Pseudogapping as pseudo-VP ellipsis

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Abstract

In this paper, we propose an analysis of pseudogapping in Hybrid Type-Logical Categorial Grammar (Hybrid TLCG; Kubota 2010; Kubota and Levine 2012). Pseudogapping poses a particularly challenging problem for previous analyses in both the transformational and nontransformational literature. We argue that the flexible syntax-semantics interface of Hybrid TLCG enables an analysis of pseudogapping that synthesizes the key insights of both transformational and nontransformational approaches, while at the same time overcoming the major difficulties of each type of approach.

Keywords: pseudogapping, VP ellipsis, anaphora, syntactic identity, Hybrid Type-Logical Categorial Grammar

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1 Introduction

Pseudogapping is a somewhat odd instance of ellipsis in which a lexical verb under an auxiliary is deleted, leaving behind its own complement(s). There are clear family resemblances between pseudogapping on the one hand and gapping and VP ellipsis on the other.

(1) Mary hasn't **dated** Bill, but she has ∅ Harry. (*pseudogapping*)

(2) Smoke **bothers** Fred, and loud music, ∅ Fred's parents. (*gapping*)

(3) Smoke might have **bothered Fred**, but it didn't ∅. (*VP ellipsis*)

In both pseudogapping and gapping, the lexical verb is missing, leaving behind some (or all) of its complements as remnants, but in pseudogapping, an auxiliary in the ellipsed clause must be present (just like in VP ellipsis), whereas in gapping no auxiliary is found. gapping is moreover different from the other two in that it is restricted to coordination environments (cf. *I'll contact John if you will (Mary)* vs. **I'll contact John if you Mary*).

The proper analysis of pseudogapping has long been a problem in the literature (e.g. Kuno 1981; Jayaseelan 1990; Miller 1990; Hoeksema 2006; Lasnik 1999; Baltin 2000; Takahashi 2004; Gengel 2013; Miller 2014, to name just a few sources). The shared auxiliary requirement and distributional parallelisms of pseudogapping and VP ellipsis (where, unlike gapping, they are not restricted to coordination environments) suggest a unitary analysis in which the latter is nothing but a limiting case of the former with all the verb's complements ellipsed. In transformational approaches (cf., e.g., Jayaseelan 1990), this unification has been implemented by treating pseudogapping as VP ellipsis in which a remnant (*Harry* in (1)) has been moved out of a subsequently deleted VP, thereby escaping ellipsis. The disagreements among previous proposals pertain to differences in (i) the kinds of movements proposed (A- vs. $\bar{\text{A}}$-movement) and (ii) the direction of movement (leftward vs. rightward). However, as we see below, regardless of which choices are made, the various movement operations employed for this purpose by different authors are not only undermotivated but empirically problematic. The nontransformational literature, by contrast, has given relatively little attention to pseudogapping, with Miller 1990, 2014 being virtually

the only exception. Building on Schachter's (1978) analysis of VP ellipsis (see also Hardt 1993), Miller (1990) proposes that the meaning of the missing verb (such as *dated* in (1)) in pseudogapping is simply recovered by an anaphoric mechanism. This approach is successful in providing a relatively simple mechanism for correlating form and meaning, but it has one major drawback: the complete dissociation between the syntactic and semantic licensing conditions for pseudogapping underlying Miller's analysis (which is common to many nontransformational analyses of ellipsis phenomena) overgenerates in a way never expected in a transformational approach.

We argue in this paper that a synthesis of the transformation and nontransformational approaches to pseudogapping becomes possible in a version of categorial grammar (CG) called Hybrid Type-Logical Categorial Grammar (Hybrid TLCG; Kubota 2010, 2014a, 2015; Kubota and Levine 2012, 2015, 2016, to appear). Hybrid TLCG is a contemporary variant of CG that recognizes both the familiar directional slashes (Lambek 1958) for handling word order and the more recent, non-directional mode of implication (or slash) from Oehrle 1994 (see also de Groote 2001, Muskens 2003, and Pollard 2013) for handling scope-related phenomena. This new approach has proven successful in the analyses of several recalcitrant phenomena, such as nonconstituent coordination (including gapping) (Kubota 2015; Kubota and Levine 2015, 2016) and the semantics of symmetrical predicates (*same*, *different*) (Kubota and Levine to appear). The present paper shows that the 'hybrid' architecture of this framework once again yields an elegant analysis of a highly problematic empirical phenomenon, namely, pseudogapping. Our analysis characterizes the syntactic properties of the 'antecedent' of the pseudogapped verb in the preceding clause via the flexible notion of constituency with directional slashes and captures the anaphoric relation between the antecedent and the ellipsis clauses via order-insensitive inference with the non-directional slash. This essentially amounts to augmenting the interpretive analysis of Miller 1990 with the insights from transformational approaches that syntactic information is also relevant in the licensing of pseudogapping, resulting in a synthesis of the seemingly antithetical transformational and nontransformational approaches.

2 Data

2.1 Basic Patterns and Sensitivity to Discourse-Oriented Factors

Pseudogapping is most typical with transitive verbs (with NP or PP complements).

(4) a. Mary hasn't dated Bill, but she has ∅ Harry.

b. Mary dates Bill more frequently than she does ∅ Harry.

(5) a. You can't count on a stranger, but you can ∅ on a friend.

b. John speaks to Mary more civilly than he does ∅ Anne.

Though both the comparative and the non-comparative variants are clearly acceptable in such simple examples, pseudogapping is a somewhat marginal phenomenon at best, and judgments are often unstable. For this reason, it is important to first clarify the factors that affect the felicity of pseudogapping and to control for them as much as possible.[1]

The most fundamental property of pseudogapping, which is particularly important to bear in mind, is that, as noted by Hoeksema (2006), this construction must satisfy the Contrast relation in Kehler's (2002) classification of discourse relations.[2] Thus, note that the highly marginal (6a) improves in (6b) with the use of contrastive *but*, and becomes virtually unexceptionable with the use of the comparative structure in (6c).

(6) a. %%John will write essays and he will ∅ novels.

[1]We use * for marking examples which, in our view, cannot be ameliorated by pragmatic manipulation (lexical choice, discourse context, world knowledge, etc.). In this section, we mark examples with intermediate levels of acceptability with %. Since we take all such examples to be grammatical (but degraded for pragmatic reasons), we generally eliminate this marking in later sections to avoid overload of notation. When a (gradient) acceptability difference is at issue, we indicate different degrees of acceptability with the number of % symbols (where %% is worse than %). Outside of the particular set of contrasted examples, this should not be taken to have any significance. For examples from the literature, we have (except where noted) replaced the original judgments with our own.

[2]The Contrast relation is typically expressed by *but*, as in *Mary went to the movies, but Bill went to a rock concert*, and is often manifested (as in this example) by the juxtaposition of two clauses having overall parallel structures but with at least one 'slot' being different and in some sense opposed to each other.

b. %John won't write essays but he will ∅ novels.

c. John will write essays much more successfully than he will ∅ novels.

Note moreover that in all these cases, contrastive emphasis on *essays* and *novels* increases acceptability of the sentence as uttered (other sources of increased acceptability include the use of the demonstratives *this*/*that* (see section 4.6), which corroborates the same point).

Indeed, Hoeksema (2006) notes a strong statistical association between pseudogapping and comparative constructions, where 87% of his attested examples involve comparatives or constructions for comparison (with expressions such as *like*, *the way/manner*, etc.). This makes sense given the tight correlation between pseudogapping and the Contrast relation.

Also, as noted by Levin (1979), Hoeksema (2006) and Miller (2014), keeping the subject of the antecedent and the pseudogapping clause identical greatly increases the acceptability of pseudogapping (in fact, Miller notes that 85% of the pseudogapping examples in his corpus sample contains a pronoun as the subject of the ellipsis clause). Thus, compared with (6a,b), (7a,b) are somewhat degraded.

(7) a. %%%John will write essays and Mary will ∅ novels.

b. %%John will write essays but Mary will ∅ novels.

The effect of the Contrast requirement and the 'same subject' preference is that the least acceptable example in this paradigm is (7a) with no contrastive stress on the remnants (and no discourse context suggesting that essays and novels are contrasted), and the best is (6c) with strong contrastive stress on the remnants. Thus, we do not regard (7a) as ungrammatical; it just fails to satisfy all the relevant discourse conditions affecting the felicity of pseudogapping.[3] When presenting our examples below, we will control for these factors so that the examples will not violate these interfering discourse conditions. This is especially important for examples with more complex structures, in which such effects (unsurprisingly) tend to be aggravated. For example, even with single remnants, when the

[3]It is well-known in the literature on island effects that cumulative effects of such extra-grammatical factors can lead to unacceptability practically indistinguishable from ungrammaticality (Kluender 1998).

syntactic and semantic types are not the simple NP individual-denoting type as in (4) and (5), the acceptability noticeably falls down, as in the following (but note that the comparative structure is consistently better than the non-comparative structure).

(8) a. %%John will bet an entire fortune that the METS will win the pennant, but he won't ∅ that the BRAVES will win. (Culicover and Jackendoff 2005:294)

b. %John will bet an entire fortune that the METS will win the pennant more readily than he will ∅ that the BRAVES will win.

2.2 Complex Pseudogapping Patterns

beyond the 'base cases' involving direct objects of transitive verbs as remnants, a variety of more complex pseudogapping examples exist, which are well within the range of acceptable patterns. We take all these examples to be generated in the syntax since doing so will make the overall analysis simpler. Wherever relevant, we offer some observations on the extragrammatical factors possibly affecting their perceived acceptability.

Multiple Remnants Pseudogapping is possible with multiple remnants in the ellipsis clause (we show the antecedent of the 'elided verb' in boldface and the remnant(s) in italics).

(9) a. %Although I wouldn't **introduce** those people to Tom and Sally, I would ∅ *these people to each other*. (Gengel 2013:58)

b. I would **introduce** those people to Tom and Sally with more hesitation than I would ∅ *these people to each other*.

The moderately degraded status of (9a) essentially disappears when they are reframed as comparatives as in (9b), suggesting that the degree of contrast in (9a) is not quite sufficient to satisfy completely the Contrast relation.

We believe that the number of remnants is not limited to two. Though (10) is admittedly awkward, we take its decreased acceptability to be due to processing difficulty.[4]

[4]Multiple remnants are difficult also in gapping, presumably due to a similar reason.

(10) %I'd **bet** a friend more dollars that something unlikely was true than I would ∅ *an enemy Euros that the sun will rise tomorrow*.

Nonconstituent Ellipsis Targets The elided material is not necessarily a standard constituent.

(11) a. %You can't **take the lining out of** that coat. You can ∅ *this one*. (Levin 1979:77)

b. You can **take the lining out of** that coat more easily than you can ∅ *this one*.

c. You can't **pay more attention to** John than you do ∅ *Mary*!

These examples are particularly important since they seem to militate against analyses which depend on rightward movements to evaluate the remnants out of the deleted VP. Out analysis in categorial grammar allows the elided material in these examples to constitute combinatorial units with proper semantic interpretations, enabling us to subsume these cases under the normal licensing mechanism of pseudogapping.

Discontinuous Ellipsis There are also data displaying apparently discontinuous ellipsis.

(12) a. She **found** her co-worker **attractive** but she didn't ∅ *her husband* ∅.

b. I didn't **expect** your mother **to like the picture**, but I did ∅ *you* ∅.

These examples seem particularly problematic to some of the movement-based approaches (again, ones involving rightward movement). These data also have some interesting implications for our analysis in categorial grammar, and raise an important (open) question of how much flexibility should be allowed in the syntax proper in capturing the possible patterns of pseudogapping adequately. We return to this issue in section 4.4.

2.3 Analytically Problematic Patterns

As noted in the introduction of the present paper, there are two major approaches to pseudogapping in the previous literature: (i) transformational analyses with movement + VP ellipsis; (ii) nontransformational analyses which rely on purely anaphoric mechanisms to retrieve the meaning of the missing verb. We now turn to data that prove to be especially difficult (or even intractable) for one or the other of these two approaches.

Problems for Covert Structure Movement-based approaches find support in essentially two types of evidence: (i) syntactic identity conditions between the antecedent and the elided VPs and (ii) manifestations of island constraints governing the movement operations involved. Both of these two types of evidence have been challenged in the recent literature.

Evidence for identity conditions is taken to come from data such as (13), which according to Merchant 2008 is ungrammatical because of voice mismatch.

(13) %%Klimt is admired by Abby more than anyone does Klee. (Merchant 2008:170).

However, as noted by Tanaka (2011:476) and Miller (2014:87), there are well-formed instances of voice-mismatch pseudogapping such as the following, casting serious doubt on an argument for hidden syntactic structure based on data like (13):[5]

(14) a. %MY problem will be investigated by Tom, but he won't YOURS.

b. These savory waffles are ideal for brunch, served with a salad as you would a quiche.

A subtler type of tolerated mismatch is noted in Miller 2014, where the pseudogapped verb has a different valence from the token which appears in the antecedent clause.

(15) Ask Doll, who spoke as much about his schoolboy career ending as he did of the season in general. (Miller 2014:83)

(14) and (15) are clearly problematic for 'deletion under structural identity' type approaches.

There is further evidence against syntactic identity in pseudogapping. Miller (2014:85) notes examples such as the following in which there is no overt syntactic constituent in the antecedent clause corresponding to the elided material in the pseudogapping clause:

[5]Nakamura (2013), building on Kertz 2010, 2013, argues convincingly that the asymmetry between cases such as (13) and those such as (14) reflects the manner in which the Contrast relation is satisfied. Specifically, when the (intended) contrast is between the subject in the antecedent clause and the corresponding demoted argument in the pseudogapped clause, voice mismatch is barred, whereas if the contrast is established between the auxiliaries in different polarities in the two clauses, voice mismatch does not lead to unacceptability. See also Miller 2014:87 for some discussion on the role of discourse constraints in acceptable examples of voice mismatch in pseudogapping.

(16) a. They all called him Pa Tommy, just as they would any village elder in Sierra Leone.
= '. . . just as they would *call* any any village elder in S. L. *by his first name*'

b. Type in your PIN, just hit those buttons like you would a phone.
= '. . . like you would *use* a phone'

c. EPA urged the Corps "to work directly with the affected communities as well as seek professional assistance in this matter as they would any other environmental issue."
= '. . . as they would *act with respect to* any other environmental issue'

Here, the ellipsis clauses are interpreted along the lines of the paraphrases given, but there are no corresponding syntactic constituents in the preceding clauses that would match these paraphrases (or any other paraphrase that would work for these examples).

Note also that pseudogapping allows for split antecedents, which are similarly problematic for syntactic approaches.

(17) a. %John saw Mary and Peter heard Ann, but neither did me. (Miller 1990:296)

b. John saw Mary and Peter heard Ann more clearly than either of them did me.

Data such as (16) and (17) obviously present severe challenges to arguments for covert structure based on the premise that straightforward syntactic identity conditions hold between the elided material and its antecedent.

A final set of important data again comes from Miller (2014), who notes a variety of attested examples in which pseudogapping displays insensitivity to island restrictions (note that (18b) is a case of antecedent-contained deletion (ACD); we take pseudogapping and ACD to be licensed by the same mechanism, pace Lasnik 1999; see footnote 18).[6]

(18) a. the frothiness of space **retards the arrival of** a burst's highest-energy photons more than it does ~~retard the arrival of~~ *the lowest-energy photons* [Subjacency]

b. **Bring the same kind of carry-ons** when traveling by train as you would ~~bring __ when traveling~~ *by air* [Adjunct island]

[6]Miller (2014) labels (18a) as Complex NP, but Subjacency seems more appropriate.

In order to derive these examples via movement+ellipsis, the movement operation prior to ellipsis would have to evacuate the remnant by moving it across an island. These examples thus significantly weaken the motivation for a movement-based analysis, since they remove one of the key evidence for assuming covert syntactic structure.[7]

Problems for Purely Interpretive Approaches Purely interpretive approaches can handle the the kinds of data given above without trouble. But this approach too faces empirical contraindications from a certain type of data, namely, ones displaying syntactic connectivity between the antecedent and the ellipsis site (Miller (1990) marks (19a) with ??, and takes it to be semantically, rather than syntactically, ill-formed; see section 3.2).

(19) a. *John spoke to Mary more often than he did for Anne.

b. *John will accuse Bill of perjury more readily than he would Mary with forgery.

c. *John insisted that Mary be fired more frequently than he did that she had done something wrong.

For example, (19a) is ungrammatical since the preposition in the remnant (*for*) does not match the one in the antecedent clause (*to*). (19c) is a particularly interesting example: *insist* has two different meanings ('demand' vs. 'believe firmly') depending on whether it takes a subjunctive or a finite complement, and the two meanings cannot be mixed in pseudogapping. It should be clear that these patterns do not fall out in any straightforward way in an approach relying solely on a semantic process of anaphora retrieval.[8]

[7]Note that we are not saying here that these island insensitivity data immediately refute movement-based approaches. Admitting the possibility of 'island repair' at PF (cf. Merchant 2001) for pseudogapping is of course an option. But it should be kept in mind that making this move effectively amounts to the recognition that there is no strong positive evidence for a movement-based analysis to begin with. Note moreover that the very notion of 'island repair' has recently been called into question (see Barros, Elliott, and Thoms 2014).

