift (Jayaseelan 1990) to A-movement (Lasnik 1999) to A'-movement, specifically, Focus Movement (Gengel 2013; Thoms 2016). Among other data, examples like those in (37)–(40) have served as support for the various kinds of movement proposed over the years. We will look more closely at Focus Movement here since it's the most recent and least controversial of the three. Consider example (43) and a simplified tree representation for the right conjunct given in (44) from Thoms (2016: 291).

(43) John will bring wine to the party, and Mary will beer.

(44)



The remnant *beer* moves out of the VP and into Spec,ΣP, a focus-related projection, leaving behind the rest of the VP, which subsequently deletes. Should it be the case that we have an example like (1), repeated here as (45), we can move either the entire PP remnant *of the private sector* or just its complement (via preposition stranding) out of the VP. That being so, Gengel (2013: 73) appears to think that NP remnants are ungrammatical, although her Focus-Movement analysis can derive them alongside PP remnants.

(45) Apparently Obama thinks as little of the Supreme Court as he does (of) the private sector.

This derivation, of course, depends on whether preposition stranding is permitted in a language, and it additionally predicts that there should be no misalignments between remnants and preposition placement under Focus Movement. That is, we wouldn't expect to see NP remnants where preposition stranding is degraded in nonelliptical clauses and conversely, we wouldn't expect to see PP remnants where preposition pied-piping is degraded. Exploring whether such misalignments exist requires careful, ideally, experimental testing, not least because problematic data have been reported for fragments (see Levin 1982, Fortin 2007, and Nykiel & Hawkins 2020 for more discussion). Furthermore, the hypothesis that preposition-stranding movement underlies P-omission under pseudogapping should be tested on crosslinguistic data, and in order to do so, we would have to work with languages with pseudogapping and P-omission but without preposition stranding. No such research exists yet.

To the best of my knowledge, it hasn't been addressed within the transformational, or any other, approach to pseudogapping that correlates may be either implicit or overt, although the first examples of implicit correlates are reported in Miller (2014: 81).[8] Nor has it been pointed out that

[8] Miller (2014: 81) cites these two examples of implicit correlates (unrelated to P-omission) drawn from COCA:

(i) Let the peas dry on a tray in the house for a few days, then store and label in airtight jars out of direct sunlight as you would any other bean or pea. (Mag)

(ii) My echoes are no longer tormentors but friends, and when one of them dies (as, inevitably, they have begun to) I mourn a little, as I would a sister. (Fic)

the overt/implicit distinction has consequences for P-omission. Given the theoretical apparatus we have seen so far, it's unclear why implicit PP correlates should never be accompanied by NP remnants (I return to and elaborate on this point in section 4). Consider the impossibility of dropping the preposition from (46) (in example (2), which we saw before, P-omission is equally impossible).

(46) Zenobia smiled very slightly, as one would *(to) a woman one had only just met.

Given that pseudogapping has a sentential source and movement operations may apply to PPs and NPs alike in English, there is no mechanism that blocks the derivation of NP remnants just in sprouting cases, i.e. when their correlates are implicit PPs. However, we could imagine that some version of the constraints proposed by Chung (2006; 2013) and Anand et al. (2023) for sluices (recall the discussion in section 2.1) might be appropriate for pseudogapping, as well.

3.2 Nontransformational analyses

A key idea shared among all nontransformational analyses of pseudogapping is that no material inside a VP undergoes deletion. There is instead an empty element which is defined on some approaches as a *pro* expression serving as complement to an auxiliary verb, closely tracking analyses of VPE (Ginzburg & Miller 2018; Nykiel & Kim 2021; Kim & Runner 2022), or as an operator with a function analogous to a transitive verb (Kubota & Levine 2017). On the earliest analysis of pseudogapping due to Miller (1990) an auxiliary is itself a verbal proform which combines with a remnant and picks up its interpretation from a salient predicate present in the surrounding context. The signature pattern of this type of analysis is that remnants fail to behave like full-clause constituents that undergo movement and they violate syntactic identity conditions (for recent overviews of the evidence against transformational analyses of pseudogapping, see Miller 2014, Kim & Runner 2022, and Poppels & Miller 2023). We will see examples of syntactic-identity violations in (47)–(49) below and in fn. 9.

The sprouting example in (46) shows that pseudogapping remnants, like fragments, are impacted by the morphosyntactic specifications of their correlates. There is in fact more evidence than just sprouting for this being the case (e.g. Miller 2014; Kubota & Levine 2017; Poppels & Miller 2023). For instance, Poppels & Miller (2023) demonstrate experimentally that pseudogapping is degraded if remnants realized as PPs mismatch their correlates. The mismatch may be due to using different prepositions in the remnants and correlates (both PPs) when antecedent verbs select two prepositions for their PP complements. Example (47) illustrates matching prepositions and example (48) mismatching ones, both prepositions selected by the verb *speak*.

(47) Eddy spoke with Susan more often than he did with Emily.

(48) Eddy spoke to Susan more often than he did with Emily.

The mismatch may also be due to the dative alternation, that is, a PP remnant being paired with an NP correlate, as in (49). Notice that now we have a syntactic category difference between the two.

(49) They will give Dana books just as they will to Tim.

At the same time, mismatching prepositions or syntactic categories naturally occur in COCA, as demonstrated by Miller (2014), so they can't be ungrammatical.[9] All such cases of mismatch raise difficulties for transformational analyses of pseudogapping, as syntactic identity is violated between the trace left behind by a fronted remnant and its correlate (for more discussion, see Poppels & Miller 2023).

A recent analysis due to Kim & Runner (2022) aims to capture these facts by building on the analysis of fragments offered in Ginzburg & Sag (2000) within the Head-Driven Phrase Structure Grammar framework. For fragments, a correlate is supplied as part of the antecedent along with information that is relevant for establishing necessary morphosyntactic identity between it and the fragment. Ginzburg & Sag (2000) impose syntactic category identity on pairs of fragments and correlates (this constraint is abandoned in later work on fragments, e.g. Nykiel & Kim 2022a). Recall that the correlate and remnant are in a contrast relation under pseudogapping unless the correlate is implicit. Therefore, Kim & Runner (2022) introduce a requirement that there be a pair of contrasting elements, the first of which is the correlate and the second the remnant (they don't include implicit correlates at all). Consider example (50) and a structural representation for the right conjunct in (51) from Kim & Runner (2022: 485).

(50) Kim has read magazines and Lee has books.

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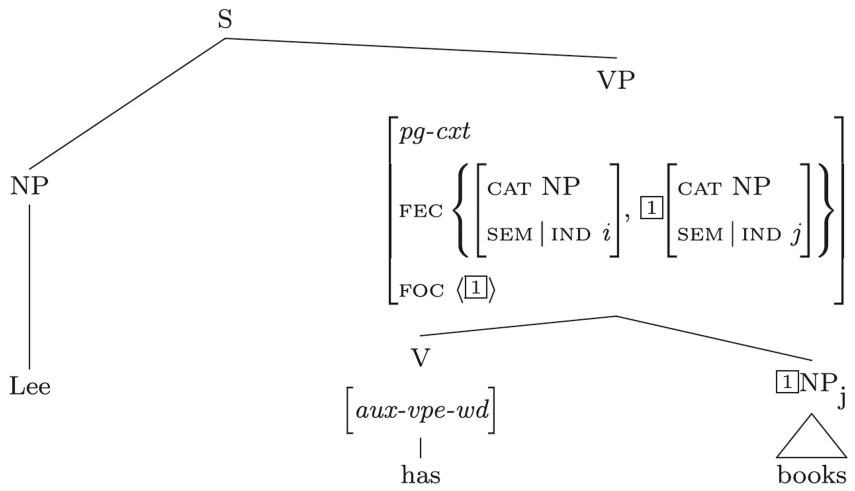
[9] Here are examples from Miller (2014: ex. 15a, 16):

(i) Ask Doll, who spoke as much about his schoolboy career ending as he did of the season in general: 'I don't want it to end.'

(ii) It's hard enough to take two hours out of my day to put out a legal fire — much less give the matter the same attention he would to something that's actually going to generate some cash for the company.

(51)



In this simple case the correlate (*magazines*) and remnant (*books*) share the same syntactic category (NP) indicated by the identical values of their CAT features in (51). Syntactic category identity is in fact also imposed on all pairs of correlates and remnants by Kim & Runner (2022), which serves to capture remnants' sensitivity to their correlates' syntax exactly as desired. At the same time, Kim & Runner (2022) are forced to relax this requirement enough to allow constrained mismatch between prepositions used by the remnant and correlate in light of Miller's (2014) corpus data. This move opens the door to abandoning the requirement of morphosyntactic identity between remnants and correlates and incorporating processing principles into theories of pseudogapping so that P-omission can be captured correctly. So long as we require the syntactic categories of fragments and correlates to match we can account for PP remnants, which would match PP arguments subcategorized by lexical heads and serving as correlates, but it's less clear how we could deal with NP remnants, which would only match the complements of such PP arguments. In fact, this problem extends beyond P-omission and to examples like (49), where a PP remnant is linked to an NP correlate, leaving us with no possibility to match them on morphosyntactic grounds. The only way to match them is by referring to their semantics and to the subcategorization frame of the licensing head (the verb *give*).

In the next section I explore the hypothesis that P-omission has a processing motivation in pseudogapping (and by extension, across all constructions in which it's observed). Toward this purpose, I test the predictions of the principles MiF and MiD on English corpus data.

4 Corpus study

This section presents a corpus study of P-omission under pseudogapping. The statistical analysis is a mixed-effects logistic regression model predicting P-omission and including four fixed factors

(of which one will be dropped from the final model due to insufficient contribution to the model) and one random factor. The fixed factors are based on the predictions of the same processing principles that Nykiel & Hawkins (2020) have shown to govern P-omission in English fragments. i.e. MiF and MiD. Structural parallelism effects, which were mentioned in section 2.2, are not part of the statistical analysis, given their invariability under pseudogapping, but will be addressed again in the General discussion.

4.1 Data and method

Data collected for this study constitute a subset of the pseudogapping data Philip Miller harvested from COCA and described in Miller (2014). The portion of Miller's (2014) data that is of relevance to us consists of 1213 items with NP remnants and 293 items with PP remnants. Both sets are potentially nonexhaustive, the former less so as it contains most of the NP remnants available in the corpus at the time the systematic search for them was completed, i.e. in 2014 (Miller 2014; Philip Miller, p.c.). PP remnants were not as systematically searched for, so it remains a possibility that they have even higher frequencies in COCA than those reported here. I searched these items manually to select all antecedents that hosted overt PPs serving as correlates for remnants (both argument and adjunct PPs serving as correlates are included here and in the final dataset). As the final step, I filtered out items where PP remnants contained different prepositions than those present in the correlates. Mismatched prepositions are a possibility if correlates are adjuncts (52) (compare the correlate *under Aquarius* and the remnant *at a natural reef overhang*) and if they are arguments (53) (compare the correlate *about his schoolboy career ending* and the remnant *of the season* and recall our discussion of Poppels & Miller's 2023 experimental data in section 3).

(52) Seeking shelter, schoolmaster snappers dart under Aquarius, just as they would at a natural reef overhang.

(53) Ask Doll, who spoke as much about his schoolboy career ending as he did of the season in general: 'I don't want it to end.'

The size of the sample that remained is 350 items, and among these, 207 (59.1%) remnants are realized as PPs. This is our first finding: English pseudogapping fails to replicate the preference for P-omission that present-day English fragments have, while it aligns itself with fragments in the languages discussed in section 2.1. The second finding is that none of my 143 NP remnants appear in a sprouting environment with an omitted preposition. This is an unsurprising result, if MiF can be expected to apply consistently across all constructions where P-omission is available by discouraging it in difficult-to-process environments. We can conclude from it that a sprouting environment blocks P-omission altogether here, just as it does in fragments (as discussed in section 2.2), and this can be construed as a grammatical constraint with a processing-based

motivation. For the sake of completeness, let me add that 62 (21.2%) of the 293 PP remnants collected by Miller (2014) are sprouted (and not part of the current analysis). Furthermore, 97.4% of all items (341 out of 350) are comparative clauses. While this distribution precludes any investigation of whether comparative vs noncomparative clauses impact P-omission, the predominance of comparative clauses, which reveals as a general characteristic of pseudogapping in Miller's (2014) corpus study and Hoeksema's (2006) experimental study, does have the effect of strengthening structural parallelism between the antecedent and the clause hosting a remnant, which I return to in the General discussion.

These data were processed for statistical analysis in order to test for effects of MiD and MiF in the ways described in the two sections below.

4.1.1 MiD's effects

The first factor here was word-external dependencies, coded according to the same scheme that Nykiel & Hawkins (2020: 429) followed. That is, three levels of dependency between P and V were identified: level 2 (P and V depend on each other), level 1 (P depends on V) and level 0 (no dependency). 20 of the items feature correlates that are nominal (54) rather than verbal complements (55), and so in these cases, dependencies, if any, are established between P and N.

(54) Indeed, in conversation, Terkel drops in (mostly) pertinent references to Thomas Hardy and Descartes as easily as he does Mahalia Jackson and the Rev. Martin Luther King Jr.

(55) People knock into Parker as hard as he does them.

Dependency levels were assigned to each combination of P and V (or N) by plugging them into two entailment tests originally proposed in Hawkins (2000), which appear below (for these versions of the tests, see Nykiel & Hawkins 2020: 426). The first test identifies (in)dependent Vs and the second (in)dependent Ps, and combinations of these Vs and Ps are assigned one of the three dependency levels.

(56) Verb entailment test
If [X V PP] entails [X V], then assign i(ndependent) to V. If not, assign d(ependent). E.g. The man waited for his son entails The man waited; The man counted on his son does not entail The man counted; i.e. *waited* i, *counted* d

(57) Pro-verb entailment test
If [X V PP] entails [X Pro-V PP] or [something Pro-V PP] for any proverb sentence listed below, then assign i to P within PP. If not, assign d. Pro-verb sentences: X did something PP; X was PP; something happened PP; something was the case PP; something was done (by X) PP. E.g., The girl waited in the early morning entails The girl did something in the

early morning; The girl depended on her mother does not entail The girl did something on her mother; i.e. *in* i, *on* d

Frequency counts yielded by these tests for the three dependency levels are given in **Table 1**.

Dependency level	NP remnant	PP remnant
0	17(37.8%)	28(62.2%)
1	85(35.3%)	156(64.7%)
2	41(64%)	23(36%)
Total remnants	143	207

Table 1: Syntactic category of remnants by dependency level.

There are two patterns to notice about these data. First, as many as 305 (87.1%) out of 350 items show at least one level of dependency, which is typical for English and even higher than the approximately 50% reported in Hawkins (2000) and Nykiel & Hawkins (2020). Second, level 2 has a reverse impact on remnants compared to levels 1 and 0, being the only one to override the preference for PPs. This suggests that there indeed is a tension between the VP and PP domains, as MiD predicts for pseudogapping, and that the VP domain wins over when the word-external dependencies are at their strongest, with the PP domain apparently dominating elsewhere.

I also coded the data for antecedent attachment site, which is another of MiD's predictions but this time exploring the PP domain and the strength of its competition with the VP domain. **Table 2** gives frequency counts for remnants coded this way. The label 'Below main V' refers to remnants whose correlates show any attachment site below a main verb, while the label 'Main V' represents attachment at the highest verb, either as a complement or VP adjunct. I operationalize antecedent attachment site in no finer detail than this binary distinction for two reasons. First, this should be sufficient if the perceived need for prepositions to support the intended interpretation of a remnant follows from a violation of frequency-based expectations about the remnant's grammatical function as an argument to the highest verb or an adjunct attached at that level. And second, finer-grained distinctions in the form of a continuous variable (e.g. the number of lexical heads present in an antecedent), could end up being problematic for the upcoming statistical analysis due to being partially collinear with the distance factor (see immediately below), which we are equally interested in exploring. A steep drop in the frequency of P-omission can indeed be seen for remnants with more deeply embedded correlates, suggesting that the competition between the PP and VP domains is real.

Antecedent attachment site	NP remnant	PP remnant
Main V	131(45.6%)	156(54.4%)
Below main V	12(19%)	51(81%)
Total remnants	143	207

Table 2: Syntactic category of remnants by antecedent attachment site.

The final factor to be mentioned here is the length (measured in words) of the material interpolated between any remnant and the antecedent lexical head that selects the remnant's correlate. By including this factor, we can explore distance effects within the VP domain.

4.1.2 MiF's effects

We saw strong support for MiF in the absence of P-omission under sprouting, and in order to examine its effects further, the data were coded for correlate content. This coding captures a split between more contentful lexical NPs and less contentful pronouns (demonstrative or personal). The raw counts appear in **Table 3**, while examples of correlates hosting a lexical NP, a demonstrative pronoun, and a personal pronoun are depicted in (58)–(60).

Correlate content	NP remnant	PP remnant
NP	92(39.5%)	141(60.5%)
Personal or demonstrative pronoun	51(43.6%)	66(56.4%)
Total remnants	143	207

Table 3: Syntactic category of remnants by correlate content.

(58) You've got to look at that guy as you would at an American sitting next to you in a bar.

(59) If they came to me at 30 and said 'I've had these experiences and I have these skills', I'd look at that as I would any investment.

(60) Once you realize what's going on, it eats at you very quickly, I think, at least it did me.

What we can glean from the counts in **Table 3** is that there are unlikely to be reliable differences between the frequencies of remnants as a function of correlate content. Recall that MiF predicts lower frequencies of P-omission for correlates with pronominal complements than for correlates with lexical-NP complements, which the data in **Table 3** appear to contradict.

4.2 Results and discussion

The questions I ask in this section are to what extent P-omission under pseudogapping obeys the principles MiF and MiD and to what extent it shows the same patterns of preference here as it does in fragments. Toward this purpose, I fitted a mixed-effects logistic regression model using the lme4 package (Bates et al. 2015) and a Bayesian logistic regression model using the brms package (Bürkner 2018) to the sample of 350 items described above. The initial models predicting P-omission included two random intercepts (Items and Register) and four fixed effects: word-external dependencies (Dependency), antecedent attachment site (Antecedent), distance between remnant and antecedent lexical head (Distance), and correlate content. The random-effects structure was suggested by multiple occurrences of identical combinations of P and V (or N) defined as Items (for instance, the P-V *look at* appears 11 times, *talk to* 9 times, and *speak of* 7 times) and by the data being distributed across five registers (academic, fiction, news, spoken and magazines). However, model comparison procedures yielded the final models that converged and contained one random intercept (Items) and the first three fixed effects with no interactions between them. The fixed effects, with the exception of Distance, were reliable and statistically significant at $p < 0.05$ in the frequentist model.[10] The frequentist model has very good predictive capacity (C-value = 0.96, Somers' D_{XY} = 0.92) and good explanatory power (conditional R^2 = 0.52). Below I describe the main effects extracted from the frequentist model (**Table 4**), but they correspond with those of the Bayesian model (**Table 6**). All model results are summarized in **Tables 4–7**.

	Estimate (Odds ratio)	Std. error	z value	p value
Intercept	–0.75(0.47)	0.66	–1.14	0.25
Dependency: 1-0	–0.21(0.81)	0.54	–0.40	0.69
Dependency: 2-1	1.84(6.30)	0.61	2.99	0.00*
Distance	–0.09(0.92)	0.05	–1.84	0.07
Antecedent: main V	1.51(4.53)	0.55	2.76	0.01*

Table 4: Frequentist model results for fixed effects.

The first factor in **Table 4**, i.e., Dependency, has the effects on P-omission that are expected based on the data we saw in **Table 1**. I used forward difference coding for this factor (as suggested by an anonymous referee), so the first contrast shows that, as we move from a level 0 dependency up to level 1, there is no reliable increase in the predicted probability of P-omission ($p = 0.69$).

[10] All five registers showed a consistent preference for PP remnants, and including register as a fourth fixed factor in the final model resulted in a failure to converge.

Group	Name	Variance	Std. dev.
Item	Intercept	2.5	1.58

Table 5: Frequentist model results for random effects.

	Estimate	Est. error	95% CI (Lower, Upper)
Intercept	0.16	1.86	–3.80, 3.67
Dependency: 1-0	–0.28	0.96	–2.21, 1.61
Dependency: 2-1	3.06	1.12	**1.29, 5.78**
Distance	–1.22	0.75	–2.74, 0.25
Antecedent: main V	2.41	1.00	**0.72, 4.70**

Table 6: Bayesian model results for population-level effects.

Group	Estimate (SD)	95% CI (Lower, Upper)	Rhat
Item (Intercept)	3.66	1.88, 6.27	1.01

Table 7: Bayesian model results for group-level effects.

Moving from level 1 to level 2 does, however, lead to a significant increase, and the largest effect of all three predictors (the odds of P-omission are over 6 times higher here compared to the baseline, see **Table 4**), in the probability of P-omission ($p < 0.001$).[11] The second factor in **Table 4** is Distance. This is a numerical factor, which I log-transformed for the analysis. It's a marginally significant predictor showing a decrease in P-omission as the distance increases ($p = 0.07$). The final factor, Antecedent, reveals a significantly higher probability of P-omission for remnants whose correlates are attached at the highest verb level compared to the baseline, i.e., anywhere below that level ($p < 0.001$).

The results reported thus far offer support for MiD operating within the VP domain when semantically dependent prepositions tend to be removed from remnants in the event that their presence compromises the remnants' independent processability. This effect is admittedly weaker than what Nykiel & Hawkins (2020) observed in fragments in affecting only the strongest dependencies at level 2, while both level 1 and 2 differ reliably from level 0 for fragments in Nykiel & Hawkins' (2020) data (Nykiel and Hawkins apply treatment coding). It was, therefore, a

[11] I performed the same analysis with treatment coding for the factor Dependency (comparing level 2 and level 1 to the baseline, level 0) and also obtained statistical significance at $p < 0.05$ at level 2. The remaining factors closely tracked the statistically significant differences described here for forward difference coding.

