

That-trace effects: haplogy is the answer*

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Abstract *That-trace* effects in English have been treated as violations of prosodic well-formedness conditions, i.e. [Kandybowicz \(2006a\)](#) and [Sato & Dobashi \(2016\)](#): the C head and the trace cannot be parsed in the same prosodic phrase. Satisfying this condition is claimed to allow for amelioration effects induced by sentential adverbs, narrow focus on the embedded verb, and pronominal resumption. However, I argue that a [C t] prosodic phrase cannot be the reason for *that-trace* effects since such a prosodic phrase is not empirically supported by several data points, and in fact should not be formed in the first place as it violates prosodic well-formedness conditions. Adopting some insights from the Cyclic Linearization model ([Fox & Pesetsky 2005b;a](#); [Davis 2020b](#)), I offer an explanation for the effects and their amelioration in terms of an interface condition: the Two-Copy filter. The filter bans two strictly identical intermediate copies from occurring in the same spell-out domain as it would lead to a lethal ambiguity problem during linearization. The effects are thus a subtype of the Obligatory Contour Principle effects. Once the identity is avoided by pre-emptive rules ([Radford 1977](#); [Nevins 2012](#); [Neeleman & Koot 2017](#)) early during the derivation (i.e. adverb intervention), or repair mechanisms at different PF stages, the effects fail to obtain.

Keywords: *that-trace* effects; syntax-PF interface; syntactic haplogy; identity avoidance; relative clauses; narrow focus; resumption;

1 Introduction

That-trace effects refer to the unacceptability of a configuration where a complementizer “immediately precedes” the trace or copy of a moved subject, as in (1):

- (1) * Who did you say that *t* wrote *Good Omens*?

Despite there being a whole body of literature addressing the phenomenon since [Perlmutter \(1968\)](#), it remains a problem to this day what is the best analysis to derive the effects. Some proposals argue for syntactic ill-formedness, i.e. a constraint making reference to the hierarchical structure of the clause (see [Pesetsky 2017](#) for a detailed overview on the phenomenon and a proposal in terms of the probe-goal theory of movement by [Pesetsky & Torrego 2001](#)). On top of the early ECP accounts based on government ([Pesetsky 1982; 1995; Rizzi 1982; 1997; Culicover 1993a;b](#)), some have recently argued that the effects can be explained if there is an anti-locality constraint ([Erlewine 2016; 2020; Brillman & Hirsch 2016; Toquero-Pérez 2021](#)) according to which movement from Spec,TP to Spec,CP is too short (i.e. it does not cross enough projections).

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There are also amelioration effects that improve the acceptability of sentences with an overt complementizer and a subject trace. The most common one is the "adverb effect" originally spotted by [Bresnan \(1977: 194, fn.6\)](#) and rediscovered by ([Culicover 1993a](#)). This consists of inserting an adverbial that breaks the linear adjacency between the C head and the trace, as in (2). These amelioration effects seemingly present a challenge to a purely syntactic explanation and bolster the appeal of accounts in terms of prosodic constraints

(2) ? Who did you say that for **all intents and purposes** *t* wrote *Good Omens*?

However, while a prosodic account has a natural way to explain the amelioration effects, the anti-locality syntactic accounts can also deal with them: assuming that the adverbial is adjoined to a functional projection above the TP ([Browning 1996](#)), *wh*-movement is "long enough" bypassing anti-locality.¹

In addition to this ameliorating effect, [Kandybowicz \(2006a: 221-222\)](#) claims that there are other mitigating effects that are due to prosody. Among these, narrow focus on the embedded verb (3) and C-auxiliary contraction (4) are supposed to improve the acceptability of a sentence with *that-trace* effects:

(3) ? I know you don't know who filmed it, but who did you say that *t* WROTE *Good Omens*?

(4) a. ? Who did you say that'll write *Good Omens*?

b. Who did you say [that-*t*-'ll] write *Good Omens*?

Data like (3) and (4), assuming they are acceptable, present serious challenges for purely syntactic accounts: no obvious change in the syntactic structure seems to have occurred that would explain the amelioration. Thus, (3) and (4) make prosody-based accounts especially appealing. We should note, however, that the acceptability of these data have been contested experimentally by [Ritchart, Goodall & Garellek \(2016\)](#). [Ritchart, Goodall & Garellek \(2016\)](#) tested [Kandybowicz's \(2006a\)](#) hypothesis by looking at focused data. Their 3x2x3 design crossed the presence of *that* (*that* vs. no *that*), type of gap (subject vs. object) and the locus of focus (narrow focus on matrix V vs. narrow focus on embedded V vs. broad focus). They found no significant interaction between overt *that* and *focus*: while the *that-trace* sentence improves in the two contrastive narrow focus cases (narrow focus on matrix and embedded V), a very similar amelioration is found in the subject gap cases without *that*, which do not need amelioration because they are not ungrammatical; their conclusion is that, in fact, this particular amelioration effect is not enough to consider [Kandybowicz's \(2006a\)](#) data acceptable.² They also looked at and C⁰-aux cliticization (*that will* → *that'll*). In the case of C⁰-aux cliticization, they found that it does not have amelioration effects on the acceptability of the sentence: no *that* is significantly better than overt *that* and *that-AUX*; overt *that* and *that-AUX* are equally bad. I will not consider the C⁰-aux cliticization further in the light of the experimental data.

They also discuss cases in which the *that-trace* effect violation is avoided due to ellipsis ([Merchant 2001](#)). These include cases in which the offending sequence [C *t*] are completely deleted at PF (5b):

(5) a. * Its probable that a certain senator will resign, but [_{DP} which senator]₁ [_{TP} it's probable that _{t_{DP}} will resign] is still a secret.

¹ For some anti-locality approaches like [Erlewine \(2016; 2017; 2020\)](#), [Douglas \(2017\)](#) and [Brillman & Hirsch \(2016\)](#), the adverb can be adjoined to the TP that is crossed by movement. For others like [Toquero-Pérez \(2021\)](#), the adverb crucially has to be introduced by its own functional projection between TP and CP.

² As [Ritchart, Goodall & Garellek \(2016: 324\)](#) put it "[t]he ameliorating effect that contrastive focus has been claimed to have on the that-trace phenomenon is thus real, but misleading: it is not specific to the that-trace sentence, and is part of a general amelioration that occurs in all the subject gap cases."

- b. Its probable that a certain senator will resign, but [_{DP} which senator]₁ [_{TP} it's probable that t_{DP} will resign] is still a secret. (Merchant 2001: 185)

Nevertheless, despite the fact that prosodic approaches apparently derive the facts in an elegant fashion, I would like to point out there are some overlooked challenges that are worth calling attention to. In this paper, I review two recent prosody-based accounts, Kandybowicz (2006a) and Sato & Dobashi (2016), and I raise two sets of concerns: one is related to the prosodic mappings argued for in the two approaches; the other focuses on the accessibility that prosody has to traces.

These proposals, though prosody based, place the focus of the ungrammaticality on the fact that the complementizer is followed by a trace or a null element. This has been the general trend in the literature since Perlmutter's (1968; 1971) original generalization. However, with the advent of successive cyclicity of movement (Chomsky 1977; 1994; 1995; Chung 1982; Fox 1999; Nissenbaum 2000; McCloskey 2000; 2002; Legate 2003), there is substantial evidence that (at least some) CPs host a copy of moving elements in their specifiers. In other words, CPs constitute phases or cycles during the syntactic derivation (Chomsky 2000; 2001; Nissenbaum 2000; Abels 2003; Citko 2014; Keine 2020). For (1), this means that when a *wh*-element in Spec,TP has to A-bar move to the matrix clause, it must first land in Spec,CP. Otherwise, if it does not move to the phase escape hatch, that *wh*-element will be trapped and unable to undergo any subsequent syntactic operation. This movement step has an important consequence as it creates two intermediate copies of the same item that have no distinction in features – nothing is checked or valued by moving to this intermediate landing site as the complementizer is declarative and the *wh*-element is [WH, uQ:___], as argued for instance by Bošković (2007). As a result, the embedded CP domain of (1) looks like (6):

- (6) [_{CP} *who* that [_{TP} *who* ...]]

This sort of configuration in (6) is troublesome for the grammar: two intermediate non-distinct copies are contained within the same cyclic domain and are relatively adjacent to each other, i.e. they are separated by a functional (as opposed to lexical) morpheme, which is phonologically weak. It resembles Obligatory Contour Principle effects (Leben 1973), in terms of identity avoidance.

Following Fox & Pesetsky's (2005b;a) suggestion that whole phases are spelled-out, I offer an explanation of the effects based on identity avoidance during linearization. Specifically, I propose that there is a PF filter, which I label The Two-Copy filter, that bans sequences of two non-distinct intermediate copies in the same spell-out domain. For the filter to apply, these copies must be in relativized adjacency (Nevins 2012): the two copies are either strictly adjacent or separated by a weak phonological element, e.g. *that*, *for*. Importantly, if the constituent in Spec,CP is not created by intermediate movement, as in relative clauses, the filter does not apply and *that-trace* effects fail to appear. In other words, the ultimate goal of the filter is to prevent a lethal ambiguity from emerging (McGinnis 2004). The amelioration triggered by focus and resumptive pronouns are repairs that the grammar might resort to, after linearization has occurred, in order to eschew sameness at different stages of PF. If no repair occurs, and the violation mark induced by the Two-Copy filter survives, the derivation crashes at the interface.

