1 Introduction

This short, fairly non-technical paper concerns a construction in which the canonical order of a preposition preceding its object can be inverted, though only under sluicing as shown in (1a).\(^1\) Merchant (2002) deems this *swiping* (an acronym for sluiced wh-word inversion with prepositions in Northern Germanic). I propose a new account for the swiping phenomenon, one that treats it as a generalizable instance of sluicing that involves extraposition, wh-movement, and IP-ellipsis.

Motivating this new account is a new set of swiping data. In particular, in addition to prepositional phrases, gerundive small clauses, infinitival complement clauses, and clefted versions of these can also undergo swiping in its generalized form. In examples (1b-3) below, we see what I claim are instances of a wider range of phrases that can undergo swiping:\(^2\)

\[
\text{(1) a. Ivy was talking, but I can’t remember who to.}
\]

\[
\text{b. Ivy was talking, but I can’t remember who it was to.}
\]

\[
\text{(2) a. Ivy was caught, but I can’t remember what doing.}
\]

\[
\text{b. Ivy was caught, but I can’t remember what it was doing.}
\]

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\(^1\) Swiping is a sub-case of sprouting (Chung, Ladusaw, and McCloskey 1995). That is, the sluiced element is interpreted in a position that is not overt in the antecedent clause. As such, sprouting will show effects similar to those of sprouting.

\(^2\) The availability of swiping with gerundive small clauses was first noted by Hartman and Ai 2007, however with little discussion. Also, the simple embedded question version of swiping of a non-finite complement clause (3a) introduces an ambiguity. It bears the interpretations in (i) and (ii). The use of embedded wh-cleft versions avoids this.

\[
\text{(i) But I can’t remember what Ivy was eager to do.}
\]

\[
\text{(ii) But I can’t remember what I should do about it.}
\]
(3) a. Ivy was eager, but I can’t remember what to do.

b. Ivy was eager, but I can’t remember what it was to do.

The analysis posited here, spurred by the facts above, will contrast with current theories of swiping that involve PF head movement of the wh-word (Merchant 2002) or movement of the entire prepositional phrase to a left-peripheral position followed by sub-extraction of the wh-word to a more left-peripheral (van Craenenbroeck 2004 and Hartman and Ai 2007) or right-peripheral position (Kim 1997 and Hasegawa 2007).

I argue that the correct analysis for swiping differs little from the common analysis for sluicing. It is in this sense unsurprising that sluicing is a necessary condition for swiping.

I follow the analysis of Merchant 2001 (by way of Ross 1969) that sluicing involves the fully clausal architecture – built up only to be elided (contra Chung, Ladusaw, and McCloskey 1995 and Culicover and Jackendoff 2005). That is (4) is derived in part in the manner that (5) suggests.

(4) Ivy saw someone, but I don’t remember who.

(5) Ivy saw someone, but I don’t remember who\text{\_\text{IP}} [IP Ivy saw \_i]
extracted wh-word. That is, I argue for an analysis of (1a) as seen in (6) below. The prepositional phrase has extraposed to adjoin to the verb phrase (its exact landing site is not crucial to the analysis). This is followed by IP ellipsis. Note that what is shown below amounts to non-constituent deletion and as such should not be possible given traditional assumptions. I will show a means to delete the struck-through string in (6) that obeys constituency by relying on Hornstein’s (2009) decomposition of Merge.

(6) Ivy was talking, but I don’t remember who, [IP Ivy was [VP talking to t_i] [to t_i]]

This will have a few repercussions. For instance, the nature of island constraints in natural language has been a matter of substantial theoretical importance recently. If this approach is on the right track then I will show that we have further reason to suspect that island phenomena are due to PF constraints. Additionally, if this approach is on the right track then we can enjoy an analysis of swiping that covers a broader empirical swath and one that involves less conceptual machinery.

In section 2 I argue that the posited instances of generalized swiping pattern like traditional swiping. In section 3 I show that this new data poses problems for current accounts of swiping. In section 4 I propose a new analysis and show how it captures the full range of swiping data and makes correct predictions about the cross-linguistic range of swiping constructions as well as implicates a particular approach to the operation Merge as it pertains to adjunction.
2 Extensions beyond prepositions

In this section I present evidence showing that the characteristics of swiping can be discerned in instances that do not involve prepositional phrases. Rather, swiping characteristics can be found category-independently involving any phrase that comports with the constraints on prepositional phrase swiping.

As noted above, sluicing is a necessary condition on swiping. That is, the inverted preposition-object order is only licensed with IP ellipsis of the same clause:

(7) Ivy was talking, but I don’t know who to (*Ivy was talking)

The same holds for the putative gerundive small clause version of swiping, the infinitival complement clause version, and the clefted version of all three:

(8) Ivy was talking, but I don’t know who it was to (*Ivy was talking).

(9) a. Ivy was caught, but I can’t remember what doing (*Ivy was caught).
    b. Ivy was caught, but I can’t remember what it was doing (*Ivy was caught).

(10) a. Ivy was eager, but I can’t remember what to do (*Ivy was eager)
    b. Ivy was eager, but I can’t remember what it was to do (*Ivy was eager).

There are other parallels as well. As noted by Rosen 1976, swiping is a sub-type of sprouting. That is, the wh-phrase cannot have an overt antecedent in the antecedent clause. This holds for prepositional swiping as well as the others:
(11)  a. Ivy was talking (*to someone), but I can’t remember who to.
       b. Ivy was talking (*to someone), but I can’t remember who it was to.

(12)  a. Ivy was caught (*doing something), but I can’t remember what doing.
       b. Ivy was caught (*doing something), but I can’t remember what it was doing.

(13)  a. Ivy was eager (*to do something), but I can’t remember what to do.
       b. Ivy was eager (*to do something), but I can’t remember what it was to do.

Further, swiping is only acceptable when both the wh-word and the phrase from which it extracts are implicit in the antecedent. This requirement precludes anything but relatively semantically bleached words (functions morphemes, unspecific wh-words, and dummy do) from arising in swiping constructions. Shown in (14a-c) it is the case that specific wh-phrases are disallowed and shown in (15a-c) it is the case that the host phrase must also not contain any words not implicit in the antecedent.

(14)  a. *Ivy was talking, but I can’t remember which person (it was) to
       b. *Ivy was caught, but I can’t remember which thing (it was) doing.
       c. *Ivy was eager, but I can’t remember which thing (it was) to do.

(15)  a. *Ivy was talking, but I can’t remember what (it was) near.
       b. *Ivy was caught, but I can’t remember what (it was) saying.
       c. *Ivy was eager, but I can’t remember what (it was) to forget.
Sprouting in general requires that the corresponding null argument in the antecedent clause be interpreted as indefinite. That is, the null complement of verbs like *sing*, *eat*, and *drink* can correspond to a sprouted wh-word because when null, that argument is interpreted as an indefinite (‘Ivy sang’ means ‘Ivy sang something’). However verbs like *notice*, *find out*, and *understand* allow null arguments that are interpreted as definites (see Williams 2012 for more discussion and finer grained distinctions). This distinction is shown in (16):

(16) a. Ivy {sang/ate/drank}, but I can’t remember what.
   
   b. *Ivy {noticed/found out/understood}, but I can’t remember what.

As a sub-case of sprouting, swiping is subject to the same constraints. For example, when used superficially intransitively, the verb *apply* bears the interpretation in which there is a null prepositional phrase with a definite object. That is, (17a) allows the interpretation that Ivy applied to some salient definite entity. Due to this, it is not possible for (17a) to serve as the antecedent to an instance of sprouting (17b).³

³Although *apply* requires that the entity applied *to* be definite, the particular entity applied *for* may be indefinite. For example there may be multiple positions to apply for at a single institution. In this case, swiping is licit (i). The same sort of background cannot save (17) as seen in (ii)

(i) A few friends were applying for jobs. Jim applied for a teaching position at State U. Lana applied for a research position there. Ivy applied too, but I can’t remember what for.

(ii) A few friends were applying for jobs. Jim applied to State U. for a research position. Lana applied to U of X for one. *Ivy applied too, but I can’t remember what/where to.
The same goes for the generalized versions of the swiping construction. When their null arguments are necessarily definite, putative swiping is not licit. When *go on* has a null gerundive interpretation, the object of the gerundive verb is interpreted as definite (‘Ivy went on’ means ‘Ivy went on doing that particular discourse salient thing’). The object of the null infinitival complement clause of a verb like *forget* must also be interpreted as definite (‘Ivy forgot’ can mean ‘Ivy forgot to do that particular discourse salient thing’). Shown in (18) and (19), swiping is not allowed in these instances.

(18)  a. *Ivy went on, but I can’t remember what (it was) doing.
       b. *Ivy forgot, but I can’t remember what (it was) to do.

This section has shown in a preliminary sense that more than just prepositional phrases seem to be involved in swiping. There is a wider array of circumstances that a wh-word can appear to the left of its base position under IP ellipsis. As long as the corresponding argument in the antecedent clause is null and indefinite and as long as the swiped elements are semantically blanched enough to be implicit in the antecedent, swiping should be allowed. In English, this confluence of events only seems to be possible with prepositional phrases, gerundive small clauses, and infinitival complement clauses, though there is nothing in principle limiting the construction to just these. In the
following section I show that these new data are problematic for previous accounts of swiping.

3 Problems for previous approaches
In this section I will sketch the main contemporary analyses of swiping. In each I will discuss, though not exhaustively, their advantages and shortcomings with respect to the new data presented here.

3.1 Head Movement
Merchant 2002 proposes an account of swiping in which the wh-head moves at PF to incorporate into its selecting preposition. What is before movement as shown in (19a) results in (19b) after movement.

(19)  a. PP
      / \  \
     P   DP
    to   who

b. PP
   / \  \
  P   DP
 who, +to ti

As head movement, the above operation has some serious constraints. One being that only heads should be able to undergo this movement. And this turns out to be the

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4 I eschew discussion for want of space and relevance past analyses like that found in van Riemsdijk 1978.
case more or less. As shown below, larger wh-elements do not work in swiping
configurations:

(20) *Ivy was talking, but I can’t remember which person to.