well justified move to explore the operation of MiD in the PP domain by considering attachment sites for remnants' correlates. The main effect of Antecedent confirms our suspicion that the PP and VP domains pull in separate directions much of the time; we can only be confident that their effects are additive and in favor of P-omission when we have a level 2 dependency and a correlate attached at the highest verb site. There is no interaction between Antecedent and Dependency, likely because items with lower attachment sites are concentrated at level 1 (57 out of 63 are at level 1). **Figure 1** represents this graphically by cross-classifying the factors Dependency and Antecedent with the dependent variable. This distribution suggests that stronger Dependency effects might arise within items with attachment sites at the highest verb when all items with lower attachment sites have been removed. However, fitting a regression model with only the fixed factors Dependency and Distance and the same coding scheme as before to the subset of items with highest-verb attachment sites yields very similar results as far as Dependency is concerned: it is still only level-2 dependencies that reliably increase the probability of P-omission ($\beta = 1.75$, z-value $= 3.09$, $p < 0.001$). In other words, lower attachment sites account for some, but not all, of the pressure to avoid P-omission. I return to the strength of word-external dependencies in the General discussion. Finally, the main effect of Distance speaks in favor of accessibility effects as per MiF, with larger stretches of material interpolated between remnants and antecedent lexical heads causing a degradation in the accessibility of antecedents and requiring better retrieval cues from remnants in the form of prepositions. In order to explore whether there are any VP domain-based distance effects that MiD predicts for semantically dependent and independent prepositions if they are retained in remnants, I conducted post-hoc analyses.

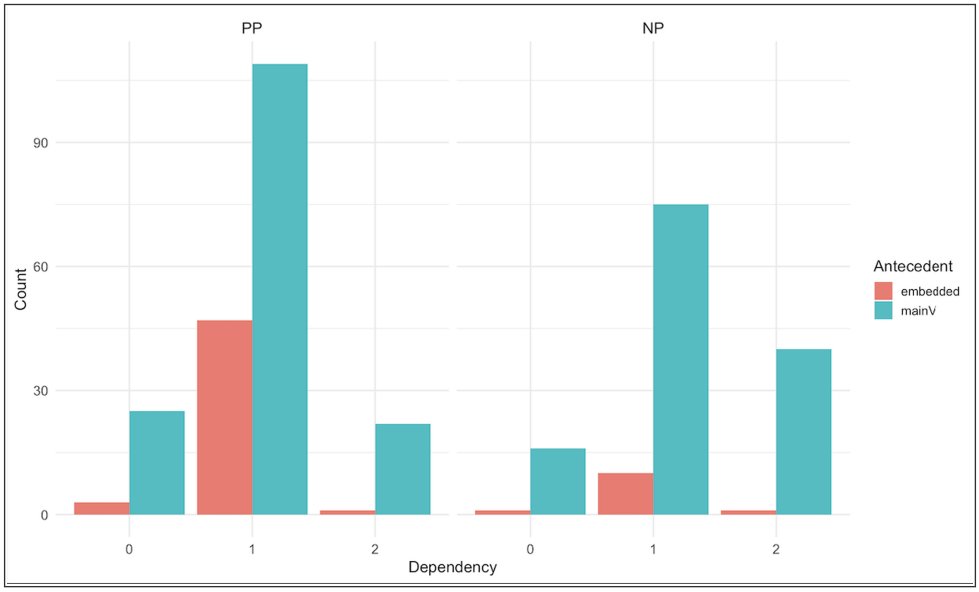


Figure 1: Frequency counts for NP and PP remnants by Dependency and Antecedent.

I fitted a mixed-effects linear regression model to the subset of data containing only PP remnants. The model predicted the distance between remnants and antecedent lexical heads from word-external dependency level. The latter factor was forward difference-coded, as before, but its original three levels were collapsed into two to compare the semantically dependent items with the independent ones. The Distance factor was log-transformed for the analysis. The results confirm a reliable decrease in distance as we move from independent to semantically dependent (β = –0.39, t-value = –5.18, p < 0.001). It's unsurprising that an analogous model fitted to the NP remnants shows no reliable difference in distance between semantically dependent and independent items (β = –0.06, t-value = –0.68, p = 0.5); MiD predicts no differences here. Taken together, these results reveal that MiD cares not only about the processor having to reach outside a remnant to interpret a semantically dependent preposition, but also about how far into the antecedent the resulting dependency stretches, providing tangible evidence that MiD applies to ellipsis no less than constituent ordering. It will be interesting to examine whether these distance effects are correlated with processing speed in online processing, a question I leave for future inquiry.

With these findings, we have confirmed all of the predictions of MiD and MiF, which speak to the processing underpinnings of P-omission, but one, namely, correlate content effects. The data reported in **Table 3** leave us wondering why personal and demonstrative pronouns behave the same as lexical NPs although their content differs. It's helpful to evoke the definition of accessibility that is familiar from Ariel's (1990) work on referring expressions (see also section 2.2). On Ariel's Accessibility Marking Scale, personal pronouns are located toward the left end, because they are typically employed in contexts where their referents are salient and hence easy to retrieve. Demonstrative pronouns are located in between personal pronouns and lexical NPs, the latter picking out the least accessible referents of the three. If personal or demonstrative pronouns appear within correlates, we would assume that they index these correlates as (highly) accessible. A high degree of accessibility sets these pronouns apart from indefinite pronouns, which we see with fragments (recall example (23)) and which, by introducing new referents into the discourse, never index salient referents. What about lexical NPs appearing within correlates? Ariel's (1990) Accessibility Marking Scale predicts a low degree of accessibility for such correlates, but the definition of accessibility adopted in section 2 leads us to the opposite conclusion, that is, that such correlates should receive strong mental representations by virtue of their content. These definitions are not irreconcilable: a lexical NP may be indexing a low-accessibility referent at the point it is first used but its own accessibility for future retrieval will be high from that point on. There is thus no contradiction in saying that all correlates are more or less equally accessible under pseudogapping. If this is so, then all correlates should promote P-omission, as MiF would lead us to expect. Yet they don't. This brings us to differences between pseudogapping and fragments despite their similar behavior with respect to MiD and MiF, as discussed in the next section.

5 General discussion

I began this investigation by asking whether a uniform processing-based analysis is plausible for P-omission across constructions and languages. This kind of analysis is fully compatible with the assumption that P-omission is grammatical, which is warranted by the crosslinguistic data we overviewed in section 2.1. Adopting a processing-based analysis would allow the grammar to interact with processing principles by taking the burden of accounting for P-omission off syntactic theory exactly when processing principles could have more straightforward solutions to offer. As we saw in section 2.1, current syntactic theories of ellipsis have difficulty accounting for a set of issues surrounding P-omission, namely, the question of why and when it is observed, as reflected in the patterns of preference in its use, its range of acceptability, and the ban on it under sprouting. We have now seen evidence that P-omission is governed by the same processing constraints across both fragments and pseudogapping, which gives us a better sense of what a processing-based analysis of it would look like: P-omission is subject to processing pressures predicted by both MiD and MiF and to structural parallelism constraints, which together provide an explanation for why and when it's used. Various predictions of both MiD and MiF can, and have been, operationalized and tested as variables here, but structural parallelism, although known to impact P-omission on the basis of Nykiel & Hawkins' (2020) work, can't be so operationalized as its setting remains constant across the pseudogapping dataset. I consider this a distinct advantage of the current study, making it possible to formulate a set of crosslinguistic predictions for P-omission. Before addressing these predictions, I review our results in the context of differences and similarities between pseudogapping and fragments.

The results support the involvement of MiD in pseudogapping, which is also the prime driver behind P-omission in present-day English fragments, as Nykiel & Hawkins (2020) have provided evidence for. On their proposal, MiD applies to reduce processing difficulty that arises in cases when PP remnants can't be processed on their own due to the prepositions within them contracting word-external dependencies with other constituents in the antecedent clause. We were able to further examine this effect in items that maintained prepositions by measuring the actual length of word-external dependencies, and found the expected pattern: the shorter the length the higher the dependency level. Pseudogapping has an advantage over fragments with respect to measuring dependency length, as an antecedent and ellipsis site typically don't cross sentence boundaries (they never do in my data, although Miller 2014: 78 reports examples of pseudogapping crossing sentence and speaker boundaries), making it more straightforward to calculate the distance between them than it would be for fragments when antecedents are located in separate sentences. However, there are some loose ends here concerning the actual strength of word-external dependencies and its interaction with P-omission.

It is puzzling that word-external dependency effects don't manifest already when the lowest level of dependency is present in pseudogapping. After all, MiD predicts that a preposition

dependent on a higher verb extends the lexical domain for processing a fragment that contains it, inducing processing difficulty, and any additional dependency going from the higher verb back to the preposition would, in principle, either no longer make a difference or enhance the effect. Nykiel & Hawkins (2020) find reliable increases in the likelihood of P-omission in fragments both at level 1 and level 2, but they don't elaborate on what might make the stronger word-external dependencies heighten processing difficulty. The current results appear, therefore, partially inconsistent with MiD unless there is independent evidence to show that resolving level 2 dependencies is costly. This cost could be the consequence of having to deal with multiple meanings of a verb involved in a dependency before the target meaning is selected.

There have been relevant experimental findings concerning lexical access (with no ellipsis involved). Several studies have reported that all the meanings of an ambiguous lexical item are simultaneously activated before some of them are eventually discarded as inappropriate in the given context (Swinney 1979; Onifer & Swinney 1981), and that accessing these meanings leads to processing difficulty (Ihara et al. 2007; Mason & Just 2007). When ellipsis is involved, the parser is initially insensitive to the lexical information encoded by an antecedent verb under VPE (Shapiro et al. 2003). That is, the elliptical VP in the right conjunct in (61) triggers reactivation of the antecedent VP, initially with both a sloppy and a strict reading, even though the latter is logically unavailable on the basis of the verb's semantics and will be subsequently dismissed.

(61) The policeman perjured himself, and the fireman did too. (Shapiro et al. 2003: 4)

These readings wouldn't be simultaneously active if the parser considered the verb's lexical specifications already in the initial stages of processing, but this finding is compatible with the idea that encountering an elliptical VP triggers initial reactivation of all of the meanings of an ambiguous antecedent verb. Beyond VPE, processing fragments also triggers reactivation of an antecedent VP (Poirier et al. 2010), making it plausible that the targeted meaning of an ambiguous antecedent verb should be active along with available non-target ones upon encountering a fragment. While no relevant findings have yet been reported for pseudogapping, the theoretical machinery for analyzing it we saw in section 3 combines aspects of VPE and fragments, suggesting that the processing of pseudogapping patterns together with VPE and fragments, that is, we would expect at least an antecedent VP to be reaccessed online. An antecedent VP hosting an ambiguous verb is a scenario associated with level 2 dependencies, in which verbs never retain their literal meanings, to a much greater extent than with level 1 dependencies, which host semantically independent verbs whose meanings are often literal. In many cases, it's not just a single ambiguous verb, as in (62), but a combination of a verb and another phrase, as in (63), whose meanings will be reaccessed online, arguably adding to the processing cost (of the 64 level 2 dependencies in the current data, 64.1% involve more than a single verb).

(62) To this day, Peecher, who led the Cardinals to a state-record 78-game winning streak, holds onto this belief as he would a tree in a typhoon.

(63) Don't, my friend. Don't let your sympathies get the best of you, as they did me way back when.