The paper is organized as follows. Section 2 overviews the two mentioned prosodic proposals. Section 3 discusses the first set of observations: (i) functional categories for syntax-prosody mapping do not generally create their own prosodic phrases; (ii) evidence for (i) based on three phonological rules of English (tap, palatalization, and glottalization rules), and cross-linguistic data; and (iii) the application of (i) and the phonological rules in (ii) to relative clauses. Section 4 provides more arguments against the two mentioned approaches. The argument is based on evidence that prosody is blind to null elements such as traces, null operators, PRO and the like;

thus, they should not count for prosodic phrasing. Section 5 offers an alternative account to *that-trace*, *anti-that-trace* effects and their amelioration based on syntactic haplology. Section 6 concludes the paper.

2 Prosody-based accounts

2.1 Kandybowicz's $*\langle C^0, t \rangle$ filter

Kandybowicz (2006a) proposes that there is a $*\langle C^0, t \rangle$ filter at PF (7) that disallows certain prosodic mappings.

- (7) $*\langle C^0, t \rangle$ iff:
- a. C^0 and t are adjacent within a prosodic phrase; and
 - b. C^0 is aligned with a prosodic phrase boundary (Kandybowicz 2006a: 223)

A note on the terminology is in order. Given the broadness of the term "prosodic phrase" in (7), it could make reference to any prosodic constituent: from a Prosodic Word (which roughly corresponds with lexical items that might host function words) to Intonational Phrases (which correspond to clauses or full utterances typically marked by obligatory pauses). The ones that will be relevant here are Intonational Phrases (IPs), Intermediate Phrases (intPs) and Phonological Phrases (PhPs). A PhP consists of at least a Prosodic Word, and roughly corresponds to XPs in the syntax, while an intP typically describes topics, adverbial and embedded clauses, i.e. they are bigger than PhPs but smaller than IPs (Khan 2008; Hsu 2016: 3).

That said, according to (7) a sentence like (1), with the prosodic phrasing of (8), is ruled out because it violates both conditions of the filter:

- (8) $* ({}_{IP} \text{Who did you say } ({}_{intP} \text{that } t \text{ wrote } \textit{Good Omens?}))$

Given the phrasing in (8), (7a) is violated because "when C is pronounced in full, an Intermediate Phrase divides the embedded clause from the matrix clause" (Kandybowicz 2006a: 222). Thus, C and the trace are contained within the same prosodic phrase, i.e. they are contained within the intP that introduces the embedded clause. (7b) is violated given that the C head is aligned with the left edge of the intP.³

The filter in (7) also provides an explanation for the adverb amelioration effect in (9):

- (9) $({}_{intP} \text{Who did you say that}) ({}_{IP} \text{for all intents and purposes}) t ({}_{intP} \text{wrote } \textit{Good Omens?})$

Sentential adverbials can be parsed as IPs creating a prosodic boundary to the right of the complementizer. Thus, even though C is aligned with a prosodic phrase boundary, C and the trace are in separate phrases. Kandybowicz (2006a: 223, fn.2) assumes that the trace is not contained within any prosodic phrase. In fact, Kandybowicz is vague on specific prosodic structures, and one of the shortcomings of his account is that it does not explain the apparent indeterminacy of how *that* and the trace are grouped with their neighboring items. If, as Kandybowicz (2006a) assumes, the trace is not part of any prosodic phrase, by that same token, the trace in (8) should also be outside of the relevant prosodic phrase, contrary to what is expected by Kandybowicz (2006a). This raises one of the questions that is dealt with in section 4: prosody and its accessibility to traces.

Kandybowicz (2006a) also observes that the effects are ameliorated if the embedded verb is focused as in (10a). The reason for the amelioration is the assumption that the focused

³ Kandybowicz (2006c) uses an underscore () to represent traces. In this squib, I have substituted the underscore with a t (race) for clarity.

constituent will create a separation into two different intPs: one containing the matrix clause and crucially the complementizer, and another that contains the embedded clause whose prosodic edge is marked by the focused constituent (10b).

- (10) a. ? Who did you say that *t* WROTE *Good Omens*?
 b. (_{intP} Who did you say that) *t* (_{intP} WROTE *Good Omens*)?
 c. * (_{IP} Who did you say (_{intP} that *t* wrote) (_{intP} GOOD OMENS?))

As observed from the mappings in (10b), the trace is not part of either prosodic constituent (Kandybowicz 2006a: 223, ex.13a). Crucially, focusing any other element does not seem to give rise to this amelioration (10c) since the trace belongs to the same prosodic phrase as the complementizer and the complementizer marks the left edge of the phrase. As noted above, though, it remains unexplained why the trace and the complementizer do not belong to the same prosodic phrase in (10b) but they do in (10c) if traces "cannot be grouped into any prosodic phrase (i.e. [I]P/intP)" (Kandybowicz 2006a: 223, fn.2).

Although the proposal is attractive and seems to make the right predictions, I address some problem and inconsistencies in later sections. But before I do that, I overview the other prosody-based approach proposed by Sato & Dobashi (2016).

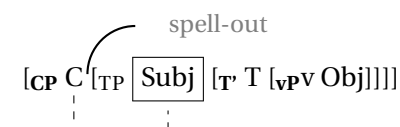
2.2 Sato & Dobashi's alternative

A more recent proposal has been made by Sato & Dobashi (2016). Building on Kandybowicz (2006a), they propose an alternative PF condition (11):

- (11) Function words cannot form a prosodic phrase on their own. (Sato & Dobashi 2016: 333)

According to (11), any prosodic phrase (e.g. PhP, intP, IP) that is made of only function words will be ruled out at PF. For them traces do count at the time of parsing and these are considered empty categories whose status is identical to that of any other functional category, i.e. they cannot form a prosodic phrase on their own. That is, a prosodic phrase composed of only C and/or a trace should be ruled out. For Sato & Dobashi (2016) adjacency between C and the trace is acceptable as long as there is a lexical item (as opposed to a functional one) in the prosodic phrase containing C and *t*. In other words, contrary to Kandybowicz (2006a), C and *t* can be next to each other in the same prosodic constituent only if there is also a lexical element in the same prosodic constituent that leads to the satisfaction of (11). The assumption that constraints relating syntactic and prosodic categories only apply to lexical elements and their projections is well motivated in the literature. Some examples of this include the Principle of the Categorical Invisibility of Function Words (Selkirk 1986), the Lexical Category Condition (Truckenbrodt 1999) or Prosodic Vacuity (Kandybowicz 2015).

In addition to this, Sato & Dobashi (2016) adopt a theory of phases according to which the spell-out domain of a phase head is mapped onto a PhP at PF (Dobashi 2003). They also assume that in order to avoid an "assembly problem" during linearization, there must be a shared element that connects the two spell-out domains:⁴ the initial (or left most element in the structure) is left behind and remains accessible to the next application of spell-out. This allows for the subject to be parsed with the complementizer, for example (12):

- (12) a. 

⁴ "Shared" should not be understood here as multidominated. It should be understood as a constituent that, though being part of a domain *X*, is also accessible to a domain *Y*. In other words, both *X* and *Y* share access to the same constituent.

- b. ($_{PhP}$ C Subj) ($_{PhP}$ T v V) ($_{PhP}$ Obj) (Sato & Dobashi 2016: 334)

The proposal makes similar predictions to Kandybowicz's (2006a) with respect to (1), and the adverb intervention facts (9). It is worth mentioning, though, that Sato & Dobashi's parse of (1) is different from Kandybowicz's (2006a) given in (8). This is illustrated in (13) and (14) for the traditional *that-trace* effect and the adverb amelioration effect respectively:

- (13) * Who did you say ($_{PhP}$ that t) ($_{PhP}$ wrote) ($_{PhP}$ *Good Omens*)?
based on Sato & Dobashi (2016: 336, ex.7a)
- (14) Who do you think ($_{IP}$ that t for all intents and purposes) ($_{PhP}$ wrote *Good Omens*)?
based on Sato & Dobashi (2016: 336, ex.12)

(13) is ruled out because C and t will be in a "minimal" (i.e smaller) prosodic phrase with no supporting lexical word. Relatedly, for the adverb amelioration effect parse in (14), *that* forms a prosodic constituent with lexical material satisfying (11).

A few notes are in order. If their parse were as (8), where what matters is constituency with respect to a larger prosodic constituent, i.e. IP, the sentence would be ruled in: their PF condition in (11) would not be violated because both function and lexical words form the IP/intP. With respect to the parse in (14), they do not provide a detailed decomposition of the larger IP into smaller PhPs. This raises a question about what the exact prosodic constituency of *that* is at the PhP level. If we are to be consistent with the structure assigned to (13), we expect *that* (and the trace) to be part of its own PhP to the exclusion of the adverb. But this configuration would violate their PF condition in (11). This is illustrated in (15) where the star (*) indicates phonological ill-formedness.

- (15) Decomposition of the IP in (14) as predicted by Sato & Dobashi (2016)
* ... ($_{IP}$ ($_{PhP}$ that t) ($_{PhP}$ for all intents and purposes)) ...

In sum, just like Kandybowicz is vague on the specific prosodic structures, so are Sato & Dobashi (2016).

A more noticeable difference with Kandybowicz (2006a) concerns the analysis of focus amelioration. In fact, Sato & Dobashi (2016) assume that there is a Left Focus Restructuring Rule (LFR) for English (16), originally proposed by Kenesei & Vogel (1995), that applies at the level of PhPs and that alters the original prosodic mapping so that (11) is satisfied. An example is in (17):

- (16) Left Focus Restructuring: English
If some word in a sentence bears focus, place a phonological phrase boundary at its right edge, and join the word to the phonological phrase on its left.
Sato & Dobashi (2016: 339) *apud* Kenesei & Vogel (1995: 19)
- (17) a. Who did you say ($_{PhP}$ that t) ($_{PhP}$ WROTE *Good Omens*)? Prior LFR
b. Who did you say ($_{PhP}$ that t WROTE) ($_{PhP}$ *Good Omens*)? After LFR

After LFR has applied in (17b), the PF condition is satisfied and the amelioration effect is achieved. This is in direct contrast with Kandybowicz (2006a), for whom focus starts a prosodic phrase (10b).

Last but not least, Sato & Dobashi (2016) report that in English it is possible to ameliorate the effects if a resumptive pronoun occupies the position to the right of the complementizer. Some examples are in (18):

- (18) Amelioration by resumption Sato & Dobashi (2016: 339, ex.18)

- a. [_{DP} Which author]_i is everyone saying that the publisher predicts that *he_i* would be adored?
- b. [_{DP} Which author]_i is everyone saying that the publisher predicts that [_{DP} *the guy*]_i would be adored?

The italicized DPs are intended to act as resumptive nominals: a personal pronoun in (18a), and an epithet DP in (18b).⁵ Regardless of what the independent conditions for resumption are at stake here, Sato & Dobashi (2016) argue that the relevant mapping for examples such as (18) satisfy their PF condition in (11) because the PhP contains phonetically realized material. The absence of the resumptive would result in a violation of the condition since the PhP would only contain the complementizer. The mapping with the resumptive is as in (19):

- (19) a. Which author is everyone saying that the publisher predicts (_{PhP} that he) (_{PhP} would be adored) ?
- b. * Which author is everyone saying that the publisher predicts (_{PhP} that *t*) (_{PhP} would be adored) ?

It is important to note that the resumptive in (18a) is a pronoun, and pronouns are functional elements; the prosodic phrase that contains the complementizer is made of only functional elements. Therefore, a mapping like (19a) should in fact be ruled by (11).

Now that the two prosody-based accounts have been reviewed, I move on to delve into the issues and questions raised by them, which to my knowledge remain unaddressed in the literature.

3 Functional categories and their own phonological phrases

In this section I concentrate on three major arguments: first, I discuss, based on the previous literature, the status of functional items with respect to syntax-prosody mappings; then I provide empirical support for the claim that function words and empty categories do not count for the prosodic mapping based on evidence from three phonological rules, which to my knowledge has not been applied to this domain before: the tap, palatalization and glottalization rules; finally, I provide more evidence for these claims in the domain of subject relative clauses introduced with *that*.

⁵ Sato & Dobashi (2016: 339, fn.2) note that not every case involving a resumptive might create amelioration effects, since it is possible that resumption is independently ruled out. For example, it has been observed that in English the resumptive element needs to be far enough from the displaced element to which it is related. If the distance between the filler and the resumptive is short, resumption is independently disallowed (Chomsky 1982; Sells 1984; Borer 1984; Ouhalla 1993), and no *that-trace* effect amelioration occurs (i):

- (i) No resumption due to filler-resumptive closeness Sato & Dobashi (2016: 339, fn.2, ex.i)
 - a. * Who_i do you think [_{CP} that *he_i* wrote the book] ?
 - b. * Who_i do you think [_{CP} that *who_i* wrote the book] ?

As opposed to (18), where the resumptive and the filler are separated by an embedded clause, in (i) they are not. Though a general trend, this observation does not always hold (ii):

- (ii) Resumption despite proximity
 - a. [_{DP} Which woman]_i does no Englishman even wonder whether *she_i* will make a good wife? Sells (1984: 477)
 - b. ? [_{DP} Which picture of John]_i were you wondering whether *it_i* was going to win the prize at the exhibition? Pesetsky (1998: 362)

Most of the syntax-prosody literature makes a distinction between lexical and functional categories. For example, lexical words in English require that one of their syllables is stressed, while function words do not; their vowels are typically unstressed and reduced to schwa (i.e. *that* = [ðət]). In fact, as argued by Selkirk (2011: 453), function words, especially monosyllabic ones, tend to not be standardly parsed as prosodic words. That said, though prosodic phrasing and its relation to syntactic structure tend to be flexible, generally function words should always be contained within a larger prosodic unit composed of at least one lexical element. In other words, there is no place for (unstressed) function words to project their own phonological phrase; instead, as Tyler (2019) observes, they just often (but not necessarily) have some kind of subcategorization requirement that makes them prosodically dependent elements.

This “invisibility” of function words is ensured by conditions like the Lexical Category Condition (Truckenbrodt 1999) and Prosodic Vacuity (Kandybowicz 2015) given in (20) and (21) respectively:⁶

(20) The Lexical Category Condition

Constraints relating syntactic and prosodic categories apply to lexical syntactic elements and their projections, but not to functional elements and their projections, or to empty syntactic elements and their projections. (Truckenbrodt 1999)

(21) Prosodic Vacuity

Phonetically empty (i.e. null elements and functional heads) prosodic phrases are ruled out at PF. (Kandybowicz 2015)

Based on these conditions, the mapping from syntax to prosody in a sentence like (1), repeated below as (22), should not be as (22a) or (22b), where some functional element forms its own prosodic constituent to the exclusion of any lexical material, but it should be as (22c). That is due to the fact that the conditions in (20) and (21) force functional elements to be prosodically dependent to lexical ones. That said, the only structure that satisfies these constraints is (22c).


(22) * Who did you say that *t* wrote *Good Omens*?

- a. (_{intP} (_{PhP} that) *t* (_{PhP} wrote) (_{PhP} *Good Omens*)) à la Kandybowicz (2006a)
 b. (_{PhP} that *t*) (_{PhP} wrote) (_{PhP} *Good Omens*) à la Sato & Dobashi (2016)
 c. (_{PhP} that *t* wrote) (_{PhP} *Good Omens*) as predicted by (20) & (21)

Importantly, the mapping in (22c) violates Kandybowicz’s filter because (i) *C* and the *t* are adjacent at the PhP level, and (ii) *C* is aligned with a prosodic boundary, namely the left boundary. Nevertheless, (22c) does not violate Sato & Dobashi’s PF condition: there is a lexical item inside the PhP containing *C* and *t*. Thus, the sentence is predicted to be grammatical, contrary to the reported judgments.⁷ Evidence for the fact that (22c) is the correct mapping comes from

⁶ The argument is also valid if we used other versions of these principles under Match Theory (Selkirk 2011). See Weir (2012), Elfner (2012), Bennett, Elfner & McCloskey (2016) for details. I am making specific reference to these two because they are the ones that at least one of the works I am reviewing here follows.

⁷ One could think of this in terms of Optimality Theory (Prince & Smolensky 1993) where The Lexical Category Condition/Prosodic Vacuity are very high ranked markedness constraints. If any candidate violates them, such violation would be fatal. The simple tableau in (iii) shows precisely that.
 (iii)

that t wrote Good Omens	LEXICAL CATEGORY CONDITION	*<C ⁰ , t>
a. (that) t (wrote) (Good Omens)	*!	
b. (that t) (wrote Good Omens)	*!	*
c.  (that t wrote) (Good Omens)		*

sentences that contain pronouns and subject relative clauses with an overt complementizer, as I show in the next sections.

3.1 Phonological Phrasing of subject pronouns

It has become standard in the literature, since Abney (1987) and Heim & Kratzer (1998), to treat pronouns and determiners as belonging to the functional category of D heading a DP.⁸ If we transformed (22) into a declarative clause and replaced the embedded subject with a pronoun like *I/you*, Sato & Dobashi (2016) would predict that the sentence is equally ungrammatical because the complementizer and a function word of type D (which is occupying the position otherwise occupied by the trace) form a PhP. However, this prediction is not borne out as shown in (23). Instead of Sato & Dobashi's predicted structure in (23a), the grammatical phrasing is as in (23b), obeying both anti-vacuity conditions in (20) and (21). Importantly, in the case of resumptive pronouns such as (18), this predicts that a mapping like (19a) should be ruled out, as already noted at the end of section 2.

- (23) You said that I wrote *Good Omens*
- a. * you said (_{PhP} that I) (_{PhP} wrote) (_{PhP} *Good Omens*) à la Sato & Dobashi (2016)
- b. you said (_{PhP} that I wrote) (_{PhP} *Good Omens*) as predicted by (20) and (21)

It is difficult to predict what the parsing would be under Kandybowicz (2006a) as he is not very explicit when it comes to the status of functional categories in general, but assuming that he allows for *that* to project its own phrase, the pronoun should too.

If phonological phrases are a domain within which segmental phonological processes apply, we can test the well-formedness of (23b) by using a phonological rule like the tap insertion, palatalization and glottal stop insertion rules. One of the environments that conditions the application of the tap or palatalization rule of coronal stops in English is such that the target segment and the trigger segment belong to words in the same prosodic domain (i.e. a PhP). It then follows that these rules apply to sentences like (23).⁹ The rules are defined and illustrated in (24) and (25):

- (24) /t/ → [ɾ] / (_{PhP} [V]__[V])
you said tha[ɾɔɪ] wrote *Good Omens*
- (25) /t/ → [tʃ] / (_{PhP} [V]__j[V])
I said tha[tʃu] wrote *Good Omens*

If the embedded verb forms a phonological phrase with the complementizer and the *t*, as indicated by the suggested parse in (22c), these rules are expected to apply in a context where the complementizer is followed by a verb that starts with /ɪ/ or /ju/, even if the sentences are ungrammatical.¹⁰ This prediction is borne out as the data in (26) and (27) show. The presence of the (*wh*-)trace does not block the application of phonological rules, as argued by Nespor & Vogel (1986: ch.2, 53-57), a point I return to in section 4. This supports the fact that the complementizer and the main verb belong to the same PhP, i.e. supporting the phrasing of (23b) over that of (23a):

⁸ Another possibility is to assume that pronouns are D heads selecting an NP that undergoes deletion (Elbourne 2001). Deleted material is not prosodifiable and only the D⁰ head, spelled-out as a pronoun, survives at PF. This entails that the remaining part of the DP for the prosody to parse is the functional element in D⁰. Thus, despite its syntactic and semantic differences with Heim & Kratzer (1998), Elbourne's (2001) theory of pronouns makes the same predictions with respect to Sato & Dobashi's prosodic phrasing.

⁹ The rules used here are very simplified versions of these rules. I am using them to support the main argument.

¹⁰ Ungrammatical phrases can still be uttered. 10 native speakers of English were informally asked to read a set of grammatical and ungrammatical *that-trace* sentences. 9/10 speakers applied the tap and palatalization rules.

- (26) /t/ → [ɾ] / (_{phP} [V]__[V])
 * who did you say (_{phP} tha[ɾɪ]nterpreted) (_{phP} Demon Crowley)
- (27) /t/ → [tʃ] / (_{phP} [V]__[jV])
 * Who did you say (_{phP} tha[tʃu]sed) (_{phP} Demon Crowley)

Jonah Katz (p.c.) notes that while taps are more likely and potentially even nearly obligatory in the contexts singled out in this section, the difference between the elements identified as non-boundaries and the ones identified as boundaries is even better illustrated by the possibility of glottal stopping. Glottalization of final stops and initial vowels applies at the edge of a prosodic constituent and marks its boundary (Pierrehumbert & Talkin 1992; Dilley, Shattuck-Hufnagel & Ostendorf 1996), which can be especially relevant at the junctures of complementizer and a following subject. We can assume the glottalization rules in (28a-28b):

- (28) a. /t/ → [ʔ] / (_{phP} __#) (_{phP} [+sonorant]) based on Pierrehumbert (1994)
 b. /Ø/ → [ʔ] / (_{phP} #__V) based on Dilley, Shattuck-Hufnagel & Ostendorf (1996)

If the complementizer and the subject belong to the same prosodic constituent and they are not separated by a boundary, application of the glottalization rules should result in unacceptability. This prediction is borne out as illustrated in (29) and (30), where the star (*) indicates a misapplication of the rules, i.e. the sentences are not syntactically but phonologically ill-formed:

- (29) * You said tha[ʔ] [ʔɪ] wrote *Good Omens*.
 (30) * I said tha[ʔ] [ju] wrote *Good Omens*.

In (29), the glottal stop appears twice because both (28a) and (28b) have applied. In any case, (29) is unacceptable because the lack of a prosodic boundary between the complementizer and the subject pronoun makes the [ʔ] impossible in that environment. In the case of (30), only the rule in (28a) is misapplied, thus supporting the claim that the complementizer and the subject pronoun should be phrased within the same prosodic phrase. The facts in (24-25) and (31-32) support the claim that the complementizer is prosodically phrased with the subject following it. However, the facts also support the aforementioned undesirable prediction made by Sato & Dobashi (2016) with respect to embedded sentences with subject pronouns: according to their prosodic phrasing, a sentence with a complementizer and a subject pronoun should be ruled out on prosodic grounds due to the fact that it violates their PF condition – only C and the pronoun, which are functional, form a phonological phrase.

To show that the glottalization rules apply at proper prosodic boundaries, let's consider the following situation. Typically, verbs can phrase with their complements if the latter are not complex, where complex means “containing lexical elements other than the head”, due to a general requirement to satisfy binarity (Selkirk 2000; Sandalo & Truckenbrodt 2002; Prieto 2006) (31). When the verb is followed by a complex nominal complement, we should expect a boundary between the verb and its complement which should be evidenced by the possibility of final /t/ or vowel-initial glottalization. The prediction is borne out too as illustrated by (32):

- (31) You said that I wro[ʔ] [ʔə]rroneous comments
 (32) You said that I wro[ʔ] [ju]r recommendation letter

With all this in mind, we can now apply glottalization to the *that-trace* example sentence as we did in (26) and (27). If *that* and the verb form a prosodic phrase, as I have been arguing, it should not be possible to apply the glottalization rules, given that glottalization applies at the juncture

of phonological phrases. Regardless of the syntactic well-formedness, my informants report that glottalization in this particular environment is not possible bearing out the prediction (33):^{11,12}

(33) * Who did you said ($_{PhP}$ tha[ʔ] [ʔɪ]rased) ($_{PhP}$ the wretched world) ?

The unavailability of glottalization in (33) supports the claim that the lexical verb should in fact be part of the phonological phrase that contains the complementizer. This entails that the PF condition proposed by Sato & Dobashi (2016) should not be violated, and the sentence should be grammatical. But this is contrary to fact. In the next section, I return to the phonological rules and their application to [C (>> t) >> V] in the domain of subject relative clauses.

3.2 Subject relative clauses

In addition to the issues with the phrasing of subject pronouns following a complementizer, both theories face some challenges with subject relatives like the one in (34). Under the head raising analysis, (Vergnaud 1974; Kayne 1994; Bhatt 2002) the head NP originates inside the CP relative and then moves out projecting a NP. Under the head external analysis (Chomsky 1977; Heim & Kratzer 1998) there is movement of the *wh*-operator to the specifier of the CP relative clause. Crucially for our purposes, any of these movement operations leaves a trace (or unpronounced copy) following the complementizer (34a-34b):¹³

- (34) The demon that saved the world from Armageddon
- the [demon]₂ [$_{CP}$ [$_{OP}$ t_1] that t_1 saved the world from Armageddon]
 - the demon [$_{CP}$ $_{OP_1}$ that t_1 saved the world from Armageddon]

The structure of this sentence is identical to that in (22) where the complementizer is followed by a trace left by a *wh*-operator. Data like this also present a challenge for antilocality approaches (but see Douglas 2017 and fn.13 for details). Following the same logic as with (22), we should expect a mapping according to which (i) the Complementizer aligned with the left boundary is adjacent to the trace within a prosodic phrase and thus violates the * $\langle C^0, t \rangle$ filter, or (ii) the complementizer should project its own PhP and thus violates the prosodic condition in (11). This is illustrated in (35a), as expected from Kandybowicz (2006a), and (35b), as expected from Sato & Dobashi (2016), respectively. (35c) is as predicted by a theory of the syntax-prosody interface for which functional elements depend on lexical ones (i.e. Match Theory, Selkirk 2011). The (*) in the examples indicates that the prosodic phrasing is ungrammatical.

- (35) The demon that t saved the world from Armageddon
- * The demon ($_{intP}$ ($_{PhP}$ that) t ($_{PhP}$ saved the world) ($_{PhP}$ from Armageddon))
 - * The demon ($_{PhP}$ that t) ($_{PhP}$ saved the world) ($_{PhP}$ from Armageddon)
 - The demon ($_{PhP}$ that t saved the world) ($_{PhP}$ from Armageddon)

¹¹ The syllabic nasal in ‘incinerated’ (26) muddies the waters here, because there is a glottalized and post-nasalized version of this [t-n] juncture available independently of prosodic boundaries. Thus, I decided to eliminate this confound by replacing [m] with the non-nasal unstressed syllable in ‘erased’. Thanks again to Jonah Katz for this suggestion.

¹² A different set of 10 native speakers of American English were informally asked to read a set of grammatical and ungrammatical *that-trace* sentences. 10/10 speakers applied the glottalization rules as illustrated in the main text.

¹³ One might argue that in subject relative clauses there is no *wh*-movement to the specifier of the CP because they show weaker island effects as observed by Chung & McCloskey (1983) and would violate some sort of antilocality (Brillman & Hirsch 2016; Toquero-Pérez 2021). In this case, instead of a trace, the *wh*-operator itself would be left in the specifier of TP immediately adjacent to the complementizer *that*. Even if we follow this approach, the predictions with respect to the prosodic mapping should be no different: there still is a null element following the complementizer which the PF interface should treat as any other unpronounced material.

Importantly, while (35c) ultimately is the correct prosodic mapping, it violates the $*_{<C^0, t>}$ filter: the C is adjacent to the trace in the same prosodic phrase and C is aligned with a PhP boundary. In order to avoid this problem, Kandybowicz (2006a: 223) stipulates, without any evidence, that the correct mapping of restrictive relative clauses is as in (36a) on the assumption that there is no pause between the antecedent N and the C head: while C and t are adjacent within the same IP, C is not aligned with a boundary. (36b) is claimed to be ungrammatical because there is a pause before the complementizer, as in restrictive relative clauses.

(36) adapted from (Kandybowicz 2006a)

- a. ($_{IP}$ The demon that t saved the world from Armageddon)
 b. * ($_{IP}$ The demon ($_{intP}$ that t saved the world from Armageddon))

There are some concerns with the structure in (36a). First of all, there is a significant lack of detail about the internal prosodic structure of the IP in (36a). IP is the major prosodic phrase (Selkirk 1984; 1986; 2011; Nespor & Vogel 1986), and we expect internal prosodic constituency inside it. However, as it has been already highlighted in this paper, vagueness in prosodification is a recurrent weakness of Kandybowicz (2006a).

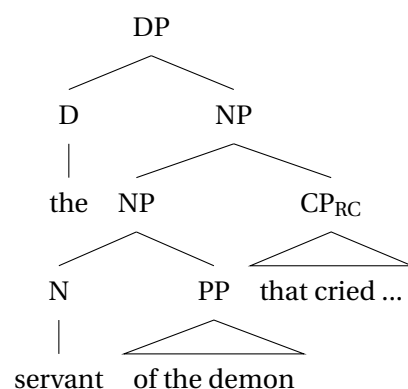
Second of all, the assumption that restrictive relative clauses do not require pauses has been contested in the theoretical and experimental literature. Relative clause data discussed in Fodor (2002) indicates that a prosodic boundary before a relative clause is actually common, especially if the relative clause is long (37a).

(37) Long and short Relative Clauses (RCs)

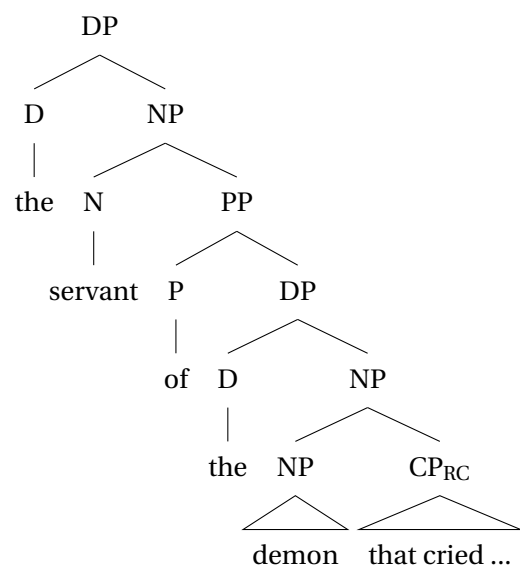
- a. Someone shot the servant of the demon [$_{CP}$ that cried all through the night]. Long RC
 b. Someone shot the servant of the demon [$_{CP}$ that cried]. Short RC

What is more, Fodor (2002) reports that the presence of a boundary before the relative clause generally indicates a higher attachment when there are two potential antecedents. For example, in (37a), the relative clause attachment is ambiguous between the NP [demon] and the NP [servant], as illustrated in (38) and (39) respectively, where the arrow means “before”:

(38) RC high attachment: pause \rightarrow C



(39) RC low attachment: no pause \rightarrow C



If Kandybowicz was correct, his proposal would predict that only a low relative clause attachment is possible given the absence of a prosodic break: the demon cried all night. The high

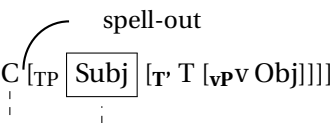
attachment interpretation in (38) in which the servant cried all night is incorrectly ruled out. The mapping for (38) should, therefore, be as in (35c) which violates the $*\langle C^0, t \rangle$ filter.¹⁴

We can test whether the mapping in (35c) is correct by applying the tap, palatalization and glottalization rules in (24), (25) and (28) as in the previous section. If *that* and the verb form a PhP we should be able to apply the tap and palatalization rules. On the contrary, prosodic constituency between the complementizer and the verb is expected to block glottalization. These predictions are all borne out as shown in (40), where (*) indicates phonological ill-formedness.¹⁵

- (40) a. The demon tha[rɪ]ncinerated the whole world
 b. The demon tha[tʃu]nited the whole world.
 c. *The demon tha[ʔ] [ʔɪ]rased the whole world.

In conclusion, these theories predict that subject relatives like (34) are ungrammatical; and yet they are not, which suggests that the correct prosodic phrasing is not as these theories argue for, but should be as in (35c)

There is one more area of concern that has remained unnoticed so far. For Sato & Dobashi (2016: 343), relative clauses do not seem to be a problem because their phasal spell-out forces the complementizer and the trace to belong to two different spell-out domains: C transfers the TP complement with the trace left by the subject when the D head is merged. However, there is a loophole in their theory. According to their model of spell-out, based on Dobashi (2003), the initial (or left most) element in the structure is left behind and remains accessible to the next application of spell-out. This was shown in (12) and repeated in (41a). For example, if the TP is spelled-out when C is merged, the subject (in Spec,TP) escapes the mapping and is able to form a phonological phrase with the preceding C head (Sato & Dobashi 2016: 334) (41b).

- (41) a. 
 b. (_{PhP} C Subj) (_{PhP} T v V) (_{PhP} Obj) (Sato & Dobashi 2016: 334)

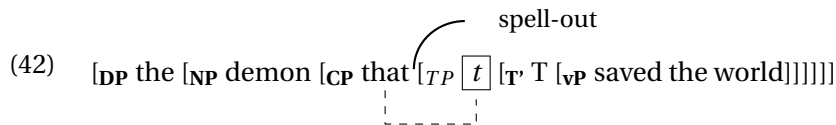
This has an important, though unnoticed, implication for subject relatives if DPs are phases as argued by Heck & Zimmermann (2004), Matushansky (2005) and Davis (2020a): when D is merged into the structure, the phase head C must spell-out its TP complement which includes the trace of the moved *wh*-subject. However, given that Sato & Dobashi (2016) assume that the subject, i.e. the leftmost element in the spell-out domain, is still accessible to the next spell-out operation, there is nothing that prevents C and the trace from forming a PhP as (41b). And as a result, the structure should be incorrectly ruled out: the exact same prosodic structure that they claim is ill-formed in the *that-trace* effect is in fact created.

¹⁴ A note with respect to restrictive relative clauses and the presence/absence of a pause before them is in order. Selkirk (2005: 14-15, ex.5 & 6) has argued that before restrictive relative clauses (v), there is no need for a preceding pause:

- (iv) The Romans, who arrived before one hundred AD, found a land of wooded hills. Pause → RC
 (v) The Romans who arrived before one hundred AD found a land of wooded hills. No Pause → RC

However, these examples discussed in Selkirk (2005), used by Sato & Dobashi (2016), differ from the ones presented in the main text adapted from Fodor (2002) in terms of antecedent ambiguity. There is only one possible antecedent in (v), while there are two in (37a), reinforcing the presence of the pause. Once again, this serves to highlight that, even though there are generalizations, prosodic phrasing (and its mapping to syntax) is extremely flexible in English. Thus, any approach that tries to derive categorical unacceptability through prosodic means is going to have to explain why prosodic repairs are (not) possible for *an extremely wide variety* of potential prosodic domains.

¹⁵ The verb *saved* from the previous examples has been replaced with *incinerated* in (40a), *united* in (40b), and *erased* in (40c) to control for the proper environment for each rule.



Up until this point I have presented some empirical arguments for why *that-trace* effects of the type seen in English cannot be reduced to prosodic conditions proposed by Kandybowicz (2006a) and Sato & Dobashi (2016). Before moving on to the next section, I want to note two more concerns: one is related to cliticization of the complementizer, and the other is specifically concerned with the focus restructuring rules.

3.3 A note on Complementizer cliticization and focus restructuring rules

Both Kandybowicz (2006a) and Sato & Dobashi (2016) assume that the complementizer cannot cliticize to the left, forming a prosodic constituent with the preceding material. However, the vowel in *that* can reduce to schwa and generally fails to display pitch accent. As such, it is a weak function word, and it is notoriously difficult to say which direction such words cliticize onto in the prosody. One might think that *that* would need to phrase with something following it because it is at the left edge of a CP, but virtually all theories of syntax-prosody mapping in English treat right edges as being noticeable to prosodic boundaries, with left edges much less so or not at all (Selkirk 1995; 1996; 2005; Truckenbrodt 1999). Besides, recent work by Tyler (2019) (building on previous work by Zec 2005) has convincingly shown that function words can have different subcategorization frames: they can either be left-cliticizing as Tyler argues for weak object pronouns, contracted negation *n't*, and the very reduced auxiliaries; or right-cliticizing as Tyler shows it is the case for most prepositions in English, auxiliaries and determiners. To my knowledge there is no research that has probed what frame complementizers belong to, and it is not easy to see how Tyler's diagnostics could be applied to the case of the complementizer. Thus, in principle, nothing should rule out a phrasing like the one in (43) where the complementizer has left-cliticized onto the preceding material.¹⁶ The (*) indicates syntactic ill-formedness, e.g. *that-trace* effect violation.

(43) * who did you (_{PhP} say that) *t* (_{PhP} wrote) (_{PhP} *Good Omens*)

Regarding LFR (16), it remains unaddressed what would happen if the focused element inside the embedded clause is an auxiliary verb as in (44a). Auxiliary verbs are function words and as such should not be phrased in their own PhP. If the LFR rule applies to (44a) we should get the phrasing in (44b):

- (44) a. I know you don't know who should play demon Crowley, but who do you think that *t* COULD play demon Crowley?
 b. (_{PhP} that *t* COULD) (_{PhP} play) (_{PhP} demon Crowley)?

(11) Function words cannot form a prosodic phrase on their own. (Sato & Dobashi 2016: 333)

(16) Left Focus Restructuring: English

If some word in a sentence bears focus, place a phonological phrase boundary at its right edge, and join the word to the phonological phrase on its left.

(Sato & Dobashi 2016: 339) *apud* (Kenesei & Vogel 1995: 19)

The focused auxiliary has created a boundary at its right edge and has joined to the phonological phrase on its left. Nevertheless, this should not be enough by itself to satisfy Sato & Dobashi's (2016) condition in (11), repeated above: the PhP that created after LFR contains no lexical

¹⁶ I am very grateful to Jonah Katz for this suggestion.

material, but function words. The informants that I have consulted and that accept these sort of sentences with focus do not report a difference in acceptability between a focused auxiliary and a focused lexical verb, which goes against what one would expect under (11).¹⁷

Last but not least, [Kandybowicz \(2006a\)](#) claims, contrary to [Sato & Dobashi \(2016\)](#), that the focused element marks the left edge of a prosodic boundary. There is no phonetic or phonological evidence that supports this claim. In fact, this goes against [Selkirk \(2000: 247-251\)](#) who argues that it is the right edge of a focused constituent that has to be aligned with the right edge of a prosodic phrase (45).¹⁸

- (45) She loaned her rollerblades to Robin adapted from [Selkirk \(2000: 247 ex.27\)](#)
- a. ($_{PhP}$ she loaned her rollerblades) ($_{PhP}$ to Robin)
 - b. ($_{PhP}$ she LOANED) ($_{PhP}$ her rollerblades) ($_{PhP}$ to Robin)
 - c. * ($_{PhP}$ she LOANED her rollerblades) ($_{PhP}$ to Robin)
 - d. * ($_{PhP}$ she) ($_{PhP}$ LOANED her rollerblades) ($_{PhP}$ to Robin)

As a result, there are strong empirical arguments to be skeptical that these prosodic accounts can successfully provide a principled explanation to *that-trace* effects in English. In the next section, I present one final argument that any syntax-prosody analysis would have to address to provide a principled explanation for the effects being discussed.

4 Why should prosody care about traces?

It is typically assumed that null or empty categories in general do not count for prosodic phrasing, which puts into question why traces should be visible to prosody (cf. [Kandybowicz 2006a](#)). [Nespor & Vogel \(1986: 48-57\)](#) show that traces do not block the application of prosodic processes or rules, contrary to what is expected if traces mattered for prosodic phrasing. One example is from Italian *raddoppiamento fonosintattico* (RS), which consists of the gemination of the initial consonant of word₂ in the sequence $word_1 \gg word_2$. One domain of application for RS is the following: word₁ in the sequence must end in a stressed vowel, and the onset of the first syllable must be composed of either a single consonant or a cluster other than /sC/ (46).¹⁹

- (46) *Filmerá domani* → *Filmerá [d:]omani*
 film.FUT.3SG tomorrow
 '(S)he will film tomorrow'

When the verb *filmerá* '(s)he will film' takes an overt direct object *il gioco* 'the game', RS is blocked (47a); but when the direct object undergoes A-bar movement, e.g. *wh*-movement, RS still applies between the stressed vowel of the verb and the initial consonant of the adjunct *domani* 'tomorrow' across the trace (47b). This is unexpected if traces or unpronounced copies played a role in prosodic phrasing:

- (47) Italian RS across a trace
- a. *Filmerá il gioco domani*
 film.FUT.3SG the game tomorrow
 '(s)he will film the game tomorrow' No RS

¹⁷ 10 native speakers of American English were consulted for judgments. Of those 10, only 2/10 accepted the structures with narrow focus on either lexical or auxiliary verbs. The other 8/10 did not report a significant amelioration aligning with the results found by [Ritchart, Goodall & Garellek \(2016\)](#) mentioned in section 1.

¹⁸ This does not mean that a focused item cannot also be at the left edge of a phrase, as in cases of sentence-initial focus, for example.

¹⁹ See [Nespor & Vogel \(1986\)](#) and [D'Alessandro & Scheer \(2015\)](#) for more details and examples of RS.

- b. Cosa₁ filmerá t₁ domani? → filmerá t₁ [d:]omani
 what film.FUT.3SG tomorrow
 ‘What will (s)he film tomorrow?’ ✓RS

The fact that traces are invisible for prosody is also supported by cross-linguistic data. Here I review Spanish Nasal Assimilation (NA) and British English linking *-r* (Link-*r*) (Nespor & Vogel 1986). In Spanish, nasal consonants assimilate in place to the following obstruent, a process which can occur across word boundaries (48):

- (48) Spanish Nasal Assimilation (NA)
- a. compra/n/ /p/avo → compra[m] [p]avo
 buy.PRES.3PL turkey
 ‘They buy turkey’ ✓NA
- b. compra/n/ /a/lmendras para navidad → compra[n] [a]lmendras
 buy.PRES.3PL almonds for christmas
 ‘They buy almonds for Christmas’ No NA

If in (48b), the object is displaced from its base position, either by *wh*-movement or cliticization, leaving a trace or unpronounced copy, NA applies between the nasal consonant of the verb and the initial obstruent of the preposition *para* ‘for’. This is illustrated in (49):

- (49) Spanish NA across a trace
- a. Qué₁ compra/n/ t₁ /p/ara navidad → compra[m] t₁ [p]ara navidad
 what buy.PRES.3PL for christmas
 ‘What do they buy for Christmas?’ ✓NA
- b. las₁ compra/n/ t₁ /p/ara navidad → compra[m] t₁ [p]ara navidad
 CL.ACC.3PL buy.PRES.3PL for christmas
 ‘They buy them for Christmas’ ✓NA

In the case of British English Link-*r*, while word-final /r/ is usually deleted, it can be retained if the following word starts with a vowel (50):

- (50) British English Link-*r*
- a. I’d prefe/r/ /t/wo monkeys instead → prefe[Ø] [t]wo No Link-*r*
- b. I’d prefe/r/ /e/ght monkeys instead → prefe[r] [e]ght ✓Link-*r*

Once again, displacement of [two monkeys] should feed the application of Int-*r*, since the /r/ is now adjacent to the vowel /ɪ/ in ‘instead’ (51):

- (51) British English Link-*r* across a trace
- What₁ do I prefe/r/ t₁ /ɪ/nstead? → prefe[r] t₁ [ɪ]nstead ✓Link-*r*

These data from different languages support the hypothesis that traces are irrelevant for prosodic phrasing. Consequently, the reason for the (un)grammaticality of *that-trace* effect sentences cannot be due to the presence/absence of a trace in a particular prosodic constituent as proposed by Kandybowicz (2006a).

The same reasoning that has been applied to traces can also be applied to other null elements more generally, e.g. null operators, PRO, *pro*, which just like traces do not block phonological rules from applying within a particular domain (Nespor & Vogel 1986: 50-53). What is more, if we extend these prosodic filters to other languages such as null subject languages (Camacho 2013), we should predict that any sentence that contains an overt complementizer and is followed by a

null subject in Spec,TP should be prosodically ill-formed. This is not a desirable prediction if one looks at Romance for example, where preverbal subjects can null; and if that is the case, the preverbal subject position is occupied by *pro* (Rizzi 1982; Jaeggli 1982; Zubizarreta 1994; Suñer 1994; Alexiadou & Anagnostopoulou 1998; Camacho 2013). An example from Spanish is in (52) including the correct prosodic phrasing:

- (52) a. Los estudiantes de química dijeron que *pro* bailó
 the students of chemistry said.PERF.3PL that *pro* danced.PERF.3SG
 ‘The chemistry students said (s)he danced’
 b. (_{IP} (_{PhP} los estudiantes de química) (_{PhP} dijeron) (_{intP} (_{PhP} que *pro* bailó)))

The phrasing of (52a) as in (52b) is analogous to the mapping in (22): the complementizer is followed by an empty category, which to the eyes of prosody is no different from traces. As a result, if *<C, t> filter is supposed to be a more general ban prohibiting unpronounced material to phrase with complementizers, its application fails outside *that-trace* effects.

In addition to this, it is important to note that these prosodic accounts only give special attention to the trace that follows the complementizer, but stay silent about the trace that precedes it. This raises the following question: why should the trace following but not the one preceding the complementizer be responsible for the violations? If CP is a phase, and there is successive cyclic movement through its edge (Chomsky 1994; 1995; 2000; 2001; 2008; McCloskey 2000; Nissenbaum 2000; Abels 2003; Rackowski & Richards 2005; Fox & Pesetsky 2005b;a; Davis 2020b; Keine 2020), there should be another trace preceding the complementizer. This is illustrated in (53):

- (53) [_{CP} who said [_{CP} t_{who_2}] [_{C'} that [_{TP} t_{who_1}] [_{T'} T [_{VP} v ...]]]]]
-

In order for *who* to escape the CP phase and avoid a violation of the Phase Impenetrability Condition (Chomsky 2000; 2001), it must move through its edge. This entails that *who* in Spec,TP must abandon this position, leaving a trace or unpronounced copy, and land in the edge of CP. Since this is not the final landing site, movement out of Spec,CP also leaves a trace/unpronounced copy behind. Why isn't the trace in Spec,CP, i.e. t_{who_2} , the problematic one? If traces are so important to prosody, any analysis that appeals to the presence of traces during prosodification should make reference to all the traces left by the moved subject.

5 An alternative

Given what has been said so far, I propose that a better way to understand the effects here described is to reverse the perspective of the traditional generalization. And instead of assuming that the [C *t*] sequence is what is causing problems, I offer an explanation based on the (preliminary) generalization in (54):²⁰

- (54) The Two-Trace/Copy Condition (preliminary version, to be modified)
 Do not have two traces/copies created by intermediate successive movement of a constituent XP within the spell-out domain.

The condition in (54) is stated as a ban on identical intermediate copies that are located in the same spell-out domain at PF. By spell-out domain, we should understand the whole phase (CP, *v*P), and not only its complement as independently argued by (Fox & Pesetsky 2005b;a; Davis

²⁰ Many thanks to Roumi Pancheva for suggesting this alternative.

2020b; 20210). The intuition behind the condition is identity avoidance and is reminiscent of the Obligatory Contour Principle, originally proposed to ban identical phonological sequences (Leben 1973; Goldsmith 1979), but whose insights have been exploited in syntax and its interface with morpho-phonology (Perlmutter 1971; Radford 1977; 1979; Menn & MacWhinney 1984; Ackema 2001; Ackema & Neeleman 2003; Richards 2010; Nevins 2012; Neeleman & Koot 2006; 2017): morpho-syntactically similar or identical elements that are relatively adjacent within a spell-out domain are dispreferred, and the grammar resorts to different repairs or pre-emptive mechanisms to obtain distinctness. The term *haplology* is typically referred to as the repairs and pre-emptives used to disrupt this identity. But here I will use it to describe both the constraint or filter and the repair/pre-emptive.

As formulated, the condition in (54) needs to be revised, though, since no distinction is made between sentences with *that-trace* effects and the adverb amelioration counterpart of those sentences, for example: both structures have two intermediate copies of a *wh*-element, and should be ruled out; a prediction which is not borne out for the adverb intervention case. Thus, in the remainder of this section, I develop a proposal based on morphosyntactic haplology, and formulate a filter sensitive to narrow syntax and PF which accounts for the *that-trace* paradigm this paper is concerned with. I argue that this type of (morpho-)syntactic dissimilation can be categorized in terms of Nevins' (2012) stages of mapping from syntax to phonology. Though, as Neeleman & Koot (2017: 28) already point out, the haplology case at hand is conditioned by syntactic features and phonologically sensitive factors. Thus, I offer a slight revision of Nevins' (2012) model to accommodate the facts and Neeleman & Koot's (Neeleman & Koot 2017) concerns.

5.1 Haplology: brief remarks

Repetition of identical elements (i.e. morphemes, labels, or phrases) in syntax is not ruled out categorically. For example, Neeleman & Koot (2017) note that in certain contexts in Dutch, PPs can be used as honorary NPs. In such cases, the honorary PP is the complement of a preposition whose head is identical to the one of the honorary PP. This is seen in (55):

- (55) *(Context: They will probably hang the painting the right way up, but since it is abstract art, you can't be sure. If they hang it upside down, all hell will break loose.)*
 De meeste journalisten hopen dan ook [PP **op** [PP **op** zn kop]].
 the most journalists hope then also on on its head
 'Indeed most journalists are hoping for upside down. (Neeleman & Koot 2017: 4, ex.2)

However, Dutch weak feminine pronouns *'r/d'r*, clustered around the left edge of VP, cannot be adjacent to each other (56a). As Neeleman & Koot (2017) note, this is not due to a purely phonological constraint, since the same phonological sequence is acceptable if, instead of a weak feminine pronoun, one of them is replaced with an allomorph of the pronoun *er* 'there' (56b). If the adjacency between the two pronouns is disrupted, the resulting structure is grammatical (56c):

- (56) a. *Ik heb (d)'r (d)'r voorgesteld.
 I have her her introduced
 b. Ik heb (d)'r (d)'r drie voorgesteld.
 I have there her three introduced
 'I have introduced three of them to her'
 c. Ik zag (d)'r 'm (d)'r voorstellen.
 I saw her him her introduced
 'I saw her introduce her to him' (Neeleman & Koot 2017: 5, ex.5-7)

Neeleman & Koot (2017) propose a descriptive rule that accounts for this contrast, where SMALL CAPITALS indicate syntactic information, and material in /forward slashes/ marks their phonological realization. The rule is illustrated in (57):

- (57) */pronoun₁/ /pronoun₂/ if
- a. /pronoun₁/ and /pronoun₂/ are adjacent;
 - b. /pronoun₁/ is identical to /pronoun₂/, and
 - c. both PRONOUN₁ and PRONOUN₂ are feminine third person singular

Rather than a repair triggered after a problem identified at spell-out, this is a ‘pre-emptive’ rule in the sense of Radford (1977; 1979) because the merger of a pronoun is a decision made early, in the numeration. Though the Dutch case selected to illustrate identity avoidance happened to require strict adjacency, pre-emptive rules occurring early during the derivation or repairs during syntactic linearization need not (Nevins 2012).

Other cases of haplology involve repairs after spell-out and after linearization, such as feature deletion, suppletion or wholesale deletion (see Nevins (2012); Neeleman & Koot (2017) for details). For example, Ackema (2001) observes that identical complementizers in Dutch repel each other: the coordinating complementizer *of* ‘of’ and the homophonous question embedding *of* ‘if’ cannot be adjacent (58a). However, if the question embedding complementizer *of* ‘if’ is replaced by the declarative counterpart, the sentence is fully grammatical (58b):

- (58) a. *Vroeg je nou of die plaats vrij is **of** **of**-ie bezet is?
asked you now if the seat free is either if-it taken is
- b. Vroeg je nou of die plaats vrij is **of** **dat**-ie bezet is?
asked you now if the seat free is either that-it taken is
‘Did you ask whether that seat is free or if it’s taken?’

This type of replacement repair involves the complete deletion of the features under the interrogative C. As a result, C is left bare and is spelled-out as the default declarative C.²¹

These cases are reminiscent of the repairs resorted to in order to avoid violations of the Person Case Constraint (PCC) (Bonet 1991; 1994) in many languages. In Spanish, for example, the third person dative clitic is *le*, and the third person accusative clitic is *lo*. When the two clitics are combined in a ditransitive configuration, an opaque clitic form *se* surfaces instead of the dative one *le*. In fact, if *le* surfaces, the sentence is ungrammatical. This is the case of *spurious se* discussed by Bonet (1995) and illustrated in (59c):

- (59) Spanish clitic combinations and spurious *se*
- a. El premio, *lo* dieron a Pedro ayer
the award CL.ACC.3SG. gave.PERF.3PL to Pedro yesterday
‘The award, they gave to Pedro yesterday’
 - b. A Pedro, **le** dieron el premio ayer
to Pedro CL.DAT.3SG gave.PERF.3PL the award yesterday
‘To Pedro, they gave the award yesterday’
 - c. A Pedro, el premio, {* **le**/ **se**} *lo* dieron ayer
to Pedro the award CL.DAT.3SG SE CL.ACC.3SG gave.PERF.3PL yesterday
‘They gave the award to Pedro yesterday’ (Bonet 1995: 608, ex.1)

The PCC violation has been argued to arise due to the fact that both dative and accusative clitics bear a feature [PERSON]. It has been proposed that the dissimilation effects involve the

²¹ For a descriptive rule along the lines of (57), see Neeleman & Koot (2017: 16).

post-syntactic deletion of the offending person feature in one of the clitics (Anagnostopoulou 2003; Nevins 2007; 2011; Walkow 2012; Pancheva & Zubizarreta 2017): in the case of (59c), the person feature of the dative clitic.

Similar phenomena are also found in some varieties of Catalan: a first person accusative clitic *me* cannot co-occur with a third person dative clitic *li* (Bonet 1991; 1994; Walkow 2012). For this banned combination to be possible, the dative clitic has to surface as *i*, which is homophonous with the locative clitic (60):

(60) Catalan ME-(L)I combinations

- a. * *Me* **li** ha recomanat la senyora Bofill
 CL.ACC.1SG CL.DAT.3SG has recommended the Mrs. Bofill
- b. *Me* **i** ha recomanat la senyora Bofill
 CL.ACC.1SG CL.DAT has recommended the Mrs. Bofill
 ‘Mrs Bofill has recommended me to him/her.’ (Bonet 1994: 33 & 48)

Bonet (2008) argues that *i* in (60b) is the realization of the dative clitic without the specification for person. As a result, third person dative clitics can avoid a PCC violation if their person features are not spelled-out. This type of repair is slightly different from Ackema’s (2001): instead of the wholesale deletion of features under a terminal node, an individual feature, i.e. [PERSON] has been the target of the post-syntactic deletion.

That said, haplogy encompasses a wide range of phenomena which span across distinct stages of the morpho-syntactic derivation: from earlier stages in the numeration to later stages at PF including an initial prosodification stage and a Vocabulary-Insertion stage.

5.2 *That-trace effects: a view from haplogy*

I noted at the beginning of section 5 that the reason why *that-trace* effects arise is due to the fact that there are two intermediate copies of the same syntactic constituent that are featurally identical in the spell-out domain. I captured this with the preliminary condition in (54). Thus, the effects arise as a reaction against repetition in the grammar. I propose a revision of (54) in the form of a morpho-syntactic filter excluding repetition of intermediate copies, regardless of whether they are eventually pronounced or deleted. I formulate this filter as in (61), where $\langle \rangle$ brackets indicate copies and the letter subscript refers to the numerically relevant link in a chain:²²

(61) The Two-Copy Filter (Final version)

- * $\langle XP_i \rangle, \langle XP_j \rangle$ iff
- $\langle XP_i \rangle$ and $\langle XP_j \rangle$ are intermediate copies of XP;
 - $\langle XP_i \rangle$ and $\langle XP_j \rangle$ are featurally identical;
 - $\langle XP_i \rangle$ and $\langle XP_j \rangle$ belong to the same spell-out domain D; and
 - $\langle XP_i \rangle$ and $\langle XP_j \rangle$ are in Relativized Adjacency.

The filter in (61) is an appropriate interface condition because it is sensitive to syntax and phonological form (Neeleman & Koot 2017). Besides, its scope is to rule out strict identity

²² In a chain composed of two copies, XP_i corresponds to the first copy created by movement, while XP_j to the second one (vi). If there are three copies, there will be another link XP_k (vii):

(vi) $XP_j \dots XP_i \dots XP$
 ↑ ↑

(vii) $XP_k \dots XP_j \dots XP_i \dots XP$
 ↑ ↑ ↑

created by intermediate movement within the same spell-out domain. One reason behind the filter is to avoid “lethal ambiguity”, i.e. the interface is stuck between two equal choices which in the case at hand is two copies of the same item. Rather than as a prosodic problem, we can think of this as a linearization problem.²³ Linearization would apply earlier at PF, before prosodification and Vocabulary Insertion. We know that structure needs to be turned into word order, and as the first part of this process, we have a (simple) linearization that scans the tree and creates an ordering statement; and copies should matter at this point to determine what precedes what and avoid contradictions.

Following the Cyclic Linearization model (Fox & Pesetsky 2005b;a; Davis 2020b; 20210), I assume that the relevant spell-out domain is the whole phase, rather than only the complement of the phase head. Namely for the purposes of this paper, CP *v*P are treated as phases. This entails that if the same constituent XP has moved to two different positions within a phase, that constituent is likely to be subject to the filter if the copies are in relativized adjacency. The notion of relativized adjacency is originally mentioned by Nevins (2012) to account for cases for which adjacency between two items matters, but there is an intervening element disrupting *strict* adjacency. I define the notion of Relativized Adjacency as in (62):

(62) Relativized Adjacency

Two items α and β are in relativized adjacency in the same spell-out domain at PF if

- a. α immediately, i.e. strictly, precedes β ; or
- b. α and β are separated by a lone phonologically weak and syntactically functional element γ

As defined in (62), Relativized Adjacency is concerned with the structural configurations at PF illustrated in (63a) and (63b) where D stands for the domain of spell-out by phase and \ll indicates ordering relations:

(63) Structural representation of Relativized Adjacency

- a. $[_{D_{\text{Phase}}} \alpha \ll \beta \ll \gamma \dots]$
- b. $[_{D_{\text{Phase}}} \alpha \ll \gamma_{[*F^*, *weak^*]} \ll \beta \dots]$

α and β are in relativized adjacency in (63a) given (63b): the former strictly or immediately precedes the latter. According to (62b), α and β also satisfy the definition of relativized adjacency: the strict adjacency is disrupted by γ , which is syntactically functional and phonologically weak, as indicated by $[*F^*, *weak^*]$ respectively. These configurations are not ruled out by default; in other words, Relativized Adjacency is not categorically banned. These configurations are prohibited in case α and β are intermediate copies of the same item. We can take (64) to be the assumed definition of what constitutes an intermediate copy:

(64) Definition of intermediate copy

A syntactic object XP_i constitutes an intermediate copy of a syntactic object XP_α iff

- a. XP_i is internally merged; but
- b. XP_i does not occupy the final landing site of a movement chain.

We can take the definition in (64) to mean that syntactic constituents that have been first merged (i.e. XP_α) or undergone the final movement step in a series (i.e. XP_ω , from now on) do not count as intermediate copies. Anything else does.

Before moving on to the relevant *that-trace* effect data points, I show how certain licit operations such as *wh*-movement, which involves successive cyclic movement, do not constitute a

²³ The term *lethal ambiguity* is attributed to the philosopher Jean Buridan, a disciple of Ockham. It was brought into the syntactic and linguistic literature by McGinnis (2004).

problem for the filter in (61). In cases of *wh*-extraction of objects in root clauses, the *wh*-element must proceed through the edge of the *v*P phase. Given the Cyclic Linearization model being adopted, successive cyclic movement is motivated by ordering preservation pressures at spell-out.²⁴ This results in a configuration like (65b) for the sentence in (65a):²⁵

- (65) a. What did John see t_{what} ?
 b. [_{vP} what₁ << John << see << what_α] vP ordering statement

The ordering statement in (65b) satisfies the filter in (61) since there are no two intermediate copies of the same *wh*-element. $what_α$ is created by movement. Besides, they are not in Relativized Adjacency: the verb, which is not functional or phonologically weak, is in between *whats*. When the CP phase is completed, the resulting configuration sent to spell-out, prior to *do*-support, is in (66):

- (66) [_{CP} what_ω << John << vP] CP ordering statement

Once again, the filter makes the right predictions and does not rule out this sequence: $what_ω$, though internally merged, is not an intermediate but a final copy.

The same occurs in long *wh*-movement dependencies across a complementizer. For example, the sentence in (67) has the linearization statements in (67a-67d) corresponding to each relevant phase:

- (67) What did you say that John saw t_{what} ?
 a. [_{vP} what₁ << John << saw << what_α] embedded vP ordering statement
 b. [_{CP} what₂ << that << John << vP] embedded CP ordering statement
 c. [_{vP} what₃ << you << say << CP] matrix vP ordering statement
 d. [_{CP} what_ω << you << vP] matrix CP ordering statement

The grammaticality of the sentence follows from the fact that there are no repeated intermediate copies of *what* in any of the spell-out domains relevant for linearization. Thus, no "lethal ambiguity" arises. We are now in a position to derive the *that-trace* paradigm this paper is concerned with.

5.2.1 *That-trace* effects: overt vs. null complementizer

Long distance extraction of an internal argument did not pose problems for the Two-Copy Filter as illustrated by (67). As a result, *wh*-movement of an object across a declarative complementizer is permitted. However, the situation is different in long distance subject extraction, as has already been discussed in this paper. The ban on this type of movement operation follows directly from the Two-Copy Filter. This is illustrated in (68):

- (68) * Who did you say t_{who} that t_{who} wrote *Good Omens*?
 a. [_{vP} who_α << wrote << *Good Omens*] embedded vP ordering statement
 b. [_{CP} who₂ << that << who₁ << vP] embedded CP ordering statement

²⁴ This does not mean that movement is not feature driven. However, successive cyclic movement is motivated by the "information-preserving nature of Spell-Out – *Order Preservation*. This property of Spell-Out only allows syntactic derivations that do not generate contradictory linearization information." (Davis 2021: 295)

²⁵ For ease of illustration V-movement has been omitted. V-to-*v* movement does not constitute a problem because there are no intermediate copies left by V on its way to *v*. Thus, the filter in (61) does not apply.

The derivation of the ν P phase in (68a) poses no problem: the external argument is already base generated in the edge of the ν P, which avoids successive cyclic movement. However, in the next phase there are two movement steps: one to Spec,TP and one to Spec,CP. The latter movement results in two identical copies of *who* in the CP spell-out domain: they are identical because both of them are [NOM, +WH, UQ] (Bošković 2007; Toquero-Pérez 2021). Last but not least, the configuration is that of Relativized Adjacency (62): the two intermediate copies are separated by a phonologically weak element which is syntactically functional, i.e. the complementizer *that*. As a result, the sentence is ruled out.²⁶

This situation can be circumvented if the complementizer is null or there is an intervening adverb. In the case of *that*-less clauses, I assume that these are not CPs but TPs alongside with Hegarty (1991); Webelhuth (1992); Doherty (1993); Svenonius (1994); Wurmbrand (2014); Bošković (2016) and Toquero-Pérez (2021). Some arguments for this include the following: *that*-less clauses cannot be topicalized (69a), they cannot move to the subject position (69b), and cannot extrapose (69c). The properties in (69) are analogous to those of TPs.

- (69) *That*-less clauses as TPs Adