Pseudogapping Does Not Involve Heavy Shift

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1. Introduction

Pseudogapping is a form of predicate ellipsis that shares surface similarity to verb phrase ellipsis (VPE), including missing VP-internal elements and the presence of a finite auxiliary (Sag, 1976).

(1)   a.   John could pull you out of a plane like he **did** ~~pull~~ **his brother** ~~out of a plane~~.
        b.   Mary hasn't dated Bill, but she has ~~dated~~ **Harry**.

Importantly, these sentences contrast with standard VPE due to the presence of a right side remnant—compare (1a) to (2a) and (1b) to (2b).

(2)   a.   John could pull you out of a plane like his brother **did** ~~pull you out of a plane~~.
        b.   Mary hasn't dated Bill, but Susan **has** ~~dated Bill~~.

Levin (1978, 1986), who gives one of the first extensive collections of pseudogapping data, notes that, though a number of potential pseudogapping sentences are marked as being flatly ungrammatical as an illustration of the constraints on such constructions, even the most acceptable pseudogapping sentences are only marginally so. One example of this comes from Lasnik 1995, 1999. Lasnik relies on data from the double object construction as evidence for his proposal (discussed in the next section), but he himself notes that the pseudogapping sentences that his proposal predicts to be good—sentences with first object remnants (3a)—are still only marginally acceptable. He reports, however, that in his judgment, first object remnants (3a) are better than second object remnants (3b), which are furthermore flatly ungrammatical, and thus that his predictions are upheld.

(3)   a.   ?John gave Bill a lot of money, and Mary will Susan.
        b.   *John gave Bill a lot of money, and Mary will a lot of advice.

This marginality with respect to even the best cases of pseudogapping is very different from standard English VPE, which is, at least in the most canonical instances, completely unobjectionable. It has furthermore led to much dispute over the conditions under which pseudogapping is acceptable and, in turn, what the correct analysis of pseudogapping is (Kuno, 1981; Jayaseelan, 1990, 2001; Lasnik, 1995, 1999; Takahashi, 2004; Gengel, 2007; Merchant, 2008). This is problematic, since such a correct analysis is crucial for theories of surface anaphora (Hankamer & Sag, 1976), which aim to characterize the nature of the syntactic objects that go unpronounced (Shopen, 1973; Sag, 1976; Hardt, 1993; Fiengo & May, 1994; Chung et al., 1995; Lobeck, 1995; Merchant, 2001; Culicover & Jackendoff, 2005) as well as the grammatical features that can and do interact with this process (Haïk, 1987; Fox & Lasnik, 2003; Lasnik & Park, 2003; Goldberg, 2005; Stjepanović, 2008; Toosarvandani, 2008).

As with many marginal phenomena in linguistics, two question arise here. First, are pseudogapping sentences ever really acceptable? And second, if they are acceptable, do disputes over the judgments arise due merely to the marginality of the phenomenon or for some other, more complex reason? For example, disputes over the true pattern of acceptability for a particular phenomenon might arise because marginal acceptability naturally induces uncertainty in judgments, giving rise to cases where one's theory

may dictate what the judgment should be classified as, leading to potentially different binary judgments in cases of different prior theoretical commitments.

In this paper, we show evidence that the marginality reported in the literature seems to be an inherent feature of pseudogapping constructions. Using an acceptability judgment task, we assess the interaction of two variables that have been claimed to interact with pseudogapping: NP weight and remnant type (Jayaseelan, 1990; Lasnik, 1995, 1999; Takahashi, 2004; Gengel, 2007; Merchant, 2008). We find that, though marginal, pseudogapping sentences of all types are statistically more acceptable than what are considered to be flatly ungrammatical Heavy NP Shift sentences. However, the paradigm of acceptability ratings we see within the various types of pseudogapping sentences are largely unpredicted by any pseudogapping analysis proposed thus far.

2. Previous approaches

Given the similarities and differences between pseudogapping and VPE, the correct analysis of the former with respect to the latter does not immediately present itself. Is this difference more of a surface difference between VPE and pseudogapping, or does it suggest a radically different derivation, as in the case of gapping (Johnson, 2001)?

Jayaseelan (1990) presents one of the first accounts that attempts a unification of VPE and pseudogapping while maintaining that rules don't affect non-constituents. This contrasts with earlier deletion accounts like that given in Sag 1976, which relied on non-constituent string deletion to account for the presence of the right side remnant. The core of the Jayaseelan analysis is that the right remnant is derived via Heavy NP Shift (HNPS), an operation allowing for rightwards movement of an NP out of a VP, feeding standard VPE.

(4)   Mary hasn't $[_{VP} [_{VP}$ dated $t_j]$ Bill$_j]$, but she has $[_{VP} [_{VP}$ dated $t_i]$ Harry$_i]$

Thus, the proposal here is that pseudogapping does not properly occupy a place in the grammar, but that it arises via an interaction between two independent and relatively well-studied grammatical operations. As support for this line of argumentation, Jayaseelan suggests that a number of facts line up between possible pseudogapping remnants and potential targets of HNPS, providing the following exmaples to illustrate the parallelism. For example, HNPS involves obligatory pied-piping of a preposition; objects of prepositions can't be pseudogapping remnants:

(5)   *John counted [on t_i] for support [a total stranger]$_i$.
(6)   *You can't count on a stranger, but you can a friend.

Additionally, heavy (or focused) constituents can undergo HNPS; remnants of pseudogapping must be similarly heavy:

(7)   *John will sue the hospital and Mary will him.
(8)   *John sued with just cause him.

Accepting the generalizations presented by Jayaseelan, it would indeed be a suspicious coincidence if pseudogapping and HNPS were unrelated in their derivations. The points of convergence Jayaseelan points out are readily explained, however, if pseudogapping is an instance of HNPS followed by deletion.

The convergence is not so complete, though. As noted above, Levin (1978) reports that pseudogapping is a marginal construction in even the most basic instances, though this does not seem to be true of either VPE or HNPS. Jayaseelan's proposal offers no account of this difference.

Further, Lasnik (1999) points out that the parallels between HNPS and pseudogapping judgments may not be completely general. Focusing on double object constructions in particular, Lasnik demonstrates that the direct and indirect objects of a verb have entirely opposite patterns of acceptability when used as the remnant of a pseudogap compared to the target of HNPS. Specifically, Lasnik reports that indirect objects are flatly unavailable for standard HNPS, but are possible as remnants for pseudogapping. Direct objects in a double object construction, though, are free to undergo HNPS, but cannot serve as remnants for pseudogapping.

(9)   a.   ?John gave Bill a lot of money, and Mary will Susan.
        b.   *John gave Bill a lot of money, and Mary will a lot of advice.

(10)   a.   *John gave a lot of money the fund for the preservation of VOS languages.
        b.   John gave Bill yesterday more money than he had ever seen.

The nonparallelism of the judgments between (9a)-(10a) and (9b)-(10b) illustrates the relevance of the double object construction in determining the correct derivation of pseudogapping: the availability or unavailability of each object to a particular movement operation is easily compared with the potential for that same object to be a right side remnant in the corresponding pseudogapping sentence. In this particular instance, it is hard to countenance an account of pseudogapping that relies solely on HNPS feeding VPE with the pattern of HNPS data presented above.

In the face of these examples, Lasnik argues that, although Jayaseelan was right in the essence of the movement-plus-ellipsis proposal, the movement operation feeding VPE cannot be just HNPS. Lasnik notes that the objects that can serve as pseudogapping remnants, such as the indirect object in a double object construction, all bear accusative case. Following the Chomsky 1991 analysis of Accusative Case feature checking through A-movement to Spec. Agr_O, Lasnik offers this operation as the movement needed to feed VPE in the generation of pseudogapping sentences.

Crucial for Lasnik, this movement is driven by the need to check strong EPP features, and thus it must occur in the overt syntax instead of at LF. This distinction is necessary to see a reflex of this operation occurring in surface strings of the language. For Lasnik, then, pseudogapping is derived via a leftward movement of the object to a projection outside of the VP that ultimately gets deleted. Not only does this approach capture the accusativity patterns seen in pseduogapping remnants, it also offers an explanation of why the direct object in a double object construction cannot be a pseudogapping remnant.

Lasnik assumes a double object syntax in which the indirect object is base generated in a VP shell higher than the indirect object, and undergoes feature-driven movement to its corresponding Agr projection (an extension of Koizumi 1993). Under Lasnik's Object Shift account, this is also the only object of the verb able to be a single object remnant of pseudogapping. To derive a pseudogapping sentence with only a direct object remnant under this approach, the direct object would have to raise past the indirect object, leaving the indirect object and verb in a lower VP projection to be deleted. Such a movement will run afoul of relativized minimality constraints, and thus "there could not be a VP (or any other constituent) to delete which includes the [direct object] but excludes the [indirect object]" (p.150).

Noting some apparent empirical shortcomings of both the Jayaseelan and Lasnik hypotheses, Takahashi (2004) argues in favor of a hybrid account of pseudogapping that combines both the possibility of A-movement to Agr_O and HNPS. Takahashi uses data from pseudogapping in double object constructions to demonstrate that the instances in which one account fails to capture the pattern of data are exactly the instances correctly predicted by the alterative hypothesis.

As an example, Takahashi fully agrees with Lasnik that the indirect object in a double object construction is a poor candidate for HNPS, but is a suitable pseudogapping remnant. But Takahashi reports (following Bowers 1998) that direct objects are viable pseudogapping remnants as well (and thus disagreeing with the judgment offered in (9b)). This aligns with the predictions of the HNPS approach to pseudogapping and is problematic for an Object Shift account. It is on this basis that Takahashi proposes a union of the two previous approaches as the proper analysis.[1]

There are two empirical worries for all of these accounts. First, because pseudogapping is marginal in almost all cases, it is difficult to sort out which types of remnants are actually more or less acceptable. Crucial here is some way of tightly controlling the sentences each remnant is found in to make sure non-grammatical effects on acceptability can be filtered out as much as possible. Second, because the acceptability of HNPS is correlated with the heaviness (and thus induces gradience in the judgments), heaviness of an NP must be explicitly controlled for in comparing HNPS-based accounts, such as Jayaseelan's and Takahashi's, against Object Shift-based accounts like Lasnik's. In the former case, we expect heaviness to interact with pseudogapping judgments, and in the latter, we expect independence.

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[1]   The logical possibility of such an account was noted by Lasnik, though for him, the open question is why HNPS apparently fails to feed VPE—cf. his judgment for (9b).

3. Experiment

In this section, we we establish three results using an acceptability judgment task. First, heavy NP shift is good with the second object (DO2) in a double object construction (DOC) and the only object (DOT) in a transitive construction but bad with the first DOC object (DO1). This corroborates previous judgments and clarifies the predictions of accounts like Jayaseelan's and Takahashi's that argue for a feeding relationship between HNPS and VPE.

Second, though marginal (Levin, 1978), pseudogapping with DO1, DO2, and DOT remnants is still better than HNPS with DO1. This suggests, *contra* Jayaseelan 1990, that heavy NP shift cannot be the only process feeding ellipsis in pseudogapping sentences, since that account predicts that pseudogapping with DO1 should be no better (and possibly worse) than HNPS with DO1.

Third, pseudogapping with DOT remnants is better than pseudogapping with DO1 and DO2 remnants when the remnant is light, but no better when the remnant is heavy. The fact that only DOT is good when light is problematic for all prior accounts: Jayaseelan's (1990) predicts DO2 and DOT to pattern together, as in HNPS; Lasnik's (1999) predicts DO1 and DOT to pattern together; and Takahashi's (2004) predicts all three to pattern the same.

3.1. Design

A $3 \times 2 \times 2$ factorial design was used with all variables within subjects. The three factors were CONSTITUENT—three levels: transitive direct object (*DOT*), ditransitive first direct object (*DO1*), ditransitive second direct object (*DO2*)—SENTENCE TYPE—two levels: *pseudogapping*, *NP shift*—and NP WEIGHT—two levels: *light*, *heavy*.

The SENTENCE TYPE factor refers to *pseudogapping* sentences (11) and sentences that uncontroversially involve rightward *NP shift* (12). The CONSTITUENT factor refers to the pseudogapping remnant in *pseudogapping* sentences, and the NP that is shifted rightward in the *NP shift* sentences. And the NP WEIGHT factor refers to whether the remnant or shifted NP is *heavy* (contains an NP adjunct) or *light* (does not contain an NP adjunct).

(11)   *Pseudogapping*
        DO1: John gave the valet a tip, and Mary will **the maid (who cleans their room)**.
        DO2: John gave the valet a tip, and Mary will **the keys (to their red convertible)**.
        DOT: Frank met the captain, and Lloyd will **the general (who ordered the assault)**.

(12)   *NP shift*
        DO1: Mary will give a tip before the dinner **the maid (who cleans their room)**.
        DO2: Mary will give the maid before the dinner **a tip (that is too small)**.
        DOT: Lloyd will meet after the parade **the general (who ordered the assault)**.

Each participant in the experiment saw each condition three times, each time with a distinct verb. This was done so that, if there is variability in how acceptability different participants think a particular syntactic configuration is—e.g., pseudogapping with a first object DOC remnant compared to a second object DOC remnant—this variability would more likely be detectable.

3.2. Materials
3.2.1. Test item construction

12 verbs that can occur in the DOC (13a) and 12 transitive verbs (13b)—all distinct from the ditransitive verbs—were selected as the basis on which to construct the test items.

(13)   a.   give, send, bring, show, tell, owe, offer, write, promise, teach, sell, mail
        b.   meet, fire, select, hire, read, play, sing, watch, cook, drink, devour, drive

For each verb, eight sentences (if the verb was one of the DOC verbs) or four sentences (if the verb was one of the transitives) were constructed such that the pseudogapping sentences constructed for that verb were plausible. All pseudogapping sentences included the auxiliary *will* in the second conjunct. This

auxiliary was chosen because (i) *will* is one of the most common auxiliaries found in pseudogapping literature example sentences; and (ii) using some form of *do*, another auxiliary commonly found in pseudogapping literature example sentences, would have resulted in second conjuncts that could be parsed as transitives with a main verb *do*.

All light direct object NPs were two words long—consisting of a determiner and a noun—and all heavy direct object NPs were six words long—consisting of a determiner, a noun, and a four word modifier. All temporal adjuncts were five syllables long.

3.2.2. Filler item construction

Three types of fillers were constructed. Each type fit the criterion that at least some items of that type involve some sort of shift of a direct object constituent—either the entire DP or a constituent of that DP (e.g., a modifier of N)—that it known to result in degraded (qualitative) acceptability (Lasnik, 1999).

The first type of filler item involved a modification of the *DOT × NP shift × heavy* test condition for each of the transitive contexts. To construct the filler for each transitive context, instead of shifting the entire heavy NP, just the modifier was shifted. For instance, (14) is one of our *transitive × NP shift × heavy* item, and (15) is the corresponding filler.

(14)   Lloyd will meet after the parade **the general who ordered the assault**.

(15)   Lloyd will meet **the general** after the parade **who ordered the assault**.

Twelve fillers were constructed in this way (one for each transitive context).[2] All participants saw all 12 fillers. Beyond acting as fillers, this setup also serves to balance out the number of times each transitive context is seen relative to the ditransitive contexts (twice per context).

The second type of filler item involved verb-particle constructions. Nine particle verbs were selected. For each particle verb, four items were constructed: two with a pronoun, shifted (16a) and unshifted (16b), and two with a heavy NP, shifted (16c) and unshifted (16d). Each participant saw one pronoun item and one heavy NP item for each of the nine particle verbs.

(16)   a.   Stacy turned off it.
       b.   Stacy turned it off.
       c.   Stacy turned off the the lamp she hung next to the bed.
       d.   Stacy turned the lamp she hung next to the bed off.

The third type of filler involved passivization of the first direct object (corresponding to the THEME semantic role) in a double object construction. (17) shows an example of such an item.

(17)   A painting from the Middle Ages was shown the collector.

Six items of this type were constructed, and each participant saw every such item.

3.3. Participants

124 participants (58 females; age: 36.5 [mean], 34 [median], 20-66 [range]) were recruited through Amazon Mechanical Turk (AMT) using a standard Human Intelligence Task (HIT) template designed for externally hosted experiments and modified for the specific task.

Item presentation was distributed across these participants such that (i) each item was seen by a minimum of 30 participants; (ii) each participant saw 36 test items and 36 filler items, for a total of 72 items; (iii) each participant saw each ditransitive verb four times—twice with *NP shift* (once with *DO1*, once with *DO2*) and twice with *pseudogapping* (once with *DO1*, once with *DO2*)—and each transitive verb twice—once with *NP shift* and once with *pseudogapping*.[3]

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[2]   Some of the filler items constructed this way are acceptable under a parse wherein the modifier attaches to the last word in the temporal adjunct. If anything, it is a feature, rather than a bug, since it will produce natural differences in acceptability among these filler items that could distract participants from which items are the true test items.

[3]   Note that each participant would see each transitive verb one further time as a filler item—though of course, that participant would not know that that item was intended as a filler.
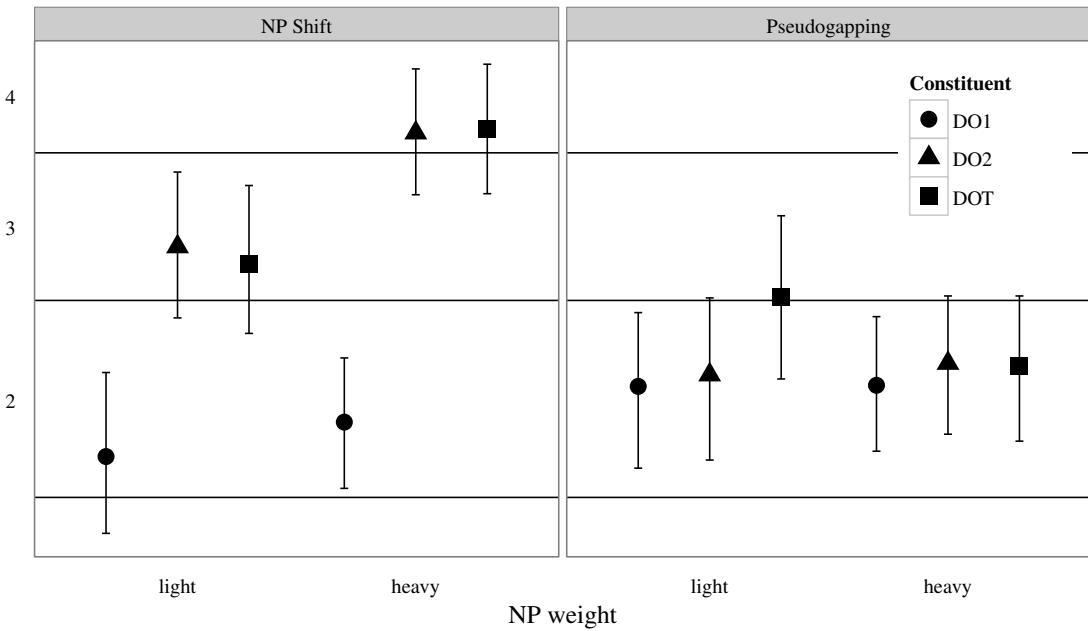
Figure 1: Most likely rating by condition. Error bars are 95% credible intervals from ordinal mixed model. Horizontal lines show the ordinal cutpoints (MAP estimate).

Prior to viewing the HIT, participants were required to score seven or better on a nine question qualification test assessing whether they were a native speaker of American English. Along with this qualification test, participants' IP addresses were required to be associated with a location within the United States, and their HIT acceptance rates were required to be 95% or better. After finishing the experiment, participants received a 15-digit hex code, which they were instructed to enter into the HIT. Once this submission was received, participants were paid $1.25.

3.4. Results

We carry out all analyses in an ordinal mixed model framework (Agresti, 2014).[4] This framework allows us to assess acceptability of particular sentence types, averaging over the population, while controlling for verb- and participant-specific effects that arise from uninteresting factors like scale use differences.[5]

Figure 1 shows the most likely rating for each sentence type. Error bars give 95% credible intervals derived from an ordinal mixed model with fixed effects for CONSTITUENT, SENTENCE TYPE, and NP WEIGHT as well as all possible two- and three-way interactions, random intercepts for participant, verb, and item, by-participant random slopes for all fixed effect terms, and by-verb random slopes for SENTENCE TYPE, NP WEIGHT, and their interaction.[6] This somewhat complex model satisfies recent recommendations in the experimental literature to "keep it maximal" (Barr et al., 2013) and it allows us to parcel out very fine-grained effects that would be impossible to assess otherwise.

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[4] All graphs are based on this sort of model but are presented in terms of the original likert scale for ease of interpretation. All in-text statistics are stated in terms of the continuous representation of acceptability that this model traffics in. Of these in-text statistics, all confirmatory statistics are stated in terms of credible intervals, and so the only thing necessary for understanding them is that an interval excluding zero represents a significant effect.

[5] See Schütze & Sprouse 2014 for discussion of why it is important to control for scale use differences in acceptability judgments.

[6] The credible intervals are derived from the marginal posterior distribution over the fixed effects, extracted from the above model fit using the R package MCMCglmm.

3.4.1. Heavy NP shift

We begin by showing that DO2 and DOT can undergo HNPS but that DO1 cannot. In the left panel of Figure 1, we see that DO2 and DOT are better than DO1 both when light and when heavy. This is ascertained from the fact that, taking *DO1* and *light* as reference levels, the main effects of *DO2* (post. mean: 1.85, 95% CI: [1.32, 2.45]) and *DOT* (post. mean: 1.72, 95% CI: [0.93, 2.56]) are reliably positive, and their interactions with NP WEIGHT are also reliably positive (*DO2 × heavy* post. mean: 0.80, 95% CI: [0.17, 1.50]; *DOT × heavy* post. mean: 0.99, 95% CI: [0.083, 1.75]). This improvement suggests that DO2 and DOT can undergo HNPS. The main effect of NP WEIGHT is furthermore not reliable (post. mean: 0.24, 95% CI: [-0.34, 0.83]). This suggests that DO1 cannot undergo HNPS.

3.4.2. The marginal acceptability of pseudogapping

Jayaseelan's account predicts that the acceptability of pseudogapping should be modulated by the availability of HNPS for a particular constituent (Lasnik, 1999). Thus, under Jayaseelan's account, pseudogapping with DO1 remnants should be just as bad as rightward shift with DO1—modulo any ameliorating effects deletion might have (Lasnik, 2001). This is not borne out by our data; taking *DO1 × NP shift × light* as the reference condition, the main effect of SENTENCE TYPE is reliably positive (post. mean: 0.67, 95% CI: [0.04, 1.40]). Thus, we tentatively reject Jayaseelan's proposal.

Lasnik's account predicts that, not only should DO1 remnants be acceptable, they should be better than DO2 remnants—under the assumption that DO2 remnants do not raise to Agr_O. This prediction is not borne out by our data either. Taking *DO1 × pseudogapping × light* as the reference condition, the main effect of *DO2* is neither reliably positive nor reliably negative (post. mean: 0.14, 95% CI: [-0.18, 0.50]).

3.4.3. Pseudogapping with DOT remnants

Previous accounts predict that DOT should pattern with either DO1 (Lasnik, 1999) or DO2 (Jayaseelan, 1990) or that it should not pattern differently from either (Takahashi, 2004). We find, however, that DOT is more acceptable than either DO1 (post. mean: 0.94 95% CI: [0.32, 1.47]) or DO2 (post. mean: 0.76, 95% CI: [0.24, 1.28]) when light. None of the accounts previously reviewed offer an explanation for this increased acceptability of DOT remnants over either double object remnant type. Even more mysterious is the fact that when the DOT remnant type is made heavy, DOT shows no significant acceptability advantage over DO1 or DO2 remnant types.

3.5. Discussion

We have established three results using an acceptability judgment task. The first is that a number of asymmetries exist within the objects that can undergo HNPS: direct objects of transitive verbs and second objects in double object constructions are available to HNPS, and are greatly improved with additional linguistic content. Compare this with the first object in a double object construction, which is unavailable as a target for HNPS, and heaviness offers no improvement for this object type.

Second, taking the static unacceptability of first object HNPS as our benchmark for an ungrammatical construction, we find that all cases of pseudogapping are rated significantly more acceptable than this ungrammatical case. However, ratings for all types pseudogapping remnants are much lower than those of heavy transitive and heavy second object HNPS sentences. We claim this is due to pseudogapping being a marginal construction, following Levin (1978, 1986). The difference in acceptability between first object pseudogapping and first object HNPS is surprising if pseudogapping simply involves HNPS and VPE.

Finally, using our NP WEIGHT manipulation, we show that unlike with HNPS, increased heaviness does not improve acceptability of any pseudogapping remnant type. This is perhaps the most problematic finding for any HNPS-based account of pseudogapping, as we show clear positive effects of heaviness in two of the three *HNPS × heavy*, suggesting that our operationalization of heaviness was effective at some level, and could reasonably be expected to track across HNPS and pseudogapping sentences.

4. Conclusion

Our results ultimately depict a somewhat more complicated relationship between the movement processes that could yield the pseudogapping remnant and the ellipsis operation. They suggest that HNPS is not generally available to feed VPE in the generation of pseudogapping. Lasnik offers compelling evidence that this gap in the paradigm is due to strong locality constraints on various types of rightwards movement. If this assessment is correct, we are able to maintain the view that, all things being equal, multiple types of movement operations should be able feed VPE, but a number of unattested cases are ruled out by constraints independent from ellipsis. Our hope, then, is that the overall pattern of results presented in this paper may be attributable to a further set of independent constraints and/or parsing preferences.

To take one example that certainly warrants further investigation, it could be the case that the negative effect of heaviness observed in *pseudogapping × DOT* may be a reflex of some parallelism preference that holds between two conjuncts of pseudogapping sentences. All of the direct objects in the first conjunct of the pseudogapping sentences we tested consisted of a light NP. Thus, a heavy DOT remnant in the second conjunct is less parallel than a light remnant, and this may cause a decrease in acceptability. Further work analyzing such possible sources of unacceptability should help clarify the underlying grammatical nature of these constructions.

Ultimately, though individual and introspective judgment data has been shown to be highly reliable (Sprouse & Almeida, 2012, 2013; Sprouse et al., 2013), the claims derived from such data can be misleading when multiple interacting grammatical and extragrammatical factors are exerting influence. To fully understand these additional factors, incremental and targeted manipulations with large scale data collection may be necessary to uncover correlational patterns of acceptability that can only properly be characterized through experimental syntax studies.

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