The processing of a level 2 dependency, therefore, requires accessing multiple meanings, inducing increased processing difficulty compared to the processing of a level 1 dependency. It's in this sense that the effects of MiD can be seen as weaker in pseudogapping than in fragments, affecting P-omission only at level 2 when the processing cost of retaining prepositions is at its highest, while the overall response of both constructions to processing pressures within the VP domain is aligned with the predictions of MiD.

A more pronounced difference between pseudogapping and fragments with respect to MiD is connected to competition between the VP and PP domains, in which MiD operates. It's unsurprising that the VP domain doesn't win all of its competitions. It clearly doesn't under pseudogapping, as the statistical analysis has revealed a disambiguating role that prepositions play within the PP domain, that is, they help retrieve PP correlates that are embedded more deeply in the antecedent structure. This role explains away some of the bias against P-omission, specifically for level-1 dependencies, which have the highest frequencies of lower attachments sites. In this context, it's reasonable to ask whether the competition between the VP and PP domains plays out differently in fragments. Fragments, too, can have more deeply embedded correlates, as in (64)–(65), both from COCA.

(64) A: I'm the manager of the A through L section.
B: Of what?

(65) A: (...) that Mrs. Clinton began two years ago considering the race for the Senate, and that she regards it as a 'race for redemption.'
B: Well, redemption from what?

The high frequency of P-omission reported in Nykiel & Hawkins (2020) shows that the PP domain is overall weaker than the VP domain in fragments, but its strength wasn't quantified by either the depth of embedding or any other means in Nykiel & Hawkins (2020). One possibility to explore here is that prepositions play less of a key role in aiding in the interpretation of fragments with lower attachment sites. It is a unique characteristic of fragments, which we can see in example (65), that we can expand them to phrases including the lexical head that selects their correlates (see also example (20)). Doing so repeats a larger chunk of material from the antecedent and arguably reduces any uncertainty that might have surrounded the interpretation of a smaller fragment. While examples like (65) wouldn't normally be part of a study specifically

focused on P-omission, the general point stands that expansion is an additional disambiguating device available to fragments, but not to pseudogapping, which can only rely on prepositions. Pseudogapping, then, has overall fewer resources to maximize the independent processability of remnants.

Fragments have yet another, potentially unique, property that arguably engages during the search for correlates. Correlates are preferably located furthest to the right, that is, in the default focus position in English. Frazier & Clifton (1998: 510–511) identified this preference in sluices by examining processing difficulty associated with having two possible correlates to choose from (66) instead of just one (67). They found that participants were faster to read the ambiguous (66) than the unambiguous (67), and attributed this difference to (66) providing an available correlate in the default focus position, which prevents the parser from considering the other candidate located in subject position.

(66) Somebody claimed that the president fired someone, but nobody knows who.

(67) Somebody claimed that the president fired Fred, but nobody knows who.

This means that the parser tends to look for fragments' correlates in the default focus position, which in turn means that phrases located in this position will be more accessible for future retrieval than phrases located elsewhere. It's not known if pseudogapping has a corresponding preference for the location of correlates, but if it doesn't, it follows, based on MiF, that prepositions will be retained to compensate for the missing retrieval cues the default focus position provides in fragments. This brings us to the supporting evidence for the effects of MiF we have observed in this study.

We have seen a (marginally significant) preference for less material to be interpolated between remnants and the sites where their correlates are attached if prepositions are omitted. This is expected, given the direct-access mechanism I assume here: more distant correlates become less accessible in memory as more representations are added to those already stored, triggering an increased use of prepositions as retrieval cues. Besides this pattern, the current data show no sign of P-omission under sprouting, indicating the presence of a constraint that is operative across pseudogapping and fragments when identical accessibility conditions are met. In section 2.2 we saw a constraint along these lines in (22). Although formulated for fragments, it can now equally well be extended to pseudogapping remnants. It should arguably be extended to both arguments and adjuncts by virtue of its processing nature and the evidence that both arguments and adjuncts are equally difficult to process as sluices if their correlates are implicit (Frazier & Clifton 1998; Dickey & Bunger 2011). Nykiel & Kim (2022a) don't extend (22) to adjuncts on the grounds that their morphosyntactic specifications are not determined by lexical heads like those of arguments are (in this sense, their constraint makes the same predictions as the syntactic

constraints proposed by Chung 2013 and Anand et al. 2023, which, however, face theory-internal problems, see section 2.1). Apparent supportive evidence for their position is found in Anand et al.'s (2021) data set of 4,700 English sluices, which yields 17 instances of what could be construed as P-omission under sprouting, all of it associated with implicit correlates functioning as adjuncts. Examples (68)–(70) illustrate three of Anand et al.'s sluices (the omitted prepositions are given in angular brackets).

(68) A: Hey, you work at Salomon? I have a friend who works at Salomon.
B: Really? <In> What group? (Anand et al. 2023: ex. 14a)

(69) He says America was once a better place and that he knows it because he was there. <In> What decade? (Anand et al. 2021: ex. 37a)

(70) When the officer asked me about her, I remembered meeting her but I couldn't say <on> what date. (Anand et al. 2023: ex. 13b)

17 sluices constitute a tiny sample and Anand et al. (2021) don't state what the proportion of sluices that could have dropped their prepositions but didn't is. To locate these data in a broader landscape, let us note that the sluices in (68)–(70) contain which-NP phrases rather than bare wh-phrases (this is so for all the examples cited in Anand et al. 2021 and Anand et al. 2023). Even in the absence of a preposition, a which-NP phrase can serve as a retrieval cue, guiding the parser toward an implicit correlate with temporal or locative semantics, as is the case in (68)–(70). Our acceptability tests for P-omission under sprouting usually involve constructed examples with bare wh-phrases (see e.g. (12) and (19)), but appropriate contexts perhaps exist in which P-omission doesn't result in unacceptability even with implicit argument correlates. Consider one such context with *engaged* taking a PP complement in (71), where P-omission appears possible. The NP fragment *Hanna*, though not a which-NP phrase, encodes sufficient semantic information to be able to query the individual Harvey may have gotten engaged to.

(71) [Context: B knows that Harvey's been dating Hanna lately:]
A: So, Harvey got engaged.
B: <To> Hanna?

If this reasoning is on the right tract, we don't need anything beyond MiF to get these accessibility-related constraints on P-omission right. However, some loose ends remain here, as well, because the low frequencies of P-omission fail to support any of the other expected accessibility-based effects of MiF.

Toward an explanation, let us return to the point I made in section 2.2, namely that all correlates are continuous PPs under pseudogapping. This fact discourages P-omission via a general preference for structural parallelism, weakening, I propose, the effects of both MiF (no

evidence of correlate content effects) and MiD (no evidence of level 1 dependency effects). My current results make it plausible that the preference for structural parallelism is a general, construction-independent mechanism, with effects that may vary from one construction to another. That they do so in English is shown by high frequencies of P-retention for pseudogapping but not for fragments, where PP correlates are discontinuous phrases as often as 28% of the time, according to Nykiel & Hawkins' (2020) data. In fact, pseudogapping may be inducing unusually strong structural parallelism effects due to the overwhelming presence of comparative clauses in the current sample. One reason to think so is Poppels & Miller's (2023) finding that violations of structural parallelism are penalized under comparative pseudogapping (72) as much as they are in its counterpart without ellipsis (73) (for these and other examples, see Poppels and Miller's experimental materials; all of their pseudogapping items feature comparative pseudogapping).

(72) Eddy spoke with Susan more often than he did to Emily.

(73) Eddy spoke with Susan more often than he spoke to Emily.

This finding stands in contrast to work that has demonstrated an ellipsis-specific penalty for lack of structural parallelism under VPE (e.g., Kim & Runner 2018; Poppels & Kehler 2019).

Based on the current results, we can make the following testable crosslinguistic predictions (summarized in **Table 8**). If a language consistently realizes correlates as continuous PPs across all relevant constructions and also has numerous and/or strong word-external dependencies, effects of the latter will be visible but may or may not prevail over structural parallelism, that is, may or may not lead to an actual preference for P-omission. This is because the VP and PP domains are also in competition, quite possibly introducing construction-dependent effects. A language with the same characteristics but with fewer and/or weaker word-external dependencies will definitely not have a preference for P-omission. The languages other than English in which P-omission has been explored and shown to have a limited distribution (see section 2) do predominantly use continuous PPs as correlates but we have yet to probe the number and strength of word-external dependencies in them. It's worth mentioning here that current P-omission promotes

Discontinuous PP correlates	**Strong word-external dependencies**	**P-omission preferred**
No (or few)	Yes	Maybe
No (or few)	No	No
Yes	Yes	Yes

Table 8: Crosslinguistic predictions of a processing account of P-omission.

more P-omission via structural parallelism, presumably in any language (Nykiel & Hawkins 2020). A language that can't provide a discontinuous PP correlate through preposition stranding, as in example (31), can do so through P-omission. Consider how B's second utterance (an NP sluice) is structurally parallel to A's second utterance (an NP fragment) and unlikely to be a PP in (74).

(74) A_1: I was right.
B_1: About what?
A_2: The fight.
B_2: What fight?

It's thus no accident that we know of no language that would ban P-omission from ellipsis so long as the effects of MiF, MiD, and structural parallelism are operative. On the other hand, a language that can produce discontinuous PP correlates via preposition stranding and has numerous and/or strong word-external dependencies (we can safely assume that every preposition-stranding language has numerous word-external dependencies, because preposition stranding is sensitive to them, as demonstrated by Hoffmann 2010) will favor P-omission over P-retention, unless particular constructions limit or altogether block the use of discontinuous PP correlates, as does English pseudogapping. But more crucially, the English pseudogapping data, along with the theoretical accounts of pseudogapping, show us that P-omission can be rarer than P-retention despite not being ruled out by the grammar. It's not straightforward to connect any degradation in the acceptability or frequency of P-omission to a grammatical constraint under any available kind of ellipsis and in any language so long as we haven't tried to control for, or simply haven't taken into account, the full set of constraints discussed in this paper, with structural parallelism being one of the key predictors of P-omission in the crosslinguistic picture. An increasingly plausible scenario is that P-omission is fully grammatical and subject to processing constraints, suggesting a theoretical analysis that allows it and includes a processing component as a way of delimiting and motivating where P-omission can, and is likely to, apply.

6 Conclusion

This paper has explored patterns of P-omission in English pseudogapping. As is typical of the majority of elliptical constructions, pseudogapping has attracted transformational and nontransformational analyses within theoretical syntax, but these analyses can't yet adequately account for the empirical data presented here, and in fact run into similar difficulties that theoretical analyses of P-omission in clausal ellipsis do. In order to solve these problems, I have proposed a processing-based mechanism with broad cross-constructional and cross-linguistic coverage to complement the existing theoretical analyses. This mechanism is based on

evidence for the same two efficiency principles (MiD and MiF) that dictate how P-omission eases processing pressures on the parser under clausal ellipsis; these principles partially compete here with a preference for structural parallelism that leads to a pseudogapping-specific bias against P-omission. A similar bias is expected in any construction and in any language (but depending on the number and strength of word-external dependencies) that predominantly realizes PP correlates as continuous phrases.

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Data availability

You can find the data at: https://osf.io/sy96z/.

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Competing interests

The author has no competing interests to declare.

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