[8]Regarding connectivity, some authors have discussed the interactions between pseudogapping and binding conditions (such as Principle A (Baltin 2000) and Principle C (Sauerland 1998; Takahashi 2004)) to draw various theoretical conclusions. Unfortunately, exploring this issue is beyond the scope of the present paper. For one thing, at least for some of these conditions (most notably, Principle C), their exact status, in particu-

3 Previous Proposals

We now review representative analyses of pseudogapping in the literature. As we discuss in more detail below, both the (majority of) transformational analyses and the nontransformational alternative by Miller (1990) take pseudogapping and VP ellipsis to be derived by essentially the same mechanism. Our own analysis in section 4 follows these proposals in this respect. Though this assumption has been challenged by some authors (most notably, Hoeksema (2006)), we believe that Miller (2014:section 5) shows convincingly that the various distributional differences between pseudogapping and VP ellipsis identified in the literature can be explained by means of independent non-syntactic (i.e. discourse-oriented and/or processing-oriented) differences between the two constructions, and thus do not constitute convincing enough evidence to posit a syntactic difference between them.

3.1 Pseudogapping as VP Ellipsis: Movement-Based Approaches

There are two aspects to movement-based approaches to pseudogapping which need to be kept separate. One is the characterization of pseudogapping (and ellipsis more generally) as an operation that makes reference to purely syntactic information. The second is the specific implementation of this syntactic dependency via structure-changing operations.

The essential insight of movement-based approaches seems to largely lie in the first of these aspects. Movement-based approaches immediately explain the category-matching connectivity effect in pseudogapping, which can be accommodated only by an ad-hoc stipulation in the interpretive approaches. At the same time, as we discuss in detail below, previous transformational analyses are unsatisfactory on both empirical and conceptual grounds: the various movement operations utilized for the analysis of pseudogapping in the litera-

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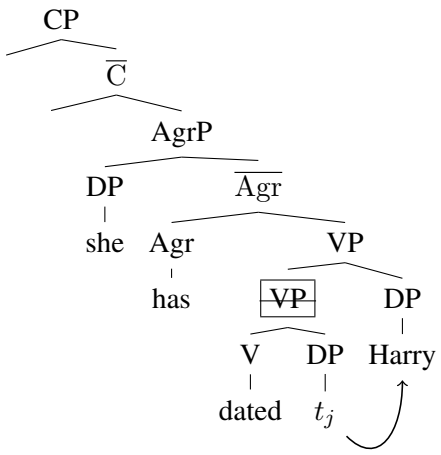
lar, whether they are syntactic in nature, has been controversial over many years (see Büring 2005 for a lucid review). Another reason for postponing this issue for future work is that (syntactic) binding is an area that is relatively underdeveloped in CG research (but see Szabolcsi 1992, Steedman 1996 and Jacobson 2007). That being said, the interaction between binding and ellipsis is an important area for future research since typical accounts of both phenomena in CG eschew reference to syntactic structures yet the relevant empirical observations in this domain have usually been taken to present evidence for structure-based accounts.

ture either lack independent motivation, or (when an independently motivated movement is retooled) do not match the actual distributional properties of pseudogapping. Moreover, movement-based approaches do not by themselves illuminate the question of why we might expect something like pseudogapping to be a possible type of ellipsis in English.

The transformational literature has essentially followed Kuno 1981, which took pseudogapping to be a case of VP ellipsis in which various constituents are moved out of the VP via adjunction operations, thus 'surviving' VP ellipsis. Jayaseelan (1990), adopting this general idea, analyzes (20) (= (1)) as in (21), via Heavy NP Shift (HNPS).

(20) Mary hasn't dated Bill, but she has ∅ Harry.

(21)



However, there are major empirical challenges for this approach. First, since HNPS cannot move the NP complement of a preposition, this analysis incorrectly rules out examples like the following (Lasnik 1999; Miller 2014):

(22) If you can't understand me, I will communicate with you like I would a dog.

Second, Jayaseelan attributes the ill-formedness of (23a) (the judgment * is Jayaseelan's) to the impossibility of multiple rightward movements in HNPS. But this supposed prohibition is directly contradicted by data such as (23b) (see more examples in section 2).

(23) a. *I didn't give a dime to Mary, but I did a nickel to Jane.

b. John gave more caviar to Mary than he did mush to Jane. (Kuno 1981:145)

Given that pseudogapping is much more acceptable in comparatives than in ordinary coordination, the contrast in (23) isn't particularly surprising.

An extreme example of this kind is provided by (10), repeated here as (24).

(24) %I'd bet a FRIEND more DOLLARS that something UNLIKELY was true than I would an ENEMY EUROS that the sun will RISE tomorrow.

On Jayaseelan's analysis, the input to the movement prior to VP ellipsis is the following:

(25) ...than I would [$_{\mathrm{VP}_0}$ bet an enemy Euros that the sun will rise tomorrow]

In order to evacuate VP_0 of all its nonhead daughters, leaving only *bet* in place to be deleted, movement must apply successively to each of the complements of the verb.

(26) ...than I would [$_{\mathrm{VP}_0}$ [$_{\mathrm{VP}_1}$ [$_{\mathrm{VP}_2}$ ~~[$_{\mathrm{VP}_3}$ bet t_1 t_2 t_3]~~ an enemy$_1$] Euros$_2$] [that the sun will rise tomorrow]$_3$]

But the rightward movements in (26) have serious empirical shortcomings. As we discuss below, when the verb is not elided, such rightward movements are ill-formed.

To see this, note first that neither of the two objects of *bet* is right-shiftable via HNPS.

(27) a. I bet Leslie a *ton* of money that Terry was alive.

b. *I bet Leslie that Terry was alive a TON of money.

(28) a. I would bet even the worst enemy I've ever met in my life (a lot of money) that Leslie is alive.

b. *I would bet (a lot of money) that Leslie is alive even the worst enemy I've ever met in my life.

The badness of (27b) or (28b) cannot be attributed to the NPs themselves since they are right-shiftable (cf. *In the past, I'd transferred to Terry's account a ton of money*).

The pattern just observed severely jeopardizes an account of (24) via rightward movement. Such an account would first take the leftmost complement *an enemy* to heavy-shift to the right, followed by two further successive rightward movements targeting the remaining complements (below, ☠ marks an operation shown to be inadmissible in (27b) or (28b)).

(29) I would [$_{\mathrm{VP}}$ bet [an enemy] Euros [that the sun will rise tomorrow]] ⇒ ☠
I would [$_{\mathrm{VP}}$ bet t_1 Euros [that the sun will rise tomorrow]][an enemy]$_1$ ⇒ ☠
I would [[[$_{\mathrm{VP}}$ bet t_1 t_2 [that the sun will rise tomorrow]] [an enemy]$_1$] Euros$_2$] ⇒
I would [[[[$_{\mathrm{VP}}$ bet t_1 t_2 t_3] [an enemy]$_1$] Euros$_2$] [that the sun will rise tomorrow]$_3$]

In short, the necessary rightward movements are precisely the prohibited ones.[9]

Finally, Jayaseelan argues that (30) supports the HNPS analysis since HNPS would not be able to apply to a weak definite pronoun such as *it*.

(30) Is she suing the hospital? – $^{\%\%}$Yes, she is it.

But this only shows that pseudogapping requires its remnant to carry stress. The stress requirement itself presumably follows from the required Contrast relation in pseudogapping along the lines discussed in the previous section (in fact, Jayaseelan himself notes this condition). Note that replacing *it* with *that* (with a marked stress on it) improves (30). (Note incidentally that, as a reviewer reminds us, the fact that pronouns other than *it* can readily occur as a remnant in pseudogapping provides a strong argument against Jayaseelan's

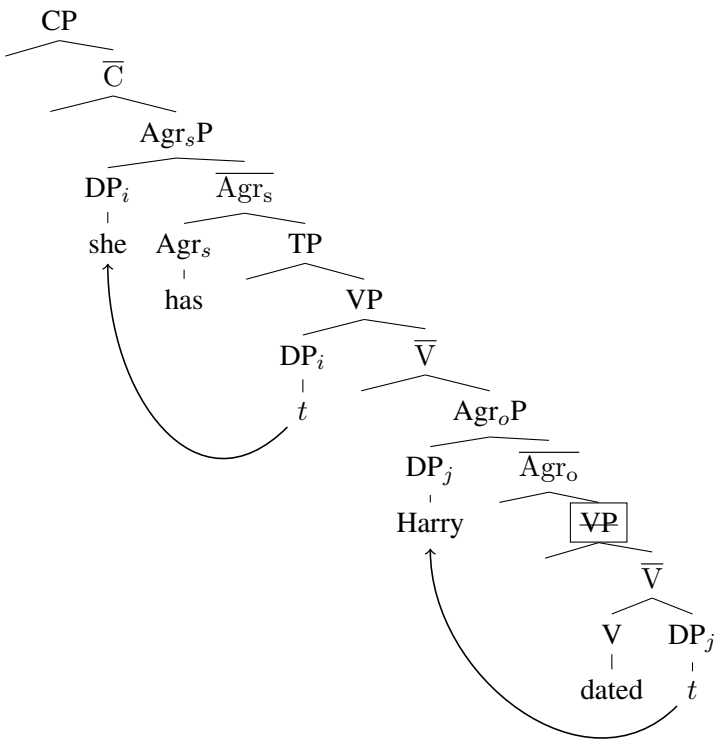
[9]One might think that Jayaseelan's proposal could be saved by assuming that the type of (rightward) movement involved here obeys the so-called 'linearization' constraint (Takahashi 2004; Fox and Pesetsky 2005), which essentially says that the original linear order should be preserved after movement. In fact, Johnson (2009:315) alludes to a similar possibility in connection to gapping. The problem with this type of account is that the critical constraint that it relies on, namely, the linearization constraint, not only fails to follow from any obvious assumptions in the theory, but completely lacks independent motivation, as noted, for example, by Toosarvandani (2013) and Kubota and Levine (2016).

Recent minimalist literature recognizes a cluster of properties associated with movement operations in ellipsis phenomena (to which the order preservation property could reasonably be added), giving it the (quite appropriate) name 'exceptional movement'. The most recent discussions of this issue (Thoms 2014; Boone 2014; Weir 2015), however, still fail to explain *why* all movement operations prior to ellipsis exhibit the particular set of properties they do (moreover, some of the underlying generalizations (such as locality) seem to be simply wrong for at least some types of ellipsis phenomena; see footnote 10). Though cast in a different theoretical framework, our analysis of pseudogapping presented below can be thought of as an attempt to offer just such an explanation, for at least some subset of the properties associated with 'movement' prior to 'ellipsis': the order preservation effect follows trivially without any additional stipulations in our analysis.

proposal—one of the hallmarks of pronouns is that they are exempt from HNPS.)

Subsequent transformational analyses have added little to Jayaseelan's main ideas. The only differences consist in whether the movement is taken to be A or $\overline{\text{A}}$ movement, and rightward or leftward movement. For example, (31) illustrates Lasnik's (1999) alternative.

(31)



Here, Jayaseelan's rightward HNPS is replaced by a leftward A-movement of the remnant NP *Harry* to [Spec,Agr$_o$]. As noted in Takahashi 2004, while this treatment avoids the difficulties of an exclusively HNPS analysis, it creates a new problem. Examples such as (32) require a structure in which everything in the VP except *CDs* is deleted.

(32) John gave me more books than he did CDs.

The complex interactions of Lasnik's assumptions about feature checking, derivational economy and binary branching yields the following structure:

(33) [$_{\text{TP}}$ he$_k$ did [$_{\text{VP}_1}$ t_k [$_{\text{AgrP}}$ me$_j$ [$_{\text{VP}_2}$ t_j [$_{\text{AgrP}_3}$ CDs$_i$ [$_{\text{VP}_3}$ give t_i]]]]]].

To delete both *give* and *me*, it would be necessary to delete VP$_1$, which would also delete

CDs. Suppose, then, that we instead assumed a simpler initial structure, where the verb directly precedes *me* and *CDs*, and then deleted the partially evacuated VP, as in (34).

(34) $[_{\mathrm{TP}}$ he did $[_{\mathrm{AgrP}}$ CDs$_i$ $[_{\mathrm{VP}}$ ~~give me t_i~~]]

However, as noted by Takahashi, this derivation would also fail. The problem is that such a derivation requires a leftward A-movement of the indirect object *CDs* across the direct object—an operation which is blocked (except in British English) in non-ellipsed contexts.

(35) *CDs were given me (by John).

Thus, as noted by Takahashi, there is no available derivation for (32) on the assumption that pseudogapping comprises exclusively leftward A-movement prior to VP deletion.[10]

Finally, Culicover and Jackendoff (2005:294) note that Lasnik's analysis, if applied to data such as (36), would require the clausal remnant to be $\overline{\mathrm{A}}$-moved to the left.

(36) John would bet an entire fortune that the METS will win the pennant far more confidently than he would ∅ that the BRAVES will win.

But, as they note, cross-linguistic evidence from Dutch and German, where overt leftward object shift is standard, shows that clauses do not undergo such movement.

In place of Jayaseelan's (1990) exclusively rightward and Lasnik's (1999) exclusively leftward movement analyses, Takahashi (2004) proposes a mixed analysis where both (leftward) Object Shift and rightward adjunction are available to partially evacuate VPs prior to deletion. It might seem at first that this 'eclectic' approach would overcome the problems just noted for Lasnik's analysis, as well as those noted earlier for Jayaseelan's. For example,

[10]Minor variations on Lasnik's proposal are offered in Gengel 2013 and Boone 2014. Neither is satisfactory. On Gengel's analysis, examples such as *John gave more caviar to Mary than he did mush to Jane* (Kuno 1981) force a $\overline{\mathrm{V}}$-deletion analysis, precisely the kind of deletion operation that Gengel herself objects to (Gengel 2013:50), with the only alternative being to posit an extra ad hoc functional projection above VP. Boone's (2014) analysis in terms of 'exceptional movement' (see also footnote 9) is not only stipulative but is empirically deficient: exceptional movement is taken to apply strictly locally, but this is counterexemplified by examples such as (18b) from the previous section. Moreover, neither Gengel's nor Boone's approach offers a solution for data such as (24).

(32) and (36) can be generated just as they would be under Jayaseelan's (1990) analysis, via a single application of HNPS. In the case of (9), Takahashi's analysis would move the leftmost complement to the left via Object-shift, followed by rightward A-movement of the rightmost complement. In a sense, Takahashi's approach can be seen as the limiting case of the movement strategy: given that neither the leftward nor the rightward analysis covers all cases, the next (and the last) analytic alternative is to combine all approaches that have worked in particular cases. Unfortunately, however, a wider set of data reveal problems similar to those which undermine the previous accounts.

In (24), for example, there are three remnants. Takahashi's analysis would take the leftmost complement *an enemy* to Object-shift to the left, followed by either two rightward movements targeting each of the remaining complements, or a second movement to the left, applying to *Euros*, and a movement of the clausal complement to the right. But both of these possibilities are ruled out by Takahashi's own lines of separate argumentation against Jayaseelan's and Lasnik's analyses. In the former case, the same problem arises as in (29) above: leaving aside the legality of multiple HNPS, the first of the rightward movements must move the indirect object *Euros* over the clausal complement. But as discussed above, this is prohibited, as per (27). In the latter case, the first movement must move the indirect object over the direct object—again, an option precluded for Takahashi, since admitting such movement would incorrectly license the passivization of an indirect object in (35).[11]

Given the discussions from the previous and the present sections, we have two kinds of evidence bearing on the movement hypothesis for pseudogapping: on the one hand, the general argument *for* movement in pseudogapping based on the putative compliance with island constraints is undercut by the evidence from Miller 2014 in section 2.2, while the

[11] A reviewer questions our reasoning here by noting that Takahashi (2004:579) himself suggests the possibility of multiple leftward movements for the two objects in multiple remnant pseudogapping with ditransitives. But this directly contradicts Takahashi's (2004:575) own argument against Lasnik 1999 just a few pages earlier. Since Takahashi suggests an alternative leftward+rightward movement analysis for ditransitives immediately after this puzzling mention of the multiple leftward movement possibility, we take the latter to be his real proposal (which is by far more in line with the spirit of his 'eclectic' approach).

arguments just reviewed *against* each specific movement-based analysis make it difficult to see how such analyses can be maintained. But the problems do not end here. There are both a general conceptual problem and one specific empirical problem that pose serious challenges to the general class of movement+VP ellipsis type analysis, regardless of the specific implementation of the movement and deletion operations involved.

We start with the conceptual issue. The main motivation for a movement+VP ellipsis approach comes from the fact that pseudogapping can be subsumed under VP ellipsis once some movement operation can be established to evacuate the remnant (but note that this latter component is actually a major weak point of this approach). A big advantage of such an approach in particular is that syntactic connectivity effects come for free (for a similar argument involving other types of ellipsis, see Merchant 2004). Despite these motivations, however, there are examples that pose serious challenges to a syntactic approach, such as the antecedentless and split-antecedent pseudogapping examples noted in section 2 (see (16) and (17)). These examples suggest that, despite the initial appeal of the movement+deletion strategy, descriptively speaking, the type of ellipsis involved in pseudogapping is anaphoric rather than being licensed syntactically. But then, the fact that pseudogapping leaves a remnant (displaying connectivity effects) is particularly troublesome, since, as noted by a reviewer for the present paper, extraction 'out of' unequivocally anaphoric expressions is generally prohibited. Note for example the following contrast between antecedent-contained ellipsis and its counterpart involving *do so* anaphora:

(37) John talked to everyone who Peter did (*so). (Haïk 1987:513)

Previous syntactic accounts of pseudogapping remain silent about this tension between (apparent) evidence for a structural account and evidence against it.

There is moreover at least one empirical argument against the specific assumption (common to all movement+VP ellipsis type analyses) that a syntactic operation of VP ellipsis underlies pseudogapping. This assumption leads to a striking incompatibility between the principal derivational analyses of pseudogapping and of gapping in view of data such as (38) involving an interaction of the two.

(38) I can eat more PIZZA than YOU can ICE CREAM or MARY TACOS.

Consider the consequences of (38) for Johnson's (2000; 2009; 2014) low VP coordination/ATB verb movement analysis of gapping. On the one hand, under a VP-evacuation/deletion analysis of pseudogapping, the first conjunct of the *than*-clause *you can ice cream* is an output of VP ellipsis, deleting a VP containing the verb and the trace of the remnant direct object. On the other hand, in order to get gapping in the righthand conjunct, Johnson's analysis requires ATB movement of the verb *eat*. Suppose, following Johnson (2000, 2009), we assume a structure for (38) along the lines of (39).

(39) [$_{\mathrm{TP}}$ can [$_{\mathrm{VP}}$ you eat ice cream]] or [$_{\mathrm{VP}}$ Mary eat tacos]]]

If *eat* undergoes ATB movement from this structure, where have the two tokens of this verb in each conjunct in (39) gone in (38)? Suppose the ATB movement for gapping applies first. Then, *eat* is removed from the first conjunct, no longer deletable by VP ellipsis, and hence necessarily visible in the comparative clause at the end of the derivation, contrary to fact. The only other option would be to start with pseudogapping in the lefthand conjunct. Then, we obtain an intermediate structure in (40).

(40) can [$_{\mathrm{VP}}$ [$_{\mathrm{VP}}$ you $\varnothing$ ice cream]] or [$_{\mathrm{VP}}$ Mary [eat tacos]]]

Even allowing non-ATB movement from the VP, we still have nowhere to move *eat* to such that (38) is derived. Given these considerations, it seems fair to say that there is no straightforward analysis of the pseudogapping/gapping interaction in (38) consistent with the standard assumptions about the two phenomena in movement-based approaches.

Thus, previous movement-based approaches are not only problematic as analyses of pseudogapping itself, but they also suffer from the implications of the fundamental premise: the assumption that the verb is elided by the syntactic operation of VP ellipsis is not only undermotivated based on an overall descriptive classification of ellipsis and anaphora, but also leads to mispredictions in interaction with analyses of other syntactic phenomena.

3.2 The Anaphoric-Interpretive Strategy

An alternative approach to ellipsis has emerged during the past three decades, whose central claim is that ellipsis never involves covert structure (Schachter 1978, Sag et al. 1985, Miller 1990, Hardt 1993, Dalrymple, Shieber, and Pereira 1991, Culicover and Jackendoff 2005, among others). Such approaches typically invoke some kind of anaphoric process based on the semantics of the antecedent clause. We illustrate this strategy by reference to Miller 1990, which is the most explicit proposal of this sort to date for pseudogapping (see Culicover and Jackendoff (2005) also for a similar idea, worked out in less detail).

The key idea of Miller's (1990) nonderivational analysis of pseudogapping, couched in GPSG, is that auxiliaries can appear as the head verb in the same set of PS rules that license projections of lexical verbs. For example, in (1), reproduced here as (41), the auxiliary *has* is effectively treated as a transitive verb and directly combines with the remnant *Harry*.

(41) Mary hasn't dated Bill, but she has ∅ Harry.

Miller implements this strategy by assuming that auxiliaries can appear not only in subcategorization frames taking non-finite VP complements, but also in frames instantiating any subcategorization frame of a lexical verb in English. This means that the auxiliary *has* is specified in the lexicon to be compatible with the [SUBCAT 2] specification, which is associated with the following PS rule licensing lexically transitive verbs such as *drink*:

(42) VP → H[SUBCAT 2], NP

This rule licenses (41), and the meaning of the 'missing' verb is then supplied by anaphoric reference to some 'corresponding' verb in the preceding clause.

Elegant though it is, this analysis has one serious source of overgeneration. The problem, in a nutshell, is that Miller's anaphora resolution procedure makes no reference to any syntactic information of the antecedent clause—in particular, to the syntactic selectional properties of the head verb, which must be matched by the auxiliary in the pseudogapped clause, as discussed above. This indeterminacy entails that if some complement in the pseudogapping clause has a denotation that corresponds to the denotation of a syntactically

different complement in the antecedent clause, then it is in principle possible to obtain a coherent interpretation in Miller's analysis even though the verb in the antecedent clause cannot actually combine with the pseudogapping clause complement. Thus, this account as it stands does not predict the anomaly of the following example from section 2:

(43) *John spoke to Mary more often than he did for Anne.

Here, the individual denotation **anne** is a possible interpretation for *for Anne* (cf. *John waited for Anne*, where the preposition *for* is standardly taken to be meaningless). But then, the meaning of the auxiliary *did* can be anaphorically resolved as the meaning of the verb *spoke* in the antecedent clause (note that *to* in *spoke to Mary* is similarly meaningless), leading to the misprediction that (43) should be well-formed with the same interpretation as *John spoke to Mary more often than he did to Anne*.

Miller takes (43) to be ruled out by a semantic selectional restriction analogous to the gender restriction on pronouns. This selectional restriction applies to the anaphoric auxiliary and imposes the constraint that it is felicitous just in case the verb meaning that is anaphorically retrieved is compatible with the overt preposition which heads the PP that the auxiliary syntactically combines with. Thus, for example, (43) is predicted to be semantically anomalous since 'NP1 *speak to* NP2' and 'NP1 *speak for* NP2' mean different things (NP2 is a participant in the act of speaking in the former but not in the latter). Thus, when appearing with *for* (as in the pseudogapping clause), the meaning of *speak* in the antecedent clause would not be the 'appropriate' one, and anaphora resolution therefore fails. Though this approach seems in principle implementable in an interpretive approach, it is unclear to us what motivates the anaphoric auxiliaries (which are all identical in form in the relevant respect) to carry *semantic* restrictions based on the intended antecedent target, which according to Miller is no different from to the gender restriction on pronouns (the latter of which has a clear morphological reflex on the overt form of the pronouns).[12] In the

[12]Since this condition cannot be hooked to the morphological form of the anaphoric auxiliary, the formulation of the relevant condition (Miller's (1990) (41)) is rather complicated.

(i) The functor from the antecedent of *do* which applies to the denotation of the complement (respectively

next section, we offer an alternative formulation of the syntactic connectivity restrictions which keeps the core insight of Miller's proposal but implements the relevant constraint in a way we believe is much more straightforward.

4 Pseudogapping as Pseudo-VP Ellipsis

In this section, we propose an analysis of pseudogapping in *Hybrid Type-Logical Categorial Grammar* (Hybrid TLCG; Kubota 2010, 2014a, 2015; Kubota and Levine 2012, 2015), a variant of categorial grammar (CG) that has a flexible syntax-semantics interface. Our analysis aims to synthesize the key insights from both transformational and nontransformational approaches. Specifically, we follow Miller (1990) in taking pseudogapping to be licensed by an anaphoric mechanism, thereby avoiding the various problems associated with previous transformational analyses. However, unlike Miller's purely interpretive approach, the specific way in which we unify the syntactic licensing mechanism of pseudogapping and VP ellipsis naturally predicts that pseudogapping is sensitive to certain syntactic information (specifically, the syntactic selectional restrictions that the antecedent verb imposes on its complements). This way, the analysis naturally incorporates the connectivity requirement on pseudogapping from transformational approaches as well.

The key analytic idea of our proposal is largely theory-independent and can be formulated in any syntactic theory that has an explicit syntax-semantics interface and which countenances a relatively flexible notion of syntactic constituency. We believe that one of the reasons that pseudogapping has turned out to be so problematic in both the transfor-

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> complements) of *do* (that functor is either the denotation of a verb or of a preposition) must be an appropriate denotation for that verb or preposition when it is used with a subcategorization frame comprising a complement (respectively complements) of the same syntactic category as that of the complement (respectively complements) of *do*. (This presupposes that such a subcategorization frame exists.)

This alleged 'semantic' selectional restriction moreover is very different from the gender restriction on pronouns (which has the simple function of restricting the domain for the referent) in that it refers to the subcategorization frame (which is syntactic, rather than semantic, information) of the target antecedent verb.

mational and nontransformational literature is that previous syntactic theories do not have these properties in a fully general manner. We choose to formulate our analysis in Hybrid TLCG, which turns out to satisfy these two requirements adequately. In particular, the flexible notion of syntactic constituency that it shares with many other variants of CG (such as Combinatory Categorial Grammar (CCG); Steedman 1996, 2000a,b, 2014) enables a straightforward characterization of the meaning/category pair of the 'elided' material, and a novel mechanism of prosodic λ-binding (originally due to Oehrle 1994) that enables a generalization of the notion of 'movement' from the transformational literature offers a simple characterization of the relevant anaphoric process.

4.1 Hybrid Type-Logical Categorial Grammar

This section presents a quick overview of Hybrid TLCG, pitched specifically to readers familiar with standard derivational approaches (for a more complete presentation discussing the logical underpinning of the theory in detail, see Kubota and Levine 2014a and Kubota 2010, 2015). We start with a simple categorial grammar equivalent to phrase structure grammar, and extend it first with a mechanism that models (and in fact generalizes) the notion of movement, and then extend it further by introducing flexible constituency.

4.1.1 The AB Grammar

We start with a simple fragment of CG called the *AB grammar*, consisting of the two most basic rules, namely, the *Slash Elimination* rules for forward and backward slashes.

(44) a. *Forward Slash Elimination*

$$\frac{a;\ \mathcal{F};\ A/B \qquad b;\ \mathcal{G};\ B}{a \circ b;\ \mathcal{F}(\mathcal{G});\ A}\ /\mathrm{E}$$

b. *Backward Slash Elimination*

$$\frac{b;\ \mathcal{G};\ B \qquad a;\ \mathcal{F};\ B\backslash A}{b \circ a;\ \mathcal{F}(\mathcal{G});\ A}\ \backslash\mathrm{E}$$

We write linguistic expressions as tuples $\langle \phi, \sigma, \kappa \rangle$ of phonological form ϕ, semantic translation σ, and syntactic category κ as in the above rules and in the following sample lexicon:[13]

[13] We adopt the Lambek-style notation of slashes, where what appears under the slash (i.e. B in A/B and $B\backslash A$) is always the argument. CCG adopts an opposite notation for $\backslash$.

(45) a. john; **j**; NP

b. mary; **m**; NP

c. walks; **walk**; $\mathrm{NP}\backslash\mathrm{S}$

d. loves; **love**; $(\mathrm{NP}\backslash\mathrm{S})/\mathrm{NP}$

Syntactic categories are defined recursively in the usual manner from the set of basic categories and the two connectives $/$ and $\backslash$ (to which the vertical slash $\mid$ will later be added). The forward and backward slashes essentially encode subcategorization (or valence) information together with the relative order between the functor and the argument: A/B ($B\backslash A$) is a functor that takes a B as an argument to its right (left) to become an A.

The *proof* (or *derivation*—we use these two terms interchangeably, since a derivation is a proof in CG) in (46) illustrates how an analysis of a sentence goes. Here, a transitive verb, of category $(\mathrm{NP}\backslash\mathrm{S})/\mathrm{NP}$, is combined with its two arguments, one on the right (object) and one on the left (subject).

(46)
$$\dfrac{\mathsf{john};\ \mathbf{j};\ \mathrm{NP} \qquad \dfrac{\mathsf{loves};\ \mathbf{love};\ (\mathrm{NP}\backslash\mathrm{S})/\mathrm{NP} \quad \mathsf{mary};\ \mathbf{m};\ \mathrm{NP}}{\mathsf{loves} \circ \mathsf{mary};\ \mathbf{love}(\mathbf{m});\ \mathrm{NP}\backslash\mathrm{S}}\ /\mathrm{E}}{\mathsf{john} \circ \mathsf{loves} \circ \mathsf{mary};\ \mathbf{love}(\mathbf{m})(\mathbf{j});\ \mathrm{S}}\ \backslash\mathrm{E}$$

The Slash Elimination rules can roughly be thought of as subcategorization cancellation rules. Note that, by applying the rules in (44), the right surface word order is obtained in (46), paired with the right meaning. The prosodic effect of these rules is string concatenation: $/$ ($\backslash$) places the argument to the right (left) of the functor in the prosodic component. The semantic effect is function application in both cases.

4.1.2 Adding the Vertical Slash to the AB Grammar

Although variants of CG that distinguish word order via the forward and backward slashes (like the AB fragment above) have been the mainstream in CG research, the limitations of such systems in handling phenomena that are analyzed via movement in derivational approaches have been well-known (see Muskens 2003 for a good summary). There is a relatively recent strand of research in CG that addresses this issue head on and proposes to deal with word order in a radically different way—specifically, by enriching the prosodic component (roughly corresponding to PF in the minimalist literature) with the use of functional expressions employing the λ-calculus (Oehrle 1994; de Groote 2001; Muskens 2003;

Mihaliček and Pollard 2012). We incorporate the key mechanism from this new approach into our AB fragment. As we show below, this small extension enables a straightforward modelling of the notion of movement within CG.[14]

The new mechanism we incorporate into our system is an order-insensitive mode of implication $\uparrow$ called the *vertical slash*. We introduce two new rules involving this slash, the *Vertical Slash Introduction* and *Elimination* rules, formulated as follows (as with $/$, we write the argument to the right for $\uparrow$; the harpoon is there as a visual aide indicating that the right category (B in $A \uparrow B$) is the argument):

(47) a. *Vertical Slash Introduction*

$$\dfrac{\dfrac{\vdots \quad \vdots \quad \underline{[\varphi;\, x;\, A]^n} \quad \vdots \quad \vdots}{b;\, \mathcal{F};\, B}}{\lambda\varphi.b;\, \lambda x.\mathcal{F};\, B \uparrow A}\ \uparrow\mathrm{I}^n$$

b. *Vertical Slash Elimination*

$$\dfrac{a;\, \mathcal{F};\, A \uparrow B \qquad b;\, \mathcal{G};\, B}{a(b);\, \mathcal{F}(\mathcal{G});\, A}\ \uparrow\mathrm{E}$$

The workings of these rules can be best illustrated with examples. We show in (48) the derivation for the sentence *John saw everyone yesterday*.