This analysis however fails in the face of the new data presented here.\(^5\) While it
may be possible to analyze swiping as head movement when only prepositions are
considered, this becomes impossible when the wh-head must be analyzed as affixing to
what is quite clearly phrasal. That is, for the examples in (2b and 3) (presented in (21)
below, it cannot be the case that the wh-word has affixed to its nearest dominating head.

(21) a. Ivy was caught, but I can’t remember what (it was) doing.

b. Ivy was eager, but I can’t remember what (it was) to do.

Another problem for this account is found when more than one prepositional
phrase is sluiced. This is indeed possible without swiping as shown below:\(^6\)

\(^5\) Van Craenenbroeck (2004) notes similar problems. In (i) it seems like an entire clause can divide the wh-
word from its host preposition. However improbably, it is possible that examples such as this one are
amenable to an analysis in which the intervening clause is a sort of parenthetical and thus not a clear
counterexample to Merchant’s analysis.

(i) Ivy said that Ivy was talking, but I can’t remember who she said to.

\(^6\) These judgments I present differ slightly from Richards’ (1997) (He considers (23a) marginal and I find
(22) marginal). The theory posited here predicts differences in judgment in exactly these cases. The
difference between the two is exactly that found between (i) and (ii): pied-piping

(i) To who was Ivy talking about what?
(ii) Who was Ivy talking to about what?
(22) Ivy was talking, but I can’t remember to who (it was) about what.

If we round out the paradigm, only the left-most prepositional phrase can be swiped.  

(23) a. Ivy was talking, but I can’t remember who (it was) to about what.  
b. *Ivy was talking, but I can’t remember who (it was) to what about.  
c. *Ivy was talking, but I can’t remember to who (it was) what about.  

Even when the leftmost swiped element is not prepositional, it is still the case that only it can be swiped. This is shown below in (24) and (25).  

(24) a. Ivy was caught, but I can’t remember what (it was) doing with who.  
b. *Ivy was caught, but I can’t remember what doing (it was) who with.  
(25) a. Ivy was eager, but I can’t remember what (it was) to do with who.  
b. *Ivy was eager, but I can’t remember what (it was) to do who with.  

I predict that those who prefer (ii) prefer (23a) and those who prefer (i) prefer (22) because they are the same modulo IP-ellipsis. An interesting result is that dis-preference for pied piping disappears for the second prepositional phrase in (23a). This is also predicted by this account which holds that this phrase is actually not pied-piped, but extraposed. This contrasts with Richards’ analysis which holds that both PPs are pied-piped and should be equally unacceptable to speaker who dis-prefers pied-piping.
The requirement that only the leftmost prepositional phrase may undergo swiping is not straightforwardly predicted under the head movement account. However, the proposed analysis predicts the facts to fall out as they do. I will explicate this in a later section.

This head movement analysis, while theoretically very interesting, requires more than is given to handle the data points offered here. In the next section I will provide additional data points that this account cannot handle in its current form.

3.2 Sub-Extraction Analyses

There is another influential approach to swiping. As opposed to post-syntactic movement, there could be movement prior to spell-out as van Craenenbroeck and Hartman and Ai propose. Under this account, the prepositional phrase moves to the left periphery. After this, the wh-element subextracts from within the moved prepositional phrase further leftward. This is sketched in the tree below.

7 Even if the prepositional phrases themselves are swapped, the generalization still holds.

(i) a. Ivy was talking, but I can’t remember about what (it was) to who.
b. Ivy was talking, but I can’t remember what (it was) about to who.
c. *Ivy was talking, but I can’t remember what (it was) about who to.
d. *Ivy was talking, but I can’t remember about what (it was) who to.

8 In van Craenenbroeck’s account it is the first of two CPs that the prepositional phrase moves to while in Hartman et al.’s account it is a Foc(us)P that it moves to. This distinction is not relevant for the discussion here.
There are various advantages to this approach. One such advantage is that it, as we will see below, neatly explains the fact that the preposition is given stress and the fact that swiping requires sluicing. That is, for the sentence in (27), the preposition must bear stress in its prosodic phrase (the example below is from Merchant, though see Romero 1998 for an extensive discussion.).

(27)a. Ben was talking, but I don’t know...
   b. [\( \phi \) who TO]
   c. *[\( \phi \) WHO to]

Hartman et al. propose that the preposition bears a [+foc] feature that picks it out as new information. They use Merchant’s stricture on ellipsis, E-GIVENness which require that all the material in the ellipsis site be E-GIVEN, or contextually old information. This compels the [+foc] prepositional phrase upwards in the tree to a [Spec, FocP] position in the left periphery. This focus feature is checked in this new position, effecting stress on the preposition, and the wh-element moves to [Spec, CP] to check it’s
[+wh] feature. Without the ellipsis, there would be no motivation for the prepositional phrase to move: It would have no E-GIVENness restriction to evade.

This confluence of features and restrictions paves the way for some core features of swiping to fall out: the preposition is stressed and not elided. And since the FocP is c-commanded by the CP in their analysis, when the wh-word moves it creates the object-preposition order.

This approach makes the prediction that swiping will not be licit when the preposition has an antecedent. This is seen in (28) from Merchant.⁹

(28) We were with somebody. I forget who (it was) (*with).

The preposition with its [+foc] feature is certainly not old information, but with this explicitly mentioned with it is. This precludes the swiping preposition from hosting the feature and thus from moving out of the ellipsis site. When the preposition is omitted (elided because it has not moved) the sentence is fine.

Despite this approach’s strong points, there are certain things it cannot handle. In this section I will discuss some.

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⁹It should be noted that the sentence in (28) is for some speakers not too degraded when the preposition is pronounced. In this paper I assume the analysis of Hartman an Ai which reduces the effect to discourse restrictions and adopt their account for the variable judgments of such sentences.

Less easy to account for though is the differences in acceptability between (28) which is marginal with the preposition unelided and (i) which is atrocious with the preposition unelided:

(i) *Ivy was talking to a man, but I don’t know which (it was) to

Hartman and Ai would attribute the unacceptability of (28) and (i) to the same source, but as such there is no way to account for the disparity in acceptability.
The sub-extraction approach requires that the to-be-swiped constituent move to a left-peripheral position before sub-extraction of the wh-word occurs. In other words, movement to the left periphery of the constituent that evades IP ellipsis feeds swiping. This is perfectly reasonable when considering prepositional phrase swiping. There is independent evidence that prepositional phrases can undergo movement to the left periphery. They be pied-piped (29), clefted (30), or topicalized (31):

(29) With who(m) was Ivy talking?
(30) It was to Lana that Ivy was talking.
(31) To Lana, Ivy was talking

However, as posited earlier, it is not only prepositional phrases that can undergo swiping – Gerundive small clauses and infinitival complement clauses can also swipe. If movement to the left periphery crucially feeds swiping, there should be independent evidence of these elements appearing in that position. But as seen below, these constituents can not be pied-piped (32), clefted (33), or topicalized (34):

(32) a. *Doing what was Ivy caught?
    b. *To do what was Ivy eager?
(33) a. *It was stealing my money that she caught him.
    b. *It was to report on time that we failed. (examples from Emonds 1972)
(34)  a. *Stealing apples, Ivy was caught.
       b. *To run away from home, Ivy was eager.

There is no evidence that constituents implicated in swiping can generally move to the left periphery which is prima facie reason to be suspicious of this account of swiping. It would be necessary for proponents of this analysis to posit one of two things in light of the data above: 1) a hybrid account of swiping in which prepositional swiping is fed by movement to the left periphery, but the other instances of swiping are derived in some other fashion or 2) Swiping is a special instance in which constituents that cannot otherwise move to the left periphery nevertheless actually do. Neither of these logically possible options is particularly attractive.

Additionally, this approach does not seem to be able to predict that swiping can occur along side the sluicing of other elements. Recall the type of sentences from (23) above, exemplified by (35).

(35)  Ivy was talking, but I can’t remember who to about what.

Under the sub-extraction account, the PP to who moves to FocP, but what about about what? The preposition is not stressed and thus presumably does not host a [+Foc] feature. There is then no motivation to move from within the IP and the fact that it survives ellipsis is unexplained.
Say for the sake of argument that the preposition *about* does have a focus feature. Were this the case, it may still have no place to go. Cinque 1999 argues that left-peripheral Topic positions can iterate, but not Focus positions. Of these there can only be one. If this is in fact the case, then the [+Foc] feature on *about* will need to move out from within the IP, but it will have nowhere to go. This ought to cause the derivation to crash: a false prediction.\(^{10}\)

3.3 Remnant Movement

The third main analysis of swiping, originally posited by Kim 1997 (see also Hasegawa 2007 and Nakao, Hajime, and Yoshida 2006), holds that remnant prepositional phrase is extraposed so as to evade IP ellipsis. Kim presents this in the following way. First the wh-element moves from within the prepositional phrase (36).

\[(36) \quad [vP \text{ who, was standing } [PP \text{ by t.}]]\]

\(^{10}\) It is also the case that the sort of movement proposed here violates the Condition on Extraction Domain (CED) proposed by Huang (1982) (see also Wexler and Culicover 1980) which quite clearly prohibits sub-extraction from a moved constituent. To avoid this problem such analyses would be forced to suppose a counter-cyclic operation of a remnant PP moving to [Spec, FocP] after their wh-word has moved to Spec, CP. This in turn would violate Chomsky’s (1995) extension condition which requires movement operations to target roots only.

Another option would be to follow Nakao, Hajime, and Yoshida’s (2006) relatively stipulative assertion that the prepositional phrase moves without leaving a trace. Movement from an element that, in effect, has not moved should not induce CED effects.
Following this and the subsequent wh-movements to Spec, CP, the prepositional phrase moves to a right-peripheral position above the IP (37).

(37) Ivy was standing, but I don’t know [CP who\(_i\) [IP Ivy was standing t\(_k\) ] [PP by t\(_i\) ]\(_k\) ]

The IP is subsequently deleted and the wh-element as well as the prepositional phrase survive and do so in such a way that derives the relevant mutual ordering.

The analysis I posit will be superficially similar to what will be argued here, yet there is a very problematic aspect of the Kim analysis that undercuts its viability. In order to avoid deletion, the prepositional phrase must move outside of the IP in a rightward fashion. There is evidence that English prepositional phrases cannot extrapose this high. That is, this movement violates all versions of the right-roof constraint (see Ross 1967, Johnson 1986, McCloskey 1999, Sabbagh, 2008).

The point is clear in instances in which the prepositional phrase must move much farther than we expect it to be able to given any definition of the right-roof constraint. Take for instance the example in (38). Here the preposition must have move across multiple clauses: a violation of the right-roof constraint as it can be seen in (39) that an prepositional phrase that is extraposed that far leads to an illicit sentence.

(38) a. Ivy said that Jim heard that Iris was talking, but I don’t know who to.

b. Ivy said that Jim heard that Iris was talking, but I don’t know [CP who\(_i\) [IP Ivy said [CP that Jim heard [CP that Iris was talking]\(_k\) ] [PP to t\(_i\) ]\(_k\) ] [PP by t\(_i\) ]\(_k\) ]
(39)  *Ivy will say (that Jim heard) that Iris was talking tomorrow to someone.

Even prepositional phrases that can extrapose can only do so very short distances.
That is, we can extrapose the prepositional phrase [with Ivy] in (40) to the right of a low adverb, but not a high adverb (in the sense of Cinque 1999) (41).

(40)  Ivy talked yesterday to Ivy.

(41)  *Ivy talked unfortunately to Ivy.

Similarly it is not possible for the other swiping constituents to extrapose outside of the IP and avoid ellipsis.

(42)  a. Ivy was caught yesterday stealing candy.

        b. *Ivy was caught unfortunately stealing candy.

(43)  a. Ivy was eager yesterday to leave for home.

        b. *Ivy was eager unfortunately to leave for home.

Were this analysis to allow extraposition to a closer node, it would fail to explain how the elements avoid IP deletion. If it moved less distance a non-constituent portion of the IP would need to be deleted in order to derive the fact that the remnant appears overtly.
This analysis has been shown to be deficient in some respects. The analysis that I propose is very similar to this however. One important difference is that my analysis does not require long-distance rightward extraposition. Where my account relies on extraposition, extremely local extraposition will suffice. Given a certain theory of Merge, there will be no recourse to non-constituent deletion.

3.4 Summary

As we have seen above, the current analyses of swiping are insufficient to account for the new data presented here (as well as some data already extant). In the following section I propose my analysis and show it to meet these criteria.

4 Proposed Analysis

The previous accounts run into serious problems. Here I will show that swiping is the result of a constellation of operations: extraposition, traditional wh-movement, and IP ellipsis. The proposed derivation for an example like (44) is as follows in (45):

(44) Ivy was talking, but I can’t remember who to.

(45) a. extraposition: [talking t₁] [to who t₁]

b. wh-movement: [who t₂ Ivy was talking t₁ to t₂]

c. IP-ellipsis: [who t₂ Ivy was talking t₁ to t₂]
In this section I show how the constraints on each of these operations make predictions about the range of swiping phenomena such that it includes gerundive small clauses and infinitival complement clauses in English and analogous cases in other Germanic languages.

4.1 Extraposition

As shown above, the elements in English that can swipe can also extrapose locally. This is seen in the pairs (46-48)

(46)  
   a. Ivy was talking yesterday to someone.
   b. Ivy was talking, but I can’t remember who (it was) to.

(47)  
   a. Ivy was caught yesterday doing something.
   b. Ivy was caught, but I can’t remember what (it was) doing.

(48)  
   a. Ivy was eager yesterday to do something.
   b. Ivy was eager, but I can’t remember what (it was) to do.

Sub-components of those phrases however often cannot extrapose. Under the analysis presented here, if something does not extrapose, it cannot escape ellipsis and will thus not be pronounced. It is predicted that if a certain sub-component of cannot extrapose it will also not be able to arise in a swiping configuration.
This is shown with prepositions below. It is impossible to extrapose the object of a preposition in English (49) and swiping that involves just the wh-word object of a preposition is illicit as well.\textsuperscript{11}

(49)  
\begin{itemize}
  \item a. *Ivy was talking to yesterday a tall man.
  \item b. *Ivy was talking, but I can’t remember who
\end{itemize}

The same holds for the object of a gerundive small clause. They cannot extrapose nor can then be the sole survivor of IP ellipsis in the relevant circumstance:

(50)  
\begin{itemize}
  \item a. *Ivy was caught doing yesterday something illegal.
  \item b. *Ivy was caught, but I can’t remember what.
\end{itemize}

The clearest instance of this is found with infinitival swiping. It is shown in (51a) that it is not possible to extrapose the verb to the exclusion of the infinitival particle \textit{to} nor is it possible to extrapose the object of the verb (51b). These same elements (taking wh-movement into account) cannot swipe either (51c-d).

(51)  
\begin{itemize}
  \item a. *Ivy was eager to yesterday \{do something (fun)\]
  \item b. *Ivy was eager to do yesterday \{something (fun)\]
\end{itemize}

\textsuperscript{11} This is difficult to test for with prepositional phrases and gerundive small clauses. These instances only have two relevant components (wh-word and host) and if only the wh-word extraposes, the swiped result will be indistinguishable from a failure traditionally found in sprouting as discussed in Chung, Ladusaw, and McCloskey 2011 and Larson 2012.
c. *Ivy was eager, but I can’t remember what do

d. *Ivy was eager, but I can’t remember what

It seems that there is a clear correlation between that which can extrapose and that which can survive IP ellipsis in swiping. This correlation extends beyond English to other Germanic languages. For example, Dutch allows implicit infinitival complement clauses in an analogous way to English. The example in (52) is possible with or without the complement clause:

(52) Jan was klaar (om iets te doen)

Jan was ready Comp something to do

Jan was ready (to do something)

Unlike English, it is not possible to extrapose the complement clause, either inclusive or exclusive of the complementizer *om as seen in (53). As predicted, these phrases cannot be swiped (54).  

12 The same pattern presented here for Dutch holds also for Afrikaans. Infinitival complement clauses cannot extrapose (i), nor can they be involved in swiping (ii):

(i) [Koos was gretig (*gister) om (*gister)] (iets te eet)
    Koos was keen yesterday Comp yesterday something to eat.
    ‘Koos was keen (yesterday) to eat something.’

(ii) *Ek weet dat Koos gretig was, maar ek kannie onthou wat (om) te doen nie.
    I know that Koos keen was but I can’t remember was Comp to do not
    ‘I know that Koos was keen, but I can’t remember what to do.’
(53) a. *[Jan was klaar gisteren] om iets te doen.

    Jan was ready yesterday to do something

b. *[Jan was klaar om gisteren] iets te doen

    ‘Jan was ready yesterday to do something.’

(54) *Ik weet dat Jan klaar was, maar ik kan me niet herinneren wat (om) te doen.

    I know that Jan was ready, but I can’t remember what to do

    ‘I know that Jan was ready, but I can’t remember what to do’

This contrasts with German which has a similar construction (55) that does allow extraposition (56):

(55) Johannes war bereit (etwas zu machen).

    Johannes was ready something to make

    Johannes was ready (to do something)

(56) [Johannes war bereit gestern] etwas zu machen.

    ‘Johannes was ready yesterday to do something.’

    As predicted, it is possible to swipe a wh-word from this infinitival phrase:
I know that Johannes was ready, but I can’t remember what to do.'

The same pattern holds for Norwegian: optionally implicit infinitival
complements that can extrapose can also undergo swiping:

'Sondre was eager (yesterday) (to do something)

'I know that Sondre was eager, but I have forgotten what to do.'

In short, there is evidence that whether or not a potentially implicit argument can
extrapose determines in part whether swiping is allowed with that construction. This
varies from language to language, but this abstract condition on swiping seems to hold in

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13 One of my Norwegian informants finds (59) unacceptable. I do not have a means to explain this although
my analysis permits additional constraints on swiping that such as a ban on extraction from extraposed
elements under sluicing.
some form across Germanic languages. However, being able to extrapose is a necessary but not sufficient condition on swiping. In this next section I discuss constraints on wh-movement that impact the possibility of swiping.

4.2 Wh-movement

In this sub-section I show that conditions on wh-movement also constraint swiping. To be able to undergo swiping, it must be possible to extract a wh-word from the constituent in question. Each of the three flavors of swiping for English independently allows wh-extraction from within that phrase:

(60)  a. Who was Ivy talking to?
     b. What was Ivy caught doing?
     c. What was Ivy eager to do?

The same holds in German to a degree. It is possible to extract from within an infinitival complement (61), but it is not possible to extract from within a prepositional phrase (62):

14 The same pattern holds outside of Germanic languages. Finnish employs a potentially implicit argument that is analogous to the gerundive small clause in English that can be extraposed (i), this same constituent allows swiping (ii):

(i) Antti näki miehen (eilen) (tekemässä jotakin)
    Antti saw man.acc yesterday eat.3inf. something
    ‘Antti saw a man (yesterday) (doing something)

(ii) Tiedän että Antti näki miehen, mutta olen unohtanut mitä tekemässä
    know.1sg that Antti saw man.acc but am forgotten what do.3inf.
    ‘I know that Antti saw a man, but I’ve forgotten what doing.’
(61) Was war Johannes bereit zu machen?
what was Johannes ready to make?
‘What was Johannes ready to do?’

(62) *Wem hat Johannes mit gesprochen?
who.dat has Johannes with spoken
‘Who did Johannes speak with?’

Given this constraint, it is not predicted that German allows swiping (as also noted in Merchant 2002) of preposition phrases (63), but it is predicted that infinitival clauses should allow swiping as seen above in (57).

(63) *Johannes hat gesprochen, aber ich weiss nicht wem mit.
Johannes has spoken but I know not who.dat with
‘Johannes has spoken, but I don’t know who with.’

Another constraint on movement that we expect to arise with sprouting is the effect of islands and the analysis proposed here predicts that swiping should be subject to them. To understand why this is a prediction of the proposed analysis, it is necessary to assume a particular view of island violations.

Fox and Lasnik (2003) among others argue that islands are a PF phenomenon and they use argumentation concerning sluicing. Without rehashing in detail what they argue,
suffice it so say that so long as an island is not pronounced, there is no violation. Slightly more concretely, the example below is a grammatical sentence because the island harboring the trace of the moved wh-element is elided (64a), though without the ellipsis, the sentence is bad (64b). In other words, it is not narrow syntax that determines island violations. Rather it is the PF component.

(64) a. Ivy saw the man who kissed someone, I just can’t remember who, [IP Ivy saw [Island the man who kissed t_i]]

b. *Ivy saw the man who kissed someone, I just can’t remember who, Ivy saw the man who kissed t_i

If swiping works the way I argue it does, swiping results in a sentence in which sluicing leaves a trace within an island yet outside ellipsis. If the trace of the element that moved outside the island is not elided and the sentence is bad, then it would provide further support to the idea the islands are PF phenomena.¹⁵

As we can see below, swiping obeys island conditions. The sentence in (65) cannot have the interpretation in which the speaker cannot remember who Ivy claimed that Ivy was talking to.¹⁶

¹⁵ Or vice versa: if islands are a PF phenomenon and swiping sentences obey island constraints, then the current analysis is the only one that predicts this. In the sub-extraction account, the elided trace of the PP should no more cause island violations than wh-traces do in sluicing.

¹⁶ There is a confounding factor here. Sluicing sentences in which what is sluiced has no antecedent (sprouting sentences) have been independently shown to be subject to island constraints (see Chung, Ladusaw, and McCloskey 1995 and Yoshida et al. 2010). Larson 2012 argues that swiping in general is fed by extraposition and the same argument is used here.
(65) a. *Ivy knows the man who was talking, but I can’t remember who to.
    b. *Ivy knows the man who was caught, but I can’t remember what doing.
    c. *Ivy knows the man who was eager, but I can’t remember what to do

It is thus possible to account for the island sensitivity of swiping having posited that there is an island-internal trace that goes un-elided.

It is generally the case that the same prohibitions on wh-movement also hold for swiping and as long as both extraposition and wh-movement are possible, swiping is not ruled out (see Hasegawa 2007 for a similar implementation of this).\textsuperscript{17} In the next section I discuss the final component of swiping, namely IP ellipsis and show how it is implicated in generalized swiping.

4.3 IP Ellipsis

In this section I discuss how IP ellipsis works in swiping. In particular I focus on how extraposed elements can avoid such ellipsis, which is a crucial component of the present analysis. I take extraposition to result in adjunction to a local phrase (it does not matter exactly which phrase for the argument to go through, as long as it is below IP) and qua adjuncts, the extraposed elements can evade deletion.

\textsuperscript{17} It is important to note that extraction from extraposed clauses is generally considered unacceptable outside of sluicing contexts (i) (Although many consider such examples acceptable). I assume that this ban can be remedied via elision of the base trace of the extraposed element such that it is as if it had not moved at all as far as sub-extraction is concerned.

(i) %Who was Ivy talking yesterday to
It is well known that certain VP-adjuncts can avoid VP ellipsis as seen below in (66). Furthermore, it is argued by Jayaseelan (1990) that extraposed arguments can avoid ellipsis. This is what lies behind the gapping in (67).

(66) Ivy wrote a letter on Tuesday and Lana did on Thursday

(67) Ivy wrote a letter and Lana a novel

It is possible for adjunct to evade deletion in IP ellipsis as well. Lasnik (in press) argues that multiple sluicing is derived via the first wh-phrase moving to the left-periphery while the other wh-phrase extraposes to avoid ellipsis. This extraposed wh-phrase can be either an adjunct (68a) or an argument (68b) and still evade ellipsis:

(68) a. Ivy saw a friend in a cafe, but I can’t remember which friend in which cafe.

b. Ivy gave a book to a friend, but I can’t remember which book to which friend.

As noted before, it is a simple empirical fact that ellipsis can target IPs to the exclusion of adjuncts (or extraposed arguments as adjuncts). But how can this happen when the extraposed elements have not vacated the IP? Below I show how this can be done using the notion of decomposed merge.
4.3.1 Decomposed Merge

Hornstein (2009) presents the following conundrum. According to Bare Phrase Structure (BPS) (Chomsky 1995), there can only be one maximal projection per head. Prior to BPS, this was not the case and in particular adjunction extended the tree but did not change the bar level information. As seen in (69), an adjunct could adjoin to a VP and the label dominating that would in turn be another VP.

\[(69) \quad \text{Ivy} [\text{VP} [\text{VP saw Ivy} \text{ on Saturday}]]\]

This was advantageous. Certain operations only worked on maximal projections, say VP-ellipsis. In the above structure VP-ellipsis could operate on the inner (70b) or outer (70c) VP.

\[(70) \quad \begin{array}{l}
\text{a. Iris saw Ivy on Sunday...} \\
\text{b. ...and Ivy did on Saturday.} \\
\text{c. ...and Ivy did, too.} \\
\end{array}\]

But with BPS, we can no longer capture these facts. What is considered a maximal projection is now relative and not inherent to any node. As such, the structure in
(69) only has one maximal projection, the outer VP. We no longer have a means of operating on the VP to the exclusion of the adjunct.18

(71) Ivy [VP [saw Ivy] on Saturday]

To solve this dilemma, Hornstein proposes a decomposition of the Merge operation.19 Merge, as construed in Chomsky 1995 takes two syntactic elements and combines them, projecting one of them as the label of said combination (72).