(48)

$$\textcircled{3}\rightarrow \dfrac{\lambda\sigma.\sigma(\mathsf{everyone});\ \mathbf{V}_{\mathbf{person}};\ \mathrm{S}\uparrow(\mathrm{S}\uparrow\mathrm{NP}) \qquad \textcircled{2}\rightarrow \dfrac{\textcircled{1}\rightarrow \dfrac{\mathsf{john};\ \mathbf{j};\ \mathrm{NP} \qquad \dfrac{\dfrac{\mathsf{saw};\ \mathbf{saw};\ (\mathrm{NP}\backslash\mathrm{S})/\mathrm{NP} \qquad \left[\begin{smallmatrix}\varphi;\\ x;\ \mathrm{NP}\end{smallmatrix}\right]^1}{\mathsf{saw}\circ\varphi;\ \mathbf{saw}(x);\ \mathrm{NP}\backslash\mathrm{S}}\ /\mathrm{E} \qquad \dfrac{\mathsf{yesterday};\ \mathbf{yest};\ (\mathrm{NP}\backslash\mathrm{S})\backslash(\mathrm{NP}\backslash\mathrm{S})}{\mathsf{saw}\circ\varphi\circ\mathsf{yesterday};\ \mathbf{yest}(\mathbf{saw}(x));\ \mathrm{NP}\backslash\mathrm{S}}\ \backslash\mathrm{E}}{\mathsf{john}\circ\mathsf{saw}\circ\varphi\circ\mathsf{yesterday};\ \mathbf{yest}(\mathbf{saw}(x))(\mathbf{j});\ \mathrm{S}}\ \backslash\mathrm{E}}{\lambda\varphi.\mathsf{john}\circ\mathsf{saw}\circ\varphi\circ\mathsf{yesterday};\ \lambda x.\mathbf{yest}(\mathbf{saw}(x))(\mathbf{j});\ \mathrm{S}\uparrow\mathrm{NP}}\ \uparrow\mathrm{I}^1}{\lambda\sigma.[\sigma(\mathsf{everyone})](\lambda\varphi.\mathsf{john}\circ\mathsf{saw}\circ\varphi\circ\mathsf{yesterday});\ \mathbf{V}_{\mathbf{person}}(\lambda x.\mathbf{yest}(\mathbf{saw}(x))(\mathbf{j}));\ \mathrm{S}}\ \uparrow\mathrm{E}$$

$$\lambda\varphi.[\mathsf{john}\circ\mathsf{saw}\circ\varphi\circ\mathsf{yesterday}](\mathsf{everyone});\ \mathbf{V}_{\mathbf{person}}(\lambda x.\mathbf{yest}(\mathbf{saw}(x))(\mathbf{j}));\ \mathrm{S}$$

$$\mathsf{john}\circ\mathsf{saw}\circ\mathsf{everyone}\circ\mathsf{yesterday};\ \mathbf{V}_{\mathbf{person}}(\lambda x.\mathbf{yest}(\mathbf{saw}(x))(\mathbf{j}));\ \mathrm{S}$$

The main new ingredient here is a type of inference called *hypothetical reasoning*. In ordinary kinds of logic (such as propositional logic), hypothetical reasoning is a type of proof in which one draws the conclusion $A \rightarrow B$ on the basis of a proof of B by *hypothetically* assuming A. What is going on in (48) is essentially the same type of proof. By hypothetically assuming an object NP (with prosody φ and semantics x; hypotheses are indicated

[14] Actually more; prosodic λ-binding enables an analysis of gapping that cannot be straightforwardly simulated in derivational approaches, accounting for its many puzzling properties (Kubota and Levine 2016).

by brackets) to the right of the verb, we first conclude the existence of a complete sentence (①). From this proof, we can conclude that what we really know is that the string *John saw __ yesterday* is a sentence *if* there is an NP in the gap position __, since the existence of the object NP was after all just a hypothesis (entertained only for the sake of making the inference go through). This step (②) is licensed by the Vertical Slash Introduction rule (47a). We say that the Vertical Slash Introduction rule *withdraws* the hypothesis since the ultimate conclusion drawn no longer depends on the initial assumption that there is an NP in the object position. A hypothesis and the corresponding application of the Introduction rule are coindexed so that we can keep track of which hypothesis is withdrawn at which step in the proof (it is important not to confuse these indices with syntactic indices in derivational frameworks; unlike syntactic trees in the latter, proofs in CG are not linguistic representations, and these indices are therefore not representational objects). The vertical dots around the hypothesis in the rule in (47a) abbreviate an arbitrarily complex proof structure. Thus, (47a) simply says that a hypothesis posited at some previous step can be withdrawn by $\uparrow$I at any step in the derivation (this means that the combinatoric component of the grammar does not predict the so-called island effects; see footnote 16 for some discussion on this issue). The variable φ corresponding to the missing NP is bound by the λ-operator in the prosodic representation, and there is corresponding λ-binding in the semantic component. The syntactic category $\mathrm{S}\uparrow\mathrm{NP}$ indicates that the whole derived expression is a sentence missing an NP, but unlike $/$ and $\backslash$, $\uparrow$ does not indicate the position of the missing expression in the syntactic category.

The expression derived at step ②, whose phonology is a function from strings into strings (of type $\mathbf{st} \rightarrow \mathbf{st}$; with **st** the type of strings), is then given as an argument to the quantifier, which itself has a functional phonology of a higher-order type $(\mathbf{st} \rightarrow \mathbf{st}) \rightarrow \mathbf{st}$. This step (③) is licensed by the *Vertical Slash Elimination* rule (47b), which simply does function application in both the semantic and prosodic components. This has the effect of embedding the quantifier (which semantically scopes over the whole sentence) in the gap position in the prosodic representation. The dotted lines show β-reduction steps for

the prosodic term obtained (we often omit these in the derivations below, directly writing the β-reduced terms), and should not be confused with the application of logical rules (i.e. Slash Elimination and Introduction) designated by solid lines; unlike the latter, purely from a formal perspective, these β-reduction steps are redundant. Semantically, the quantifier denotes a standard GQ meaning of type $(e \to t) \to t$. $\mathbf{\forall_{person}}$ abbreviates the term $\lambda P.\forall x[\mathbf{person}(x) \to P(x)]$ (similarly for the existential quantifier $\mathbf{\exists_{person}}$).

Scope ambiguity is then straightforward, and essentially parallel to quantifying-in and QR. (49) shows the inverse scope derivation for *Someone talked to everyone yesterday*.

(49)

$$\dfrac{\lambda\sigma.\sigma(\mathsf{everyone});\ \mathbf{\forall_{person}};\ \mathrm{S}\uparrow(\mathrm{S}\uparrow\mathrm{NP}) \qquad \dfrac{\lambda\sigma.\sigma(\mathsf{someone});\ \mathbf{\exists_{person}};\ \mathrm{S}\uparrow(\mathrm{S}\uparrow\mathrm{NP}) \qquad \dfrac{\dfrac{\dfrac{\begin{bmatrix}\varphi_2;\\ x_2;\\ \mathrm{NP}\end{bmatrix}^2 \quad \dfrac{\mathsf{talked}\circ\mathsf{to};\ \mathbf{talked\text{-}to};\ (\mathrm{NP}\backslash\mathrm{S})/\mathrm{NP} \qquad \begin{bmatrix}\varphi_1;\\ x_1;\mathrm{NP}\end{bmatrix}^1}{\mathsf{talked}\circ\mathsf{to}\circ\varphi_1;\ \mathbf{talked\text{-}to}(x_1);\ \mathrm{NP}\backslash\mathrm{S}}\,/\mathrm{E}}{\varphi_2\circ\mathsf{talked}\circ\mathsf{to}\circ\varphi_1;\ \mathbf{talked\text{-}to}(x_1)(x_2);\ \mathrm{S}}\,\backslash\mathrm{E} \qquad \begin{array}{l}\mathsf{yesterday};\\ \mathbf{yest};\ \mathrm{S}\backslash\mathrm{S}\end{array}}{\begin{array}{l}\varphi_2\circ\mathsf{talked}\circ\mathsf{to}\circ\varphi_1\circ\mathsf{yesterday};\\ \mathbf{yest}(\mathbf{talked\text{-}to}(x_1)(x_2));\ \mathrm{S}\end{array}}\,\backslash\mathrm{E}}{\begin{array}{l}\lambda\varphi_2.\varphi_2\circ\mathsf{talked}\circ\mathsf{to}\circ\varphi_1\circ\mathsf{yesterday};\\ \lambda x_2.\mathbf{yest}(\mathbf{talked\text{-}to}(x_1)(x_2));\ \mathrm{S}\uparrow\mathrm{NP}\end{array}}\uparrow\mathrm{I}^2}{\begin{array}{l}\mathsf{someone}\circ\mathsf{talked}\circ\mathsf{to}\circ\varphi_1\circ\mathsf{yesterday};\\ \mathbf{\exists_{person}}(\lambda x_2.\mathbf{yest}(\mathbf{talked\text{-}to}(x_1)(x_2)));\ \mathrm{S}\end{array}}\uparrow\mathrm{E}}{\begin{array}{l}\lambda\varphi_1.\mathsf{someone}\circ\mathsf{talked}\circ\mathsf{to}\circ\varphi_1\circ\mathsf{yesterday};\\ \lambda x_1.\mathbf{\exists_{person}}(\lambda x_2.\mathbf{yest}(\mathbf{talked\text{-}to}(x_1)(x_2)));\ \mathrm{S}\uparrow\mathrm{NP}\end{array}}\uparrow\mathrm{I}^1}{\begin{array}{l}\mathsf{someone}\circ\mathsf{talked}\circ\mathsf{to}\circ\mathsf{everyone}\circ\mathsf{yesterday};\\ \mathbf{\forall_{person}}(\lambda x_1.\mathbf{\exists_{person}}(\lambda x_2.\mathbf{yest}(\mathbf{talked\text{-}to}(x_1)(x_2))));\ \mathrm{S}\end{array}}\uparrow\mathrm{E}$$

The scopal relation between multiple quantifiers depends on the order of application of the hypothetical reasoning involving $\uparrow$ to introduce quantifiers. We get the inverse scope reading in this derivation since the subject quantifier is combined with the sentence first.

This logical reconceptualization of covert movement originally due to Oehrle 1994—which can be extended straightforwardly to overt movement (cf. Muskens 2003; Mihaliček and Pollard 2012; Kubota and Levine 2014a)—captures the tight correlation between the semantic and prosodic effects of quantification transparently. Note in particular the way in which the scope-taking property of quantifiers is directly mediated by the logical properties of the quantifiers reflected in their syntactic categories, rather than by purpose-specific structure-changing operations as in quantifying-in and QR. This analysis of 'covert movement' has a number of empirical advantages as well. In particular, this approach enables

simple and formally explicit modelling of more complex types of scope-taking phenomena such as 'parasitic scope' (Barker 2007; Pollard and Smith 2012; Kubota and Levine to appear) and 'split scope' (Pollard 2014; Kubota and Levine 2016).

4.1.3 Hypothetical Reasoning for All Slashes: Hybrid Type-Logical Categorial Grammar

At this point, we extend our fragment once more, this time by adding the Introduction rules for the forward and backward slashes. This gives us the full Hybrid TLCG, complete with both the Introduction and Elimination rules for all three slashes $/$, $\backslash$ and $\uparrow$. The main motivation for extending the system with the Introduction rules for the directional (i.e. forward and backward) slashes comes from the analysis of coordination, in particular, cases of *nonconstituent coordination*, as we illustrate below.

The Slash Introduction rules for $/$ and $\backslash$ are formulated as follows:

(50) a. *Forward Slash Introduction*

$$\dfrac{\begin{array}{ccccc}\vdots & \vdots & \underline{[\varphi;\, x;\, A]^n} & \vdots & \vdots \\ \vdots & \vdots & & \vdots & \vdots\end{array}}{\dfrac{b \circ \varphi;\, \boldsymbol{\mathcal{F}};\, B}{b;\, \lambda x.\boldsymbol{\mathcal{F}};\, B/A}\,/\mathrm{I}^n}$$

b. *Backward Slash Introduction*

$$\dfrac{\begin{array}{ccccc}\vdots & \vdots & \underline{[\varphi;\, x;\, A]^n} & \vdots & \vdots \\ \vdots & \vdots & & \vdots & \vdots\end{array}}{\dfrac{\varphi \circ b;\, \boldsymbol{\mathcal{F}};\, B}{b;\, \lambda x.\boldsymbol{\mathcal{F}};\, A\backslash B}\,\backslash\mathrm{I}^n}$$

The difference between the Introduction rule for the vertical slash and the Introduction rules for the directional slashes is that, in the $/$I and $\backslash$I rules, the prosodic variable φ for the hypothesis (which is bound by the λ-operator in the $\uparrow$ rule) is simply thrown away in the output on the condition of its presence at the (either right or left) periphery of the phonology of the input. The position of the missing expression is instead recorded in the forward vs. backward slash distinction in the syntactic category.

With the Introduction rules for $/$ and $\backslash$, it becomes possible to reanalyze any substring of a sentence as a (derived) constituent. (52) shows how the string *John loves* in the Right-Node Raising (RNR) example in (51) is assigned the syntactic category S/NP.

(51) John loves, and Bill hates, Mary.

(52)

$$\dfrac{\textcircled{1}\rightarrow\ \dfrac{\textsf{john};\ \mathbf{j};\ \mathrm{NP} \qquad \dfrac{[\varphi;\ x;\ \mathrm{NP}]^1 \qquad \textsf{loves};\ \mathbf{love};\ (\mathrm{NP}\backslash\mathrm{S})/\mathrm{NP}}{\textsf{loves}\circ\varphi;\ \mathbf{love}(x);\ \mathrm{NP}\backslash\mathrm{S}}\ \backslash\mathrm{E}}{\textcircled{2}\rightarrow\ \textsf{john}\circ\textsf{loves}\circ\varphi;\ \mathbf{love}(x)(\mathbf{j});\ \mathrm{S}}\ /\mathrm{I}^1}{\textsf{john}\circ\textsf{loves};\ \lambda x.\mathbf{love}(x)(\mathbf{j});\ \mathrm{S}/\mathrm{NP}}\ /\mathrm{E}$$

Here, we see another instance of hypothetical reasoning, but one involving the forward slash / rather than the vertical slash ⫽. By hypothesizing a direct object NP, we first prove an S (①). Since the phonology of this hypothesis appears at the right periphery of this derived S, we can conclude that the whole expression is S/NP, that is, something that becomes a complete sentence *if* there is an NP to its right. The semantic effect of Slash Introduction is the same as with the vertical slash: the variable x corresponding to the hypothesis is bound by the λ-operator. Note that, in the notation of rules and derivations we adopt, the phonological term labelling, rather than the left-to-right order of the premises in the proof tree, is relevant for the applicability conditions of the /I and \I rules (see also Morrill 1994, which was the first to recast the Lambek calculus in this format). This point should be clear from the proof in (52), where we have deliberately placed the hypothetical object NP to the *left* of the verb in the proof tree to underscore this point.

In the CG analysis of RNR (Steedman 1985; Morrill 1994), non-standard constituents like the one derived in (52) are directly coordinated as constituents and then combined with the RNR'ed expression ($\sqcap$ designates *generalized conjunction* (Partee and Rooth 1983), recursively defined as $P \sqcap Q \equiv \lambda x.P(x) \sqcap Q(x)$, with the base case $P_t \sqcap Q_t \equiv P \wedge Q$).

(53)

$$\dfrac{\dfrac{\vdots\ \ \vdots \qquad \dfrac{\textsf{and};\ \lambda\mathcal{W}\lambda\mathcal{V}.\mathcal{V}\sqcap\mathcal{W};\ (X\backslash X)/X \qquad \vdots\ \ \vdots\ \ \textsf{bill}\circ\textsf{hates};\ \lambda x.\mathbf{hate}(x)(\mathbf{b});\ \mathrm{S}/\mathrm{NP}}{\textsf{and}\circ\textsf{bill}\circ\textsf{hates};\ \lambda\mathcal{V}.\mathcal{V}\sqcap\lambda x.\mathbf{hate}(x)(\mathbf{b});\ (\mathrm{S}/\mathrm{NP})\backslash(\mathrm{S}/\mathrm{NP})}\ /\mathrm{E}}{\textsf{john}\circ\textsf{loves};\ \lambda x.\mathbf{love}(x)(\mathbf{j});\ \mathrm{S}/\mathrm{NP} \qquad \textsf{john}\circ\textsf{loves}\circ\textsf{and}\circ\textsf{bill}\circ\textsf{hates};\ \lambda x.\mathbf{love}(x)(\mathbf{j})\sqcap\lambda x.\mathbf{hate}(x)(\mathbf{b});\ \mathrm{S}/\mathrm{NP}}\ \backslash\mathrm{E} \qquad \textsf{mary};\ \mathbf{m};\ \mathrm{NP}}{\textsf{john}\circ\textsf{loves}\circ\textsf{and}\circ\textsf{bill}\circ\textsf{hates}\circ\textsf{mary};\ \mathbf{love}(\mathbf{m})(\mathbf{j})\wedge\mathbf{hate}(\mathbf{m})(\mathbf{b});\ \mathrm{S}}\ /\mathrm{E}$$

Note that this analysis assigns the right meaning to the whole sentence compositionally.[15]

[15]This is by no means the whole story of RNR (see in particular Kubota and Levine 2015, to appear for a detailed analysis of the RNR/scope expression interaction). A reviewer notes that French allows for a certain type of mismatch between the left conjunct (one that is not immediately adjacent to the RNR'ed material)

This analysis of nonconstituent coordination extends immediately to argument cluster coordination exemplified by data such as (54). See Morrill 1994 and Kubota and Levine 2014a, 2015 for details (also Dowty 1988 for the original proposal in CCG).

(54) John gave a book to Bill and a record to Chris.

This completes our exposition of Hybrid TLCG. To summarize the discussion up to the point, hypothetical reasoning for the vertical slash roughly corresponds to the notion of movement,[16] whereas there is no direct analog within derivational approaches to hypothet-

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and the RNR'ed material, citing unpublished work by Anne Abeillé, Berthold Crysmann and Aoi Shiraishi (presented at CSSP 2015). This might be a case of closest conjunction agreement, which would likely involve not strictly grammatical factors. Another possibility is that the non-matching RNR is an instance of an ellipsis phenomenon (see in particular Chaves 2014 for an extensive survey arguing that the data that have been classified under the rubric of RNR do not constitute a unified class). Our approach treats ellipsis and sharing of a material in coordination by totally different mechanisms, and the type of 'agreement mismatch' exhibited by French RNR (where the RNR'ed material fails to satisfy the subcategorization requirement of some lexical head contained in a distant conjunct) is unproblematic if the relevant examples can be analyzed by an ellipsis mechanism. See footnote 25 for a discussion on a related point.

Another potential challenge for the CG analysis of RNR is so-called 'right-node wrapping' (Whitman 2009; Yatabe 2012; Chaves 2014; Warstadt 2015). Discussing this phenomenon goes far beyond the scope of the present paper, but there are at least two types of analyses of this construction developed in the CG literature (one involving surface reordering in 'multi-modal' TLCG (Whitman 2009; Kubota 2014b) and the other involving a wrapping-type operation in CCG (Warstadt 2015)), and, to our knowledge, no conclusive argument has been given in the literature against either of these proposals.

[16]There is, however, one important difference. Unlike traces, hypotheses in hypothetical reasoning are not representational objects. Thus, the present setup precludes a possibility of encoding the so-called 'island effects'—either syntactic islands or scope islands—as combinatoric constraints in the grammar. We believe that this is as it should be, but this is admittedly a controversial point. So far as syntactic islands are concerned, there is now considerable evidence in the literature that these constraints receive independent accounts via processing-oriented principles (Deane 1991; Kluender 1992, 1998; Kehler 2002; Hofmeister and Sag 2010). Whether semantic scope islands can be accounted for in terms of similar processing constraints is currently an open question. However, despite what appears to be the 'accepted wisdom' in the literature (cf., e.g., Ruys and Winter 2010), syntactic and semantic islands display a large degree of divergence (see, e.g., Kubota and Levine 2015 for some discussion on this point), suggesting that the common assumption that they both

ical reasoning for the forward and backward slashes in the present framework. The latter is what introduces the flexible notion of constituency common to many variants of CG. The central characteristic of Hybrid TLCG is that these two types of inference smoothly interact with one another. Kubota 2015 and Kubota and Levine 2015, 2016, to appear show how this architecture of grammar enables simple analyses of a number of recalcitrant problems at the syntax-semantics interface such as gapping and interactions between scopal operators (including quantifiers and symmetrical predicates) and nonconstituent coordination. In what follows, we show that this 'hybrid' architecture of the present framework also plays a crucial role in capturing the properties of pseudogapping: the flexible notion of constituency is essential in characterizing the 'nonstandard' syntactic constituents that serve as the antecedents of pseudogapping, and the order-insensitive mode of inference involving the vertical slash enables a simple formulation of the relevant anaphoric mechanism.

4.2 VP Ellipsis

Since we take pseudogapping to be a special case of VP ellipsis, we start with an analysis of VP ellipsis. In CG, auxiliary verbs are standardly analyzed as having the syntactic category VP/VP (where VP is an abbreviation for $\mathrm{NP}\backslash\mathrm{S}$), as in the following lexical entry for *can*:

(55) $\mathsf{can};\ \lambda Q\lambda x.\Diamond Q(x);\ \mathrm{VP}/\mathrm{VP}$

We take VP ellipsis to be licensed by an alternative sign for the auxiliary verb that does not subcategorize for a VP but instead anaphorically retrieves the relevant VP meaning in reference to the preceding discourse. For this purpose, we posit an empty operator that applies to the lexical sign of auxiliaries and saturates the VP argument slot of the latter. This 'VP ellipsis' operator is defined as in (56).

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should be accounted for in terms of the same type of combinatoric constraints is not as attractive as it may initially appear. We thus tentatively assume that the different patterns of island effects found in syntactic and semantic islands derive from the fact that syntactic and semantic processing pertain to different components of grammar and deal with somewhat different types of abstract representations of linguistic knowledge.

(56) **VP ellipsis operator, version 1**

$\lambda\varphi.\varphi;\ \lambda\mathscr{F}.\mathscr{F}(P);\ \mathrm{VP}\uparrow(\mathrm{VP}/\mathrm{VP})$

——where P is a free variable whose value is identified with the meaning of some linguistic sign in the preceding discourse with category VP

By applying (56) to (55), we obtain a derived auxiliary entry of category VP as in (57).

(57)
$$\frac{\begin{array}{ll}\lambda\varphi.\varphi; & \mathsf{can};\\ \lambda\mathscr{F}.\mathscr{F}(P);\ \mathrm{VP}\uparrow(\mathrm{VP}/\mathrm{VP}) & \lambda Q\lambda x.\Diamond Q(x);\ \mathrm{VP}/\mathrm{VP}\end{array}}{\mathsf{can};\ \lambda x.\Diamond P(x);\ \mathrm{VP}}\ \uparrow\mathrm{E}$$

Then, a simple VP ellipsis example (58) can be derived as (59) (here and below, the syntactic category of the expression that serves as an antecedent of VP ellipsis is shadowed).

(58) John can sing. Bill can't.

(59)
$$\dfrac{\mathsf{john};\ \mathbf{j};\ \mathrm{NP} \qquad \dfrac{\mathsf{can};\ \lambda P\lambda x.\Diamond P(x);\ \mathrm{VP}/\mathrm{VP} \qquad \mathsf{sing};\ \mathbf{sing};\ \mathrm{VP}}{\mathsf{can}\circ\mathsf{sing};\ \lambda x.\Diamond\mathbf{sing}(x);\ \mathrm{VP}}\ /\mathrm{E}}{\mathsf{john}\circ\mathsf{can}\circ\mathsf{sing};\ \Diamond\mathbf{sing}(\mathbf{j});\ \mathrm{S}}\ \backslash\mathrm{E}$$

$$\dfrac{\mathsf{bill};\ \mathbf{b};\ \mathrm{NP} \qquad \dfrac{\begin{array}{ll}\lambda\varphi.\varphi; & \mathsf{can't};\\ \lambda\mathscr{F}.\mathscr{F}(\mathbf{sing}); & \lambda P\lambda x.\neg\Diamond P(x);\\ \mathrm{VP}\uparrow(\mathrm{VP}/\mathrm{VP}) & \mathrm{VP}/\mathrm{VP}\end{array}}{\mathsf{can't};\ \lambda x.\neg\Diamond\mathbf{sing}(x);\ \mathrm{VP}}\ \uparrow\mathrm{E}}{\mathsf{bill}\circ\mathsf{can't};\ \neg\Diamond\mathbf{sing}(\mathbf{b});\ \mathrm{S}}\ \backslash\mathrm{E}$$

Note that, since the operator directly applies to the auxiliary to modify its subcategorization property, there is no phonologically empty verb involved.

At this point, some comments are in order as to our choice of an analysis involving an empty syntactic operator. There are at least three alternatives to this approach: (i) a binding-based analysis in which a hypothetical VP is bound by an antecedent VP via a syntactic mechanism of variable binding (Morrill, Valentín, and Fadda 2011; Barker 2013); (ii) an analysis that posits an empty VP (this would correspond most closely to a deletion-based analysis in derivational approaches); and (iii) one that posits an alternative auxiliary entry (identical to the output of our syntactic empty operator) in the lexicon (Jäger 2005).

We find these three alternatives less than optimal. The binding approach does not extend to intersentential anaphora easily; especially problematic are cases where VP ellipsis takes place across speakers. The present approach is superior to an empty VP approach in that it can capture the generalization straightforwardly that auxiliaries (including the 'infinitive

marker' *to*) are the triggers of VP ellipsis.[17] We believe that our approach is superior to a lexical approach along the lines of the third alternative in straightforwardly generalizing to the pseudogapping case (see below). It is not clear whether a purely lexical approach like Jäger's (2005) can offer a general characterization of the set of alternative entries for the auxiliary necessary to license pseudogapping.

Interactions between VP ellipsis and other phenomena such as quantifier scope and the strict/sloppy ambiguity of pronouns can be handled in essentially the same way as in previous analyses of VP ellipsis in TLCG (Morrill and Merenciano 1996; Jäger 2005). (61) shows the sloppy reading of (60a) and (62) shows the *every* > *before* reading of (60b).

(60) a. John thinks he is a genius. Bill does, too.

b. John read every book before Bill did.

(61)

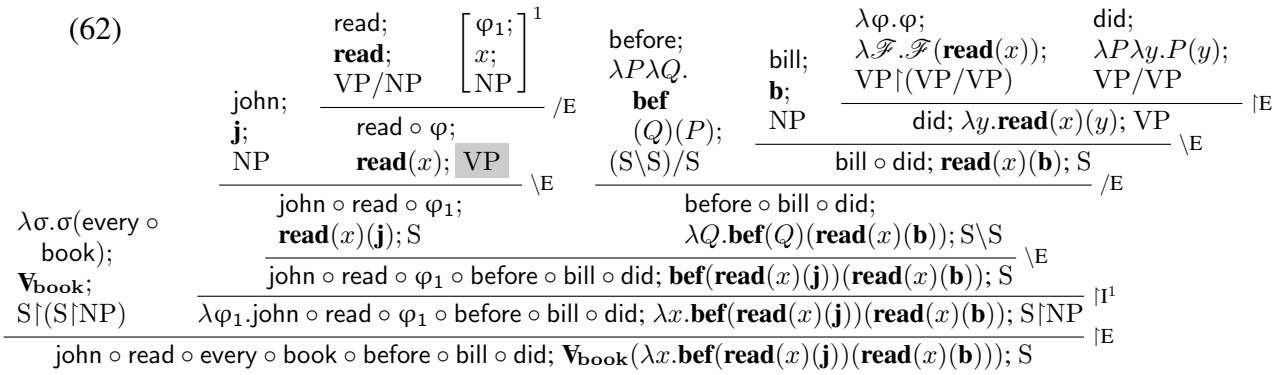
$$\dfrac{\mathsf{john};\ \mathbf{j};\ \mathrm{NP} \qquad \dfrac{\lambda\sigma.\sigma(\mathsf{he});\ \lambda R\lambda x.R(x)(x);\ \mathrm{VP}\uparrow(\mathrm{VP}\uparrow\mathrm{NP}) \qquad \dfrac{\dfrac{\mathsf{thinks};\ \mathbf{think};\ \mathrm{VP/S} \qquad \dfrac{[\varphi_1; x; \mathrm{NP}]^1 \quad \mathsf{is}\circ\mathsf{a}\circ\mathsf{genius};\ \mathbf{is\text{-}a\text{-}gens};\ \mathrm{VP}}{\varphi_1\circ\mathsf{is}\circ\mathsf{a}\circ\mathsf{genius};\ \mathbf{is\text{-}a\text{-}gens}(x);\ \mathrm{S}}\ \backslash\mathrm{E}}{\mathsf{thinks}\circ\varphi_1\circ\mathsf{is}\circ\mathsf{a}\circ\mathsf{genius};\ \mathbf{think}(\mathbf{is\text{-}a\text{-}gens}(x));\ \mathrm{VP}}\ /\mathrm{E}}{\lambda\varphi_1.\mathsf{thinks}\circ\varphi_1\circ\mathsf{is}\circ\mathsf{a}\circ\mathsf{genius};\ \lambda x.\mathbf{think}(\mathbf{is\text{-}a\text{-}gens}(x));\ \mathrm{VP}\uparrow\mathrm{NP}}\ \uparrow\mathrm{I}^1}{\mathsf{thinks}\circ\mathsf{he}\circ\mathsf{is}\circ\mathsf{a}\circ\mathsf{genius};\ \lambda x.\mathbf{think}(\mathbf{is\text{-}a\text{-}gens}(x))(x);\ \mathrm{VP}}\ \uparrow\mathrm{E}}{\mathsf{john}\circ\mathsf{thinks}\circ\mathsf{he}\circ\mathsf{is}\circ\mathsf{a}\circ\mathsf{genius};\ \mathbf{think}(\mathbf{is\text{-}a\text{-}gens}(\mathbf{j}))(\mathbf{j});\ \mathrm{S}}\ \backslash\mathrm{E}$$

$$\dfrac{\mathsf{bill};\ \mathbf{b};\ \mathrm{NP} \qquad \dfrac{\lambda\varphi.\varphi;\ \lambda\mathscr{F}.\mathscr{F}(\lambda x.\mathbf{think}(\mathbf{is\text{-}a\text{-}gens}(x))(x));\ \mathrm{VP}\uparrow(\mathrm{VP/VP}) \quad \mathsf{does};\ \lambda P.P;\ \mathrm{VP/VP}}{\mathsf{does};\ \lambda x.\mathbf{think}(\mathbf{is\text{-}a\text{-}gens}(x))(x);\ \mathrm{VP}}\ \uparrow\mathrm{E}}{\mathsf{bill}\circ\mathsf{does};\ \mathbf{think}(\mathbf{is\text{-}a\text{-}gens}(\mathbf{b}))(\mathbf{b});\ \mathrm{S}}\ \backslash\mathrm{E}$$

We assume the so-called 'binding at VP' analysis of pronouns in (61) (cf. Bach and Partee 1980, 1984). In this analysis, after the binding of the pronoun to the subject NP, the right meaning (self-ascription of the property of being a genius) is assigned to the VP, which the VP ellipsis operator can then take as the antecedent.

[17] Note in this connection that (56) involves a simplification in this respect, since, as it stands, the VP ellipsis operator can combine with any $\mathrm{VP/VP}$. In a more complete account, auxiliaries need to be distinguished from VP adverbs. A well-established approach in lexicalist theories (such as HPSG and CCG) is to introduce syntactic features to classify different types of VPs (for example, the auxiliary *have* will be specified as $\mathrm{VP}_{bse}/\mathrm{VP}_{pst}$, a verb taking a past participle and returns a base form VP). Once this modification is made, we can refine the syntactic category of the VP ellipsis operator so that they take as an argument $\mathrm{VP}_\alpha/\mathrm{VP}_\beta$ where $\alpha \neq \beta$ (which suffices to distinguish auxiliaries from adverbs).

(62)



In the quantifier-scope interaction case in (62), the VP ellipsis operator takes the VP in the antecedent clause containing a free variable x (to be later bound by the universal quantifier) as the antecedent. The quantifier scopes over the whole sentence after this anaphora resolution takes place, and binds the variable x in both the antecedent and ellipsis clauses.

4.3 Pseudogapping

We analyze pseudogapping in (63) via transitive verb ($\mathrm{TV} = (\mathrm{NP}\backslash\mathrm{S})/\mathrm{NP}$) ellipsis (Jacobson (2014) independently arrives at the same conclusion).

(63) John should eat the banana. Bill should ~~eat~~ the apple.

In the present setup, this involves making only a very minimum extra assumption. In fact, the only thing we need to do is to make the VP ellipsis operator in (56) polymorphic. Polymorphism is a standard technique for generalizing the lexical definitions of semantic operators independently needed in the grammar, in the analysis of coordination and certain adverbial operators (cf. the 'cross-categorial' analysis of focus particles by Rooth (1985)).

There is moreover independent evidence that English allows for TV ellipsis. Jacobson (1992, 2008) argues that antecedent-contained deletion (ACD) is to be analyzed in terms of TV ellipsis rather than VP ellipsis. The idea is that in (64), what is missing after *had* is just the transitive verb *showed* instead of a full VP.[18]

[18] Pseudogapping and ACD are sometimes thought to display different distributions. For example, Jacobson (1998:80) reports the following contrast (her (17), judgment hers):

(i) a. John thought that Mary read everything that Bill (also) did (= think that Mary read).

(64) John showed Bill every place that Harry already had.

We refer the reader to Jacobson's work for a detailed empirical justification and technical execution of this analysis of ACD (see also Jäger 2005 for a TLCG implementation of Jacobson's analysis), but one big advantage should be immediately obvious: in this analysis, the notorious problem of 'infinite regress' simply does not arise, since a VP containing a trace is not reconstructed in the ellipsis site to begin with.

Since pseudogapping is not restricted to transitive verbs but can involve ditransitive verbs, etc., we make the VP ellipsis operator polymorphic, employing Steedman's (2000b) \$-notation for polymorphic lexical entries.

(65) **VP ellipsis/pseudogapping operator, version 2**

$\lambda\varphi.\varphi;\ \lambda\mathscr{F}.\mathscr{F}(P);\ (\mathrm{VP}/\$)\backslash((\mathrm{VP}/\$)/(\mathrm{VP}/\$))$

---

b. *John thought that Mary read *Crime and Punishment* and Bill did *The Brothers Karamazov* (= think that Mary read).

But note that the structure in (ib) improves considerably in an example like the following:

(ii) John would claim Bill is a SPY more confidently than I would a SABOTEUR.

We think that the unacceptability of (ib) is not due to a combinatoric constraint but rather derives from the requirement that the elided material corresponds to some 'coherent semantic unit' so as to support the Contrast relation between the two clauses. (The notion of 'coherent semantic unit' here is admittedly vague. The pragmatic conditions affecting the felicity of pseudogapping seems particularly complex. See section 4.6 for some relevant discussion.) ACD is not so constrained presumably become the object is shared in the two clauses and hence the construction is not associated with the Contrast discourse relation.

Similarly, Lasnik (1999:169) reports contrasts like (iii), arguing that pseudogapping is limited to direct objects but ACD is not.

(iii) a. John stood near everyone Bill did.

b. *John stood near Bill and Mary should Susan.

Again, the alleged restriction on pseudogapping is dubious at best. Miller (2014) reports attested examples analogous in structure to (iiib), such as (22) from section 2.

Finally, one might worry about the so-called 'Kennedy's puzzle' (Kennedy 1994/2008) in ACD. See Jacobson (2009) for a non-representational account of this phenomenon.

——where P is a free variable whose value is identified with the meaning of some linguistic sign in the preceding discourse with category $\mathrm{VP}/\$$

$\mathrm{VP}/\$$ is a metavariable notation for a set of categories where any number of arguments (of any category) are sought via / (VP, VP/NP, $\mathrm{VP}/\mathrm{NP}/\mathrm{PP}$, etc.). The three occurrences of $\mathrm{VP}/\$$ are to be instantiated in the same way. The key idea behind this extension is that the ellipsis operator is generalized to apply to any syntactic category that the auxiliary itself can be derived in (as will become clear momentarily). Thus, thought the schema in (65) itself needs to be stipulated, it embodies a natural extension of the simpler version in (56).

The TV/TV (= $(\mathrm{VP}/\mathrm{VP})/(\mathrm{VP}/\mathrm{VP})$) entry of the auxiliary that this operator applies to in the analysis of (63) can be derivable from the lexically assigned VP/VP entry, and does not need to be posited separately. This is an instance of the Geach rule, which is a theorem in the Lambek calculus and TLCG (as long as the calculus is associative).

(66)
$$\dfrac{\dfrac{\dfrac{\mathsf{should};\ \lambda P\lambda y.\Box P(y);\ \mathrm{VP}/\mathrm{VP} \qquad \dfrac{[\varphi_2;\ f;\ \mathrm{TV}]^2 \quad [\varphi_3;\ x;\ \mathrm{NP}]^3}{\varphi_2 \circ \varphi_3;\ f(x);\ \mathrm{VP}}\ /\mathrm{E}}{\mathsf{should} \circ \varphi_2 \circ \varphi_3;\ \lambda y.\Box f(x)(y);\ \mathrm{VP}}\ /\mathrm{E}}{\mathsf{should} \circ \varphi_2;\ \lambda x\lambda y.\Box f(x)(y);\ \mathrm{TV}}\ /\mathrm{I}^3}{\mathsf{should};\ \lambda f\lambda x\lambda y.\Box f(x)(y);\ \mathrm{TV}/\mathrm{TV}}\ /\mathrm{I}^2$$

The analysis of a basic pseudogapping example like (63) is then straightforward.

(67)
$$\dfrac{\mathsf{john};\ \mathbf{j};\ \mathrm{NP} \qquad \dfrac{\mathsf{should};\ \lambda P\lambda x.\ \Box P(x);\ \mathrm{VP}/\mathrm{VP} \qquad \dfrac{\mathsf{eat};\ \mathbf{eat};\ \mathrm{TV} \qquad \mathsf{the} \circ \mathsf{banana};\ \mathbf{the\text{-}b};\ \mathrm{NP}}{\mathsf{eat} \circ \mathsf{the} \circ \mathsf{banana};\ \mathbf{eat}(\mathbf{the\text{-}b});\ \mathrm{VP}}\ /\mathrm{E}}{\mathsf{should} \circ \mathsf{eat} \circ \mathsf{the} \circ \mathsf{banana};\ \lambda x.\Box\mathbf{eat}(\mathbf{the\text{-}b})(x);\ \mathrm{VP}}\ /\mathrm{E}}{\mathsf{john} \circ \mathsf{should} \circ \mathsf{eat} \circ \mathsf{the} \circ \mathsf{banana};\ \Box\mathbf{eat}(\mathbf{the\text{-}b})(\mathbf{j});\ \mathrm{S}}\ \backslash\mathrm{E}$$

$$\dfrac{\mathsf{bill};\ \mathbf{b};\ \mathrm{NP} \qquad \dfrac{\dfrac{\lambda\varphi.\varphi;\ \lambda\mathscr{F}.\mathscr{F}(\mathbf{eat});\ \mathrm{TV}\uparrow(\mathrm{TV}/\mathrm{TV}) \qquad \dfrac{\vdots \quad \vdots}{\mathsf{should};\ \lambda f\lambda x\lambda y.\ \Box f(x)(y);\ \mathrm{TV}/\mathrm{TV}}}{\mathsf{should};\ \lambda x\lambda y.\Box\mathbf{eat}(x)(y);\ \mathrm{TV}}\ /\mathrm{E} \qquad \dfrac{\mathsf{the} \circ \mathsf{apple};\ \mathbf{the\text{-}a};\ \mathrm{NP}}{\mathsf{should} \circ \mathsf{the} \circ \mathsf{apple};\ \lambda y.\Box\mathbf{eat}(\mathbf{the\text{-}a})(y);\ \mathrm{VP}}\ /\mathrm{E}}{\mathsf{bill} \circ \mathsf{should} \circ \mathsf{the} \circ \mathsf{apple};\ \Box\mathbf{eat}(\mathbf{the\text{-}a})(\mathbf{b});\ \mathrm{S}}\ \backslash\mathrm{E}$$

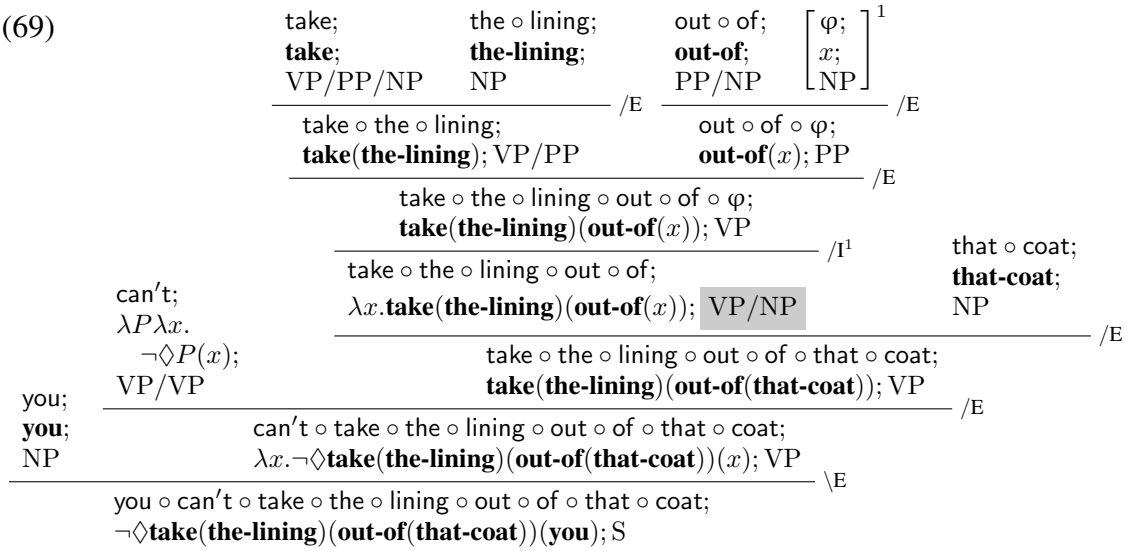
Here, the auxiliary is in the derived TV/TV category. The VP ellipsis/pseudogapping operator in (65) takes this auxiliary category as an argument and saturates its TV argument by anaphorically referring to the transitive verb *eat* in the antecedent clause.

As discussed in section 2, the 'deleted' material in pseudogapping does not necessarily correspond to a syntactic constituent in the traditional sense. The present approach straight-

forwardly handles such cases of 'nonconstituent' pseudogapping (like those in (11)), by treating the 'nonconstituent' strings in the preceding clause as syntactic constituents that can serve as antecedents in pseudogapping. We illustrate in (69) the derivation for (the antecedent clause of) (68) (= (11a)).

(68) You can't **take the lining out of** that coat. You can ∅ this one.

(69)



Via hypothetical reasoning involving directional slashes, the string *take the lining out of* is derived as a syntactic constituent of category VP/NP. This can then be identified as the antecedent of the relevant anaphoric process in the target clause. Examples like those in (11) are especially important in that they show the significance of the flexible notion of constituency available in CG in an empirical domain other than coordination.[19] Note that these nonconstituent pseudogapping examples pose significant problems for many previous transformational accounts since deriving these examples via movement+ellipsis entails positing various otherwise unmotivated movement operations.

[19]In a CG-based analysis, a similarly straightforward characterization is possible for the 'deleted' material in gapping, too, in examples like the following (Steedman 1990), which are similarly problematic for movement-based approaches (see Kubota and Levine 2016):

(i) John **wants to try to begin to write** a novel, and Mary ∅ a play.

As discussed in the previous section, pseudogapping with multiple remnants like the following are also highly problematic for movement-based approaches:

(70) a. I won't introduce THOSE GIRLS to my SISTER, but I WOULD these boys to my BROTHER.

b. I bet more money with JOHN that the game would go into OVERTIME than I did with MARY that the final score would be a TIE.

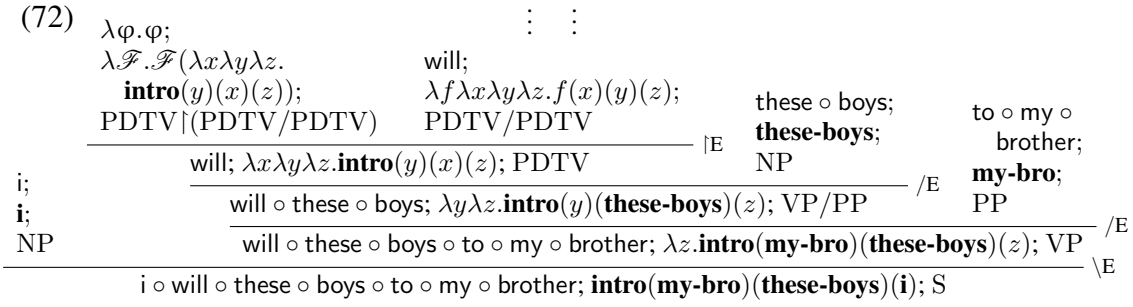
Multiple remnant pseudogapping is straightforward in our approach. The key point is that the following $\mathrm{PDTV}/\mathrm{PDTV}$ (where PDTV = $\mathrm{VP}/\mathrm{PP}/\mathrm{NP}$) version of the auxiliary can be derived from the lexically specified VP/VP entry via Geach:

(71) will; $\lambda f \lambda x \lambda y \lambda z.f(x)(y)(z)$; $\mathrm{PDTV}/\mathrm{PDTV}$

Since the derivation is parallel to the one for the TV/TV entry above (hypothesizing a PDTV, NP and PP to the right of the auxiliary and withdrawing these hypotheses one by one after combining them with the auxiliary), we omit it here.

Since the VP ellipsis/pseudogapping operator is polymorphic, it can take this derived auxiliary verb as an argument and anaphorically saturate the missing PDTV argument position, in the same way as in the simpler examples above. Here, we show only the derivation for the target clause of pseudogapping. The VP ellipsis/pseudogapping operator makes reference to the ditransitive verb in the antecedent clause with category PDTV and semantics **introduce** (here we ignore the tense meaning of the auxiliary *will*).

(72)



The present analysis also correctly predicts the interactions between pseudogapping and strict/sloppy readings and quantifier scope in examples like the following:

(73) a. John forwarded HIS address to Ann before BILL did to SUE.

b. John read every book to MARY before Bill did to SUE.

We omit the derivations, which are parallel to the VP ellipsis case above in (61) and (62).

Since in CG the combinatorial properties of linguistic expressions (including those corresponding to non-traditional constituents) are represented explicitly in their syntactic categories, our approach overcomes the major problem for previous nontransformational approaches as well. Recall from section 3.2 that Miller's (1990) interpretive approach has difficulties in explaining the ungrammaticality of preposition mismatch examples like (74).

(74) *John spoke to Mary more often than he did for Anne.

Our approach rules out this type of example straightforwardly. In the antecedent clause, we have an instance of the verb *speak* that subcategorizes for a *to* PP (of syntactic category $\mathrm{VP}/\mathrm{PP}_{to}$). But in the target clause, we need to recover the meaning of *speak* associated with a different subcategorization frame $\mathrm{VP}/\mathrm{PP}_{for}$. Because of the syntactic category mismatch, the relevant anaphoric mechanism fails and hence (74) is correctly blocked.

Interestingly, the present proposal can also correctly capture cases of tolerated category mismatch, exemplified by data such as (75) (= (15)).

(75) Ask Doll, who spoke as much about his schoolboy career ending as he did of the season in general.

Miller (2014) makes an important observation that (75) is licensed despite the preposition mismatch because of the closeness of the lexical meaning of the verb in the different subcategorization frames. This condition is not satisfied in the minimally different (74), resulting in the degraded status of the latter.

To see how the contrast in (74) vs. (75) can be accounted for in the present approach, note first that exactly the same contrast is found in unlike category coordination (UCC).

(76) a. Robin spoke about the War and of similar horrible events.

b. *John didn't speak to Mary or for Susan at the meeting.

This contrast motivates assigning the category $\mathrm{VP}/\mathrm{PP}_{\textit{of}} \wedge \mathrm{VP}/\mathrm{PP}_{\textit{about}}$ involving the 'meet' connective to the verb *speak*, following the general analysis of UCC by Morrill (1994) and Bayer (1996) (see also Kubota and Levine 2013). We assume that $/$ and $\backslash$ associate more strongly than $\wedge$; thus, $\mathrm{VP}/\mathrm{PP}_{\textit{of}} \wedge \mathrm{VP}/\mathrm{PP}_{\textit{about}}$ is an abbreviation for $(\mathrm{VP}/\mathrm{PP}_{\textit{of}}) \wedge (\mathrm{VP}/\mathrm{PP}_{\textit{about}})$. In (77), the two (related yet distinct) meanings of *speak* associated with different subcategorization frames are represented separately in the form of a tuple.[20]

(77) $\mathsf{speak};\ \langle \textbf{speak-about}, \textbf{speak-of} \rangle;\ \mathrm{VP}/\mathrm{PP}_{\textit{about}} \wedge \mathrm{VP}/\mathrm{PP}_{\textit{of}}$

With this lexical assignment and the *Meet Elimination* rules in (78) (where π_1 and π_2 are the standard projection functions such that $\pi_1(\langle \alpha, \beta \rangle) = \alpha$ and $\pi_2(\langle \alpha, \beta \rangle) = \beta$), the analysis for (76a) is straightforward as in (79).

(78) a. *Left Meet Elimination*

$$\frac{\mathsf{a};\ \boldsymbol{\mathcal{F}};\ A \wedge B}{\mathsf{a};\ \pi_1(\boldsymbol{\mathcal{F}});\ A}\ \wedge\mathrm{E}_l$$

b. *Right Meet Elimination*

$$\frac{\mathsf{a};\ \boldsymbol{\mathcal{F}};\ A \wedge B}{\mathsf{a};\ \pi_2(\boldsymbol{\mathcal{F}});\ B}\ \wedge\mathrm{E}_r$$

(79)

$$\dfrac{\dfrac{\dfrac{[\varphi;\ F;\ \mathrm{VP}/\mathrm{PP}_{\textit{about}} \wedge \mathrm{VP}/\mathrm{PP}_{\textit{of}}]^1}{\varphi;\ \pi_1(F);\ \mathrm{VP}/\mathrm{PP}_{\textit{about}}}\ \wedge\mathrm{E}_l \quad \mathsf{about} \circ \mathsf{the} \circ \mathsf{war};\ \mathbf{w};\ \mathrm{PP}_{\textit{about}}}{\varphi \circ \mathsf{about} \circ \mathsf{the} \circ \mathsf{war};\ \pi_1(F)(\mathbf{w});\ \mathrm{VP}}\ /\mathrm{E}}{\mathsf{about} \circ \mathsf{the} \circ \mathsf{war};\ \lambda F.\pi_1(F)(\mathbf{w});\ (\mathrm{VP}/\mathrm{PP}_{\textit{about}} \wedge \mathrm{VP}/\mathrm{PP}_{\textit{of}})\backslash\mathrm{VP}}\ \backslash\mathrm{I}^1$$

$$\dfrac{\mathsf{robin};\ \mathbf{r};\ \mathrm{NP} \qquad \dfrac{\mathsf{spoke};\ \langle \textbf{spoke-about}, \textbf{spoke-of} \rangle;\ \mathrm{VP}/\mathrm{PP}_{\textit{about}} \wedge \mathrm{VP}/\mathrm{PP}_{\textit{of}} \qquad \begin{array}{c}\vdots\quad\vdots\\ \mathsf{about} \circ \mathsf{the} \circ \mathsf{war} \circ \mathsf{and} \circ \mathsf{of} \circ \mathsf{similar} \circ \mathsf{events};\\ \lambda F.\pi_1(F)(\mathbf{w}) \sqcap \lambda F.\pi_2(F)(\textbf{s-ev});\ (\mathrm{VP}/\mathrm{PP}_{\textit{about}} \wedge \mathrm{VP}/\mathrm{PP}_{\textit{of}})\backslash\mathrm{VP}\end{array}}{\mathsf{spoke} \circ \mathsf{about} \circ \mathsf{the} \circ \mathsf{war} \circ \mathsf{and} \circ \mathsf{of} \circ \mathsf{similar} \circ \mathsf{events};\ \textbf{spoke-about}(\mathbf{w}) \sqcap \textbf{spoke-of}(\textbf{s-ev});\ \mathrm{VP}}\ \backslash\mathrm{E}}{\mathsf{robin} \circ \mathsf{spoke} \circ \mathsf{about} \circ \mathsf{the} \circ \mathsf{war} \circ \mathsf{and} \circ \mathsf{of} \circ \mathsf{similar} \circ \mathsf{events};\ \textbf{spoke-about}(\mathbf{w})(\mathbf{r}) \wedge \textbf{spoke-of}(\textbf{s-ev})(\mathbf{r});\ \mathrm{S}}\ \backslash\mathrm{E}$$

[20] This corresponds to 'semantically potent' meet in Bayer 1996. Bayer rejects this type of lexical entry by claiming that admitting them would incorrectly overgenerate violations of Zaenen and Karttunen's (1984) Anti-Pun Ordinance (**I can tuna and get a job*). We don't find this argument convincing. By assuming that lexical entries involving meet are restricted to ones in which the two meanings listed together in a single entry are related (as in (77) and (82)), and by ensuring that meet cannot be syntactically introduced, the Anti-Pun Ordinance can be maintained while still admitting semantically potent meet.

The contrast in (76) then follows from the assumption that *speak* with a *for* PP complement is simply listed as a separate entry in the lexicon. We take it that the 'closeness' of meaning that Miller (2014) alludes to governs which subcategorization frames can be 'packaged' into a single lexical entry involving the meet connective for any given verb.

The parallel contrast between (74) and (75) in the pseudogapping case follows from the same assumption. The preposition-mismatch pseudogapping apparently violating connectivity is licensed in the present analysis without any extra machinery, except that the anaphoric retrieval mechanism is a bit more involved in this case. We assume that the VP ellipsis/pseudogapping operator can access either of the two category-meaning pairs stored in a linguistic sign involving the meet connective such as (77). With this assumption, the derivation for (75) is straightforward, as in (80).

(80)

$$\dfrac{\text{robin; } \mathbf{r}; \text{ NP} \qquad \dfrac{\text{has; } \lambda P.P; \text{ VP/VP} \qquad \dfrac{\dfrac{\text{spoken; } \langle \textbf{speak-about}, \textbf{speak-of} \rangle; \text{ VP/PP}_{about} \wedge \text{VP/PP}_{of}}{\text{spoken; } \textbf{speak-about}; \text{ VP/PP}_{about}} \wedge\text{E}_l \qquad \text{about} \circ \text{the} \circ \text{war; } \mathbf{w}; \text{ PP}_{about}}{\text{spoken} \circ \text{about} \circ \text{the} \circ \text{war; } \textbf{speak-about}(\mathbf{w}); \text{ VP}} /\text{E}}{\text{has} \circ \text{spoken} \circ \text{about} \circ \text{the} \circ \text{war; } \textbf{speak-about}(\mathbf{w}); \text{ VP}} /\text{E}}{\text{robin} \circ \text{has} \circ \text{spoken} \circ \text{about} \circ \text{the} \circ \text{war; } \textbf{speak-about}(\mathbf{w})(\mathbf{r}); \text{ S}} \backslash\text{E}$$

$$\dfrac{\text{leslie; } \mathbf{l}; \text{ NP} \qquad \dfrac{\dfrac{\lambda\varphi.\varphi; \; \lambda\mathscr{F}.\mathscr{F}(\textbf{speak-of}); \; (\text{VP/PP}_{of})\uparrow((\text{VP/PP}_{of})/(\text{VP/PP}_{of})) \qquad \text{has; } \lambda f\lambda x\lambda y.f(x)(y); \; (\text{VP/PP}_{of})/(\text{VP/PP}_{of})}{\text{has; } \lambda x\lambda y.\textbf{speak-of}(x)(y); \text{ VP/PP}_{of}} \uparrow\text{E} \qquad \text{of} \circ \text{similar} \circ \text{events; } \textbf{s-ev}; \text{ PP}_{of}}{\text{has} \circ \text{of} \circ \text{similar} \circ \text{events; } \lambda y.\textbf{speak-of}(\textbf{s-ev})(y); \text{ VP}} /\text{E}}{\text{leslie} \circ \text{has} \circ \text{of} \circ \text{similar} \circ \text{events; } \textbf{speak-of}(\textbf{s-ev})(y)(\mathbf{l}); \text{ S}} \backslash\text{E}$$

The ungrammaticality of (74) still follows, since the meaning of *speak* associated with the different lexical entry with syntactic category VP/PP_{for} cannot be anaphorically retrieved from an occurrence of the $\text{VP/PP}_{of} \wedge \text{VP/PP}_{about}$ entry in the antecedent.

Furthermore, the following related example noted by Miller (1990), in which a ditransitive verb instantiates different subcategorization frames (V NP NP vs. V NP PP) in the antecedent and the pseudogapping clauses, can be analyzed in essentially the same way (see Kubota and Levine 2014b for a complete derivation):

(81) I will give Mary my books if YOU will ∅ your records to Ann.

The key assumption is the following entry for the ditransitive verb *give* involving the meet connective (which again is motivated by the pattern in UCC (Kubota and Levine 2013)):

(82) give; $\langle \lambda x \lambda y \lambda z.\mathbf{give}(x)(y)(z), \lambda y \lambda x \lambda z.\mathbf{give}(x)(y)(z) \rangle$; $(\mathrm{VP/PP/NP}) \wedge (\mathrm{VP/NP/NP})$

We take voice-mismatch examples such as (83) (= (14)) to be licensed in a similar way.

(83) $^{\%}$MY problem will be investigated by Tom, but he won't YOURS.

Though the active/passive alternation is different from the argument structure alternation involving ditransitive verbs in that a morphological marking is involved (thus, the meet connective would be of no use here), there is an obvious similarity between examples like (81) and voice-mismatch examples involving the active form in the antecedent clause licensing a passive pseudogapped verb or vice versa. The key in both cases is lexical relatedness and the mutual entailment of the two related meanings.[21] Following the standard assumption in the nontransformational literature (cf. Bresnan 1982; Pollard and Sag 1994), we take passivization to be a lexical operation. Since the argument structure and the morphological form are different, the passive form of a verb is listed in the lexicon as a distinct entry separate from the active form. However, they are related to each other via some explicit lexical operation (one standard way of formalizing this is in terms of lexical rules), and the active and the passive forms have identical meanings in terms of their truth conditional entailments. It is then not unreasonable to assume that the pseudogapping operator can have access to the lexical entry of the passive form from the occurrence of the active form in the preceding clause and vice versa, due to this close relation between the lexical entries for the active and passive forms in the lexicon. Thus, the voice-mismatch examples like (83) do not pose problems for the present approach.

[21] We'd like to thank an anonymous reviewer for reminding us that mutual entailment is also a crucial factor. For example, the conative alternation is treated (under certain theories) via a lexical rule, but **He kicked Bill more than he did at John* does not seem to be as acceptable as (83).

Before moving on to more complex examples involving discontinuity, we'd like to discuss how the interaction between pseudogapping and gapping discussed at the end of section 3.1 (and identified there as being problematic for transformational analyses) can be dealt with in the present approach.

Unlike movement-based approaches, the present approach properly handles the gapping/pseudogapping interaction in (38), reproduced in a slightly modified form in (84) (involving coordination rather than a comparative structure).

(84) I can eat ice cream and John can pizza or Mary tacos.

The only difference between this and simpler examples of gapping like (85) is that the verb *eat* is missing from the first conjunct of gapping conjunction due to pseudogapping in (84).

(85) John can eat pizza or Mary tacos.

Thus, the same proof for (85) works for (84) except for this extra complication. In Kubota and Levine's (2016) analysis (see their Appendix 2.2), the following sign is derivable:

(86) $\lambda\varphi_1.\mathsf{john} \circ \varphi_1 \circ \mathsf{pizza} \circ \mathsf{or} \circ \mathsf{mary} \circ \mathsf{tacos};\ \lambda P.P(\mathbf{p})(\mathbf{j}) \sqcup \lambda Q.Q(\mathbf{t})(\mathbf{m});\ \mathrm{S}\restriction(\mathrm{VP}/\mathrm{NP})$

The rest of the derivation merely involves replacing the actual transitive verb *eat* with the pseudogapping operator supplying the meaning of this transitive verb for the auxiliary via anaphoric reference to the preceding clause.

(87)

$$\dfrac{\dfrac{\mathsf{can};\ \lambda P\lambda x.\ \Diamond P(x);\ \mathrm{VP}/\mathrm{VP} \qquad \dfrac{\dfrac{\lambda\varphi.\varphi;\ \lambda\mathscr{F}.\mathscr{F}(\mathbf{eat});\ \mathrm{TV}\restriction(\mathrm{TV}/\mathrm{TV}) \qquad \dfrac{\dfrac{[\varphi;\ P;\ \mathrm{VP}/\mathrm{VP}]^1}{\vdots}}{\varphi;\ \lambda f\lambda x.P(f(x));\ \mathrm{TV}/\mathrm{TV}}}{\varphi;\ \lambda x.P(\mathbf{eat}(x));\ \mathrm{TV}}\restriction\mathrm{E} \qquad \begin{bmatrix}\varphi_2;\\ x;\\ \mathrm{NP}\end{bmatrix}^2}{\varphi \circ \varphi_2;\ P(\mathbf{eat}(x));\ \mathrm{VP}}/\mathrm{E}}{\varphi;\ \lambda x.P(\mathbf{eat}(x));\ \mathrm{VP}/\mathrm{NP}}/\mathrm{I}^2 \qquad \dfrac{\vdots}{\lambda\varphi_1.\mathsf{john} \circ \varphi_1 \circ \mathsf{pizza} \circ \mathsf{or} \circ \mathsf{mary} \circ \mathsf{tacos};\ \lambda P.P(\mathbf{p})(\mathbf{j}) \sqcup \lambda Q.Q(\mathbf{t})(\mathbf{m});\ \mathrm{S}\restriction(\mathrm{VP}/\mathrm{NP})}}{\mathsf{john} \circ \varphi \circ \mathsf{pizza} \circ \mathsf{or} \circ \mathsf{mary} \circ \mathsf{tacos};\ P(\mathbf{eat}(\mathbf{p}))(\mathbf{j}) \vee P(\mathbf{eat}(\mathbf{t}))(\mathbf{m});\ \mathrm{S}}\restriction\mathrm{E}}{\lambda\varphi.\mathsf{john} \circ \varphi \circ \mathsf{pizza} \circ \mathsf{or} \circ \mathsf{mary} \circ \mathsf{tacos};\ \lambda P.P(\mathbf{eat}(\mathbf{p}))(\mathbf{j}) \vee P(\mathbf{eat}(\mathbf{t}))(\mathbf{m});\ \mathrm{S}\restriction(\mathrm{VP}/\mathrm{VP})}\restriction\mathrm{I}^1}{\mathsf{john} \circ \mathsf{can} \circ \mathsf{pizza} \circ \mathsf{or} \circ \mathsf{mary} \circ \mathsf{tacos};\ \Diamond\mathbf{eat}(\mathbf{p})(\mathbf{j}) \vee \Diamond\mathbf{eat}(\mathbf{t})(\mathbf{m});\ \mathrm{S}}\restriction\mathrm{E}$$

4.4 Discontinuous Pseudogapping

As discussed in the previous section, our approach extends smoothly to quite complex types of data such as multiple remnant pseudogapping (70), 'nonconstituent' pseudogap-

ping (68), 'unlike category' pseudogapping (75) and (81), and an interaction between pseudogapping and gapping (84) just shown, all of which are highly problematic for many previous approaches. However, as it stands, the present analysis does not yet cover cases of discontinuous pseudogapping exemplified by the following data:

(88) a. Although I didn't **give** Bill **the book**, I did ∅ Susan ∅.

b. She **found** her co-worker **attractive** but she didn't ∅ her husband ∅.

There are at least two possible approaches to this problem, and deciding between them is a delicate matter, given the somewhat marginal status of the pseudogapping construction itself and especially its discontinuous variant. Here, we simply lay out the two options and leave it for future work to determine which of them represents a better alternative.

One possible approach would be to deal with discontinuity via the prosodic λ-binding mechanism already available in the grammar. Since this alternative doesn't involve adding any new machinery to the grammar, we will be relatively brief in sketching the main idea. See Kubota and Levine 2014b for a more detailed demonstration of this approach with example derivations. The idea of this vertical slash-based approach essentially is that, in order to license, for example, (88a), we can derive the following expression of type $\mathrm{VP}\uparrow\mathrm{NP}$ and identify it as the antecedent for the VP ellipsis/pseudogapping operator (whose syntactic category also needs to be changed slightly) in the target clause:

(89) $\lambda\varphi \circ \mathsf{give} \circ \varphi \circ \mathsf{the} \circ \mathsf{book}$; $\lambda x.\mathbf{give}(x)(\mathbf{the\text{-}book})$; $\mathrm{VP}\uparrow\mathrm{NP}$

This would suffice to license (88a) ((88b) could be derived analogously).

One worry that one might have for this type of approach is its overgeneration. The present CG analysis is already very flexible, and it needs to rely heavily on pragmatic principles to rule out unacceptable examples (but note that all other alternative proposals share the same problem: they either undergenerate or overgenerate). If we allowed for the possibility of unrestricted discontinuous pseudogapping, we would increase the set of strings that the syntax would overgenerate even more. One concrete case which the vertical slash-based approach would overgenerate is the following:

(90) *John **laughed when** BILL **arrived**, but he didn't ∅ SUE ∅.
intended: '... he didn't laugh when Sue arrived.'

Here, the same $\mathrm{VP}\uparrow\mathrm{NP}$ category as in (89) could be assigned to the string *laughed when __ arrived*. It is not immediately clear whether this example could be ruled out by any of the known pragmatic properties associated with pseudogapping.[22]

While pushing the 'syntax overgenerates, pragmatics constrains' approach to its limits is certainly an attractive option (especially if doing so obviates the introduction of new theoretical machinery), we'd like to offer another possibility, if only as a point of comparison for future investigations. The guiding intuition behind this alternative is the observation (which itself needs to be scrutinized, but which seems to match the overall empirical patterns we have been able to identify) that there is an intriguing overlap between the cases of discontinuous pseudogapping and patterns of (apparent) discontinuity traditionally analyzed by the 'wrapping' operation in the CG literature.[23] Wrapping is a mechanism originally pro-

[22] A reviewer notes that (i) (from Miller 2014:83) may have the same structure as (90):

(i) ... they would **examine what I wore** as intensely as anything else—as they would ∅ any woman who met with them ∅

If the elided material were to correspond to the boldfaced material in the antecedent clause, this indeed would not seem to lend itself to any well-motivated wrapping analysis (discussed below). However, (i) seems to allow for an alternative parse in which the elided material is just the verb *examine* (note from above that, as in (16), pseudogapping is sometimes possible without any matching syntactic antecedent), and it is hard to clearly establish that this example is consistent only with the former interpretation. For this reason, we do not take (i) to provide a conclusive enough argument against the wrapping-type analysis.

[23] Levin (1979) provides several examples of (apparent) discontinuous pseudogapping. So far as we can tell, all of her examples belong to one of the following three classes: (i) antecedentless pseudogapping (similar to those discussed in section 4.5); (ii) pseudogapping combined with an independent nominal ellipsis or adjunct ellipsis; (iii) wrapping-type pseudogapping. For example, her (36) on p. 77 *Does it [writing a check at a grocery store] usually take this long? – No, it never did me before* can be analyzed as an instance of (i), where what is missing after *did* is simply the verb (plus preposition) *happen to*. See section 4.5 for antecedentless pseudogapping. We take an example such as (1) on p. 75 *We'll share it–like we do ∅ the pink [blouse]* as an instance of (ii), where the ellipsis of *blouse* after *pink* is nominal ellipsis independent of

posed by Bach (1979) and Dowty (1982) in the early literature of Montague Grammar for treating discontinuous strings (such as *make __ up*, *pull __ out* in verb-particle constructions) as combinatoric units. For example, in a wrapping-based analysis, the verb-adjective pair *found __ attractive* in (88b) is analyzed as an 'underlying' constituent, and it 'wraps' around the object NP *her co-worker* in the surface form of the sentence.

We now sketch this alternative in some detail, which treats discontinuous pseudogapping like that in (88) via an interaction between pseudogapping and wrapping. In contemporary TLCG, wrapping is modelled by enriching the prosodic component of the theory (roughly corresponding to PF) via the notion of 'multi-modality' (Moortgat and Oehrle 1994; Dowty 1996a,b; Muskens 2007; Kubota 2010, 2014a; Mihaliček 2012). The notion of 'modality' here pertains to different 'modes' of composition in the prosodic component governing various reordering and restructuring operations related to surface morpho-phonological constituency, and has nothing to do with the notion of modality in the semantics literature. Following Kubota (2010, 2014a), we call this surface morpho-phonological component of grammar the 'prosodic algebra'.

For our purposes, it suffices to distinguish between two modes of composition in the prosodic algebra: the ordinary concatenation mode ($\circ$) and the infixation mode (which we notate as $\circ\!\!\bullet$). Prosodic terms are ordered in the prosodic algebra by the *deducibility* relations between terms (where $\varphi_1 \leq \varphi_2$ is to be read 'φ_2 is deducible from φ_1'). Specifically, to model wrapping, we posit the following rule:

(91) $(A \circ\!\!\bullet B) \circ C \leq (A \circ C) \circ B$

The intuition behind this is that when A and B are combined in the infixation mode, an expression C that combines with that unit at a later point in the derivation can be infixed in the middle by a surface morpho-phonological reordering operation. To refer to the deducibility relation in the prosodic algebra from the combinatoric component during the course of a derivation, we posit the following P(rosodic)-interface rule:

---

pseudogapping.

(92) P-interface rule

$$\frac{\varphi_1;\ \mathcal{F};\ A}{\varphi_2;\ \mathcal{F};\ A}\ \text{PI}$$

——where $\varphi_1 \leq \varphi_2$ holds in the prosodic calculus

The syntactic rules of the calculus are also revised to take into account the sensitivity to modes of composition (for space reasons, we only reproduce the rules for $/$, but the rules for $\backslash$ are similarly revised; the rules for $\restriction$ remain the same as above).

(93) a. *Forward Slash Introduction*

$$\frac{\begin{array}{ccccc}\vdots & \vdots & \underline{[\varphi;\ x;\ A]^n} & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots\end{array}}{\dfrac{b \circ_i \varphi;\ \mathcal{F};\ B}{b;\ \lambda x.\mathcal{F};\ B/_i A}\ /_i\text{I}^n}$$

b. *Forward Slash Elimination*

$$\frac{a;\ \mathcal{F};\ A/_i B \quad b;\ \mathcal{G};\ B}{a \circ_i b;\ \mathcal{F}(\mathcal{G});\ A}\ /_i\text{E}$$

In these revised rules, the modes encoded in the slashes match those that are used to combine the phonologies of the functor expressions with those of their arguments.

With this small extension, a simple wrapping example can be analyzed as in (94).

(94)

$$\dfrac{\dfrac{\text{mary};\ \mathbf{m};\ \text{NP} \qquad \dfrac{\dfrac{\text{found};\ \mathbf{find};\ \text{VP}/\text{NP}/_{\bullet}\text{Adj} \quad \text{attractive};\ \mathbf{attractive};\ \text{Adj}}{\text{found} \circ_{\bullet} \text{attractive};\ \mathbf{find}(\mathbf{attractive});\ \text{VP}/\text{NP}}\ /_{\bullet}\text{E} \qquad \text{chris};\ \mathbf{c};\ \text{NP}}{(\text{find} \circ_{\bullet} \text{attractive}) \circ \text{chris};\ \mathbf{find}(\mathbf{attractive})(\mathbf{c});\ \text{VP}}\ /\text{E}}{\text{mary} \circ ((\text{found} \circ_{\bullet} \text{attractive}) \circ \text{chris});\ \mathbf{find}(\mathbf{attractive})(\mathbf{c})(\mathbf{m});\ \text{S}}\ \backslash\text{E}}{\text{mary} \circ \text{found} \circ \text{chris} \circ \text{attractive};\ \mathbf{find}(\mathbf{attractive})(\mathbf{c})(\mathbf{m});\ \text{S}}\ \text{PI}$$

The point here is that the (surface) discontinuous string *found __ attractive* behaves as a unit in the combinatoric component (motivation for this assumption comes from patterns of argument structure-sensitive phenomena such as passivization and binding; see, for example, Dowty 1982, 1996a). The pseudogapping operator can then directly refer to the syntactic category and the semantics of this 'underlying constituent' to supply the relevant subcategorization frame and meaning of the missing TV to the auxiliary, in exactly the same way as in the simpler examples above. Thus, (88b) is licensed as follows:

(95)

$$\dfrac{\dfrac{\begin{array}{l}\lambda\varphi.\varphi;\\ \lambda\mathscr{F}.\mathscr{F}(\mathbf{find}(\mathbf{attractive}));\\ \text{TV}\restriction(\text{TV}/\text{TV})\end{array} \qquad \begin{array}{l}\vdots \quad \vdots\\ \text{didn't};\\ \lambda f\lambda x\lambda y.\neg f(x)(y);\ \text{TV}/\text{TV}\end{array}}{\text{didn't};\ \lambda x\lambda y.\neg\mathbf{find}(\mathbf{attractive})(x)(y);\ \text{TV}}\ \restriction\text{E} \qquad \text{robin};\ \mathbf{r};\ \text{NP}}{\text{didn't} \circ \text{robin};\ \lambda y.\neg\mathbf{find}(\mathbf{attractive})(\mathbf{r})(y);\ \text{VP}}\ /\text{E}$$

The wrapping-based alternative just sketched does not admit discontinuous constituents involving the vertical slash $\uparrow$ (such as $\mathrm{VP}\uparrow\mathrm{NP}$), since $\mathrm{VP}/\$$ ranges over categories involving directional slashes only. With this restriction, it is predicted that discontinuous pseudogapping is possible only when the deleted discontinuous string corresponds to an 'underlying' constituent in the combinatoric component involving wrapping. The data reported in the literature seems to conform to this prediction, but it remains an open question whether this analysis is adequate or true counterexample can be found which would suggest that the other alternative involving the vertical slash would be a better approach.

4.5 The Nature of the Syntactic Identity Condition

The analysis of VP ellipsis and pseudogapping given above is actually a bit too simplistic in assuming that there is always a syntactic antecedent that the ellipsis operator anaphorically refers to (see the side condition in (65)). This requirement is clearly too strong for VP ellipsis and arguably also for pseudogapping. As noted by Miller and Pullum (2013), if appropriate discourse conditions are satisfied, purely exophoric VP ellipsis is possible.

(96) a. Once in my room, I took the pills out. "Should I?" I asked myself. [COCA]

b. [Entering a construction site, somebody hands a helmet to the speaker:]
Do I have to?

While it seems considerably more difficult to construct analogous purely exophoric cases of pseudogapping (presumably due to the requirement specific to pseudogapping that the remnant needs to be contrasted with some 'corresponding' item),[24] as we have

[24]To our knowledge, the literature does not report any case of purely exophoric pseudogapping, but the following example may count as one (which to the ears of the native-speaker author of the present paper sounds acceptable):

(i) [You stop in at a (German) friend's house, and he holds out to you a huge 1-liter mug of beer. You look at it quickly, smile and shake your head, and say:]
No, but I could a small glass of wine.

already noted, there are cases of pseudogapping in which there are no appropriate syntactic antecedents in the preceding clauses (Miller 2014), and also instances of split-antecedent pseudogapping, which essentially establish the same point.

(97) a. Type in your PIN, just hit those buttons like you would ∅ a phone.

b. John saw Mary and Peter heard Ann, but neither of them did ∅ me.

While these examples clearly show that the condition encoded in (65) (which requires the existence of a syntactic antecedent) is too strong, purely interpretive approaches such as Miller's (1990) would overgenerate radically, as Miller (2014) himself acknowledges.

We think the right empirical pattern can be captured by relaxing the condition on the VP ellipsis/pseudogapping operator (reproduced in (98)) slightly, along the lines of (99).

(98) **VP ellipsis/pseudogapping operator, final version**

$\lambda\varphi.\varphi$; $\lambda\mathscr{F}.\mathscr{F}(P)$; $(\mathrm{VP}/\$)\uparrow((\mathrm{VP}/\$)/(\mathrm{VP}/\$))$

——where P is a free variable whose value is resolved anaphorically

(99) Anaphora resolution condition on the VP ellipsis/pseudogapping operator:

(i) if there is a syntactic constituent with category $\mathrm{VP}/\$$ in the antecedent clause matching the syntactic category of the missing verb in the target clause, then the value of P is identified with the denotation of that constituent;

(ii) if there is no such syntactic constituent, then the value of P is anaphorically identified with some salient property in the discourse that is not inconsistent with the syntactic category $\mathrm{VP}/\$$

With these conditions, the preposition mismatch case in (43), repeated here as (100), is still correctly ruled out.

(100) *John spoke to Mary more often than he did for Anne.

The remnant $\mathrm{PP}_{\mathit{for}}$ forces the syntactic category of the derived auxiliary to be $\mathrm{VP}/\mathrm{PP}_{\mathit{for}}$, but then, there is no matching syntactic antecedent in the preceding clause. Crucially, recovering the 'speak to' meaning of *speak* from the preceding clause via a purely anaphoric

process (clause (ii)) is not an option either, since that meaning is associated with a distinct subcategorization frame $\mathrm{VP}/\mathrm{PP}_{to}$ and thus is inconsistent with the $\mathrm{VP}/\mathrm{PP}_{for}$ frame.[25]

The revised condition in (99) is clearly in the same spirit as Miller's (1990) selectional restriction-based treatment (see section 3.2) in embodying the intuition that the ill-formedness of (100) is essentially due to the distinctness of meaning of the verb in the two different subcategorization frames. But it achieves the same effect by simply making the anaphora resolution process be sensitive to both the syntactic and semantic information of the antecedent simultaneously, rather than by making the *semantic* restriction on the denotation of the anaphoric verb directly access the subcategorization frame of the antecedent.[26]

The antecedentless and split antecedent examples in (97) are no longer problematic for the revised formulation of the anaphora resolution condition in (99). In these cases, there are no syntactic antecedents matching in category with the 'missing verbs'. However,

[25]Though the formulation in (98) and (99) predicts morphological identity between the remnant and its correlate in the antecedent clause, it does not require the morphological forms of the elided verb and the antecedent verb to be identical. This is because the VP in the result category of (98) and the VP in the anaphora resolution condition (99) do not need to match in terms of their morpho-syntactic features. Thus, well-known form mismatches in VP ellipsis and pseudogapping (e.g. in *I talked to John, though I didn't want to* $\varnothing$ with VP_{fin} vs. VP_{bse}) are not problematic. The anaphora condition in (99) essentially says that it doesn't care about either the number or the category of the remnants, as long as they match in the antecedent clause and the ellipsis site. This seems to correspond to the relevant generalization on connectivity in ellipsis cross-linguistically (cf. Merchant 2004).

[26]We believe that this is a subtle, but important difference between the present proposal and related proposals in the anaphoric approaches. For example, Ginzburg and Sag's (2000) SAL-UTT feature (invoked in their analysis of sluicing and fragment answers and also employed in other recent work such as Chaves 2014) does roughly the same work, but a possible criticism one might raise for it, that it builds strictly morphosyntactic specifications of linguistic expressions into supposedly purely discourse-based information (under CONTEXT) to capture morpho-syntactic connectivity by fiat, does not apply to our approach.

Note also that formulating a syntax-semantics interface condition along the lines of (99) seems less straightforward in phrase structure-based frameworks such as HPSG, since such frameworks do not have a fully general 'built-in device' of representing the notion of flexible incomplete constituents with some valent(s) unsaturated. In our CG-based approach, hypothetical reasoning is the device which gives us this flexibility.

unlike in the case of (100), the relevant relations appropriate as antecedents (such as 'use' for (97a) and 'saw or heard' for (97b)) are salient in the preceding discourse, and there is moreover no interference from a lexically associated conflicting subcategorization frame. Thus, anaphora is resolved by a purely semantic/pragmatic mechanism in these cases.

4.6 A Note on Overgeneration

We believe that the above discussion has it made clear that our analysis of pseudogapping has a better empirical coverage than any of the transformational analyses. At the same time, the CG-based flexible syntax-semantics interface enables us to formulate the restrictions pertaining to syntactic connectivity much more simply than in purely anaphoric approaches. Nonetheless, the present proposal leaves open one major issue, which we should note explicitly before concluding the paper: a remaining issue in the present account is overgeneration due to the flexible architecture of CG. For example, on our account, nothing in the syntax predicts that the following (101a) to be unacceptable. We take this to be the correct result, since a structurally parallel (101b), an attested example from Levin (1979), is an acceptable example of pseudogapping.

(101) a. $^{\%\%\%}$I took a book out of the box. But I didn't ∅ the bookcase.

b. $^{\%}$You can't take the lining out of that coat. You can ∅ this one.

But then, how can we account for the unacceptability of (101a)? Here too, we feel sympathetic to the general perspective advocated by Miller (2014), in which the syntax overgenerates somewhat wildly and additional processing-oriented and pragmatic factors constrain the acceptability of specific examples further. It is beyond the scope of the present paper to fully articulate these extra-grammatical conditions, but we would like to note some potentially relevant factors, in the hope that our discussion here will at least provide a starting point for investigating this quite complex issue in more detail in future research.[27]

The acceptability of complex instances of pseudogapping (such as those in (101)) seems to be particularly sensitive to pragmatic factors such as prototypicality and plausibility of

[27] We'd like to thank in particular an anonymous reviewer for detailed comments here.

the event described by the sentence in view of general world knowledge.[28] For example, the intended interpretation of (101b) is presumably supported by the fact that linings are components of coats that are detachable for some, but not all types of coats. In (101a), by contrast, there is no such inherent part-whole relation between books and boxes.

Note further that the contrast in (101) becomes less clear by manipulating some lexical choices. (102b) is less natural than (101b) since skirts and dresses don't normally have linings. By contrast, (102a) is more natural than (101a) since the use of the demonstratives *this* and *that* naturally invokes a contrast between the two remnants.

(102) a. %%I took a book out of this box. But I didn't ∅ that one.

b. %%I took the lining out of the skirt. But I didn't ∅ the dress.

Given the diversity of the possible relevant factors, predicting the acceptability of specific examples in some precisely measurable manner is a huge open question, and we do not attempt to undertake it in the present paper. But the overall conclusion from the discussion above should be clear: in general, one should be extra careful in assessing the acceptability of pseudogapping examples; in particular, when some example seems to sound bad, one should not immediately draw the conclusion that the badness of that example is due to grammatical factors. Such a conclusion is justified only if the unacceptability cannot be ameliorated by controlling for all conceivable confounding factors carefully.

5 Conclusion

Pseudogapping has remained problematic for both transformational and nontransformational approaches because of what has recently been identified in a different domain of ellipsis as 'partial syntactic sensitivity' (Chung 2013; Barker 2013; Yoshida, Hunter, and Frazier 2015): with respect to subcategorization-related properties, the elided verb and the remnant exhibit morpho-syntactic matching, apparently motivating an analysis in terms of

[28]The greater role of extra-grammatical factors in regulating acceptability here is reminiscent of the similarly non-trivial role that such factors play in the so-called 'gapless' relative clauses in Japanese and Korean (Kuno 1973; Yoon 1993; Matsumoto 1997).

syntactic movement; in other respects, however, the movement operations required in syntactic deletion-based analyses do not exhibit the expected distributional properties (such as island sensitivity), thus casting doubt on movement-based analyses. Interpretive approaches can account for the island insensitivity straightforwardly (and avoid various other problems for movement-based analyses), but on this type of approach, connectivity effects in subcategorization-related properties remain puzzling. In fact, Miller 1990—the only extant proposal which explicitly attempts to capture syntactic connectivity in pseudogapping in an interpretive approach—invokes a quite complex and abstract type of semantic selectional restriction that does not resemble any other well-known types of selectional restrictions for this purpose. Importantly, neither the transformational nor the nontransformational approach tells us *why* pseudogapping exhibits only partial syntactic sensitivity, and why it is that, among the various syntactic information encoded in the 'elided' material, what matters are the selectional requirements that the elided verb imposes on the remnant.

It is then interesting to see that, from the CG perspective, this partial syntactic sensitivity is exactly what is expected in an analysis that embodies the null hypothesis about pseudogapping. Pseudogapping involves anaphorically retrieving the meaning of the missing verb. In CG, there is a tight connection between the syntactic category of any linguistic expression and its semantic denotation (even in cases in which the linguistic expression in question does not correspond to a traditional constituent). Thus, it is naturally expected that the relevant anaphoric process is sensitive not just to the meaning of the antecedent but also to its syntactic category that encodes the relevant subcategorization information. But this anaphora resolution process does not involve any movement operation, and, for this reason, the account is free from the problems for movement-based approaches. As we have argued in this paper, this CG perspective enables us to naturally synthesize the insights of both transformational and nontransformational approaches, paving a way toward a truly explanatory account of the phenomenon.[29] Of course, much more work needs to be done to

[29]See also Barker (2013) in this connection, who arrives at a very similar conclusion as ours in the analysis of another major and controversial type of ellipsis, namely, sluicing.

determine whether this approach ultimately offers a viable account of ellipsis phenomena in general, but given its initial success in one of the most recalcitrant instances of ellipsis phenomena, we feel justified in our optimism about the prospects.

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