(72) \( \text{Merge}(x,y) \rightarrow \{x,\{x,y\}\} \)

Hornstein instead posits that the above operation should be broken down into two operations: Concatenate (73) and Label (74). The Concatenate operation takes two atomic syntactic units and combines them into a complex of atomic units. Label makes said complex atomic itself by choosing one of the elements of the Concatenation operation to serve as the label of complex:

(73) \( \text{Concatenate}(x,y) \rightarrow \{x,y\} \)

(74) \( \text{Label}(x,\{x,y\}) \rightarrow \{x,\{x,y\}\} \)

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18See Hornstein 2009 for arguments against Chomsky’s (1995) reformulation of adjunction which could in principle avoid this problem.
19Precursors to this theory can be found in Chametzky 2000 and Uriagereka 2002 and the theory is further discussed in Hornstein and Nunes 2008.
According to the theory, normally both of these operations are carried-out, but with adjunction this is not the case. Adjuncts, not being necessary to the derivation, do not necessarily have to undergo Label. See Larson (forthcoming) for a more detailed analysis of when Label must apply.

This decomposition allows for an elegant account of the differential behavior of adverbial modification. When an adverb Concatenates with a verb and does not project (75), the verb+adverb complex is, in Hornstein’s words, “invisible” to the rest of the structure.20 So when an operation like VP-deletion targets a VP with a Concatenated adverb, the VP deletes leaving the adverb behind (76).

(75) \[ \overline{VP} \overline{A} \]
    \[
    \begin{array}{c}
    \text{run} \\
    \text{quickly}
    \end{array}
    \]

(76) Ivy ran slowly and Ivy did quickly.

When an adverb is both Concatenated and Labeled into the structure (77), VP-deletion applies to the adverb as well (78).

(77) \[ \overline{VP} \overline{A} \]
    \[
    \begin{array}{c}
    \text{V} \\
    \text{run} \\
    \text{A} \\
    \text{quickly}
    \end{array}
    \]

(78) Ivy ran quickly and Ivy did too.

20 Take the dashed line to indicate Concatenation with Labeling.
4.3.2 Application to Swiping

We can straightforwardly apply the above discussion to adjunct PPs attaching to IP. So long as they do not Label, the ellipsis will leave them unscathed. Take “^” to signify Concatenation without Label, we can analyze swiping more accurately as (79) below.

(79) Ivy was talking, I just can’t remember who[^IP Ivy was talking t_k][PP to t_k]

This has an advantage over the superficially similar Kim account. In his account, the prepositional phrase rightward moves to some extra-IP position, violating the right roof constraint. In this analysis no movement outside of the vP is required. Instead, the preposition avoids IP deletion by not fully integrating into the structure.

Instances where swiping occurs with noun complement prepositional phrase work in a similar fashion. For the example below, the noun complement PP need only extrapose to adjoin to the phrase that it is a complement to for this analysis to work. In fact, this is exactly the analysis proposed by Akmajian (1975). This allows us to avoid deleting the PP without resorting to long distance rightward movement out of the cyclic node which in this case the DP:

(80) Ivy met a student, but I don’t know what of.
(81) Ivy met a [NP student t_k] [PP of t_k]
This account is essentially an echo of Ross’ (1969) account that avoids both the stipulative nature of it as well as its ungainly recourse to deletion of non-constituents, a problem Ross himself acknowledges. His transformational analysis is given below. The string in (82) has its elements in slots 2 (X) and 4 (Y) deleted to the exclusion of the element in slot 3 (P).

\[(82) \quad [CP \, XP_{+wh} \, [IP \, X - P - Y]] \rightarrow [CP \, XP_{+wh} \, [IP_- - P - _]]\]

The analysis present here derives the fact that the P is excluded from this deletion by allowing X and Y to form a constituent to the exclusion of P via extraposition.

4.4 Summary

In this section I have shown how extraposition and wh-movement accurately constrain the analysis of swiping so as to comport with the facts. Further, the fact that adjuncts can avoid ellipsis allows the extraposed remnants to persist to PF and be pronounced. This analysis is sufficient to handle the prepositional phrase swiping data that has long informed the analysis of swiping. It is also general enough to permit the novel date presented here: Any potentially implicit argument that can bear wh-extraction and also undergo extraposition can be involved in swiping. This is not a large class of elements, but it is wider than the previous accounts can handle.
5 Conclusion

In this paper I widen the empirical domain of the swiping construction to comprise more than just optionally implicit prepositional phrase complements. I presented novel data from multiple languages that shows that various optionally implicit non-finite clauses can also take part in swiping. I propose an analysis of swiping that does not succumb to the shortcomings of its predecessors and is able to capture the expanded purview of swiped presented here. Third, I have found further support for the idea that islands are PF phenomena. And last, as a strictly theoretical point, I have suggested a further use for Hornstein’s decomposition of merge.

6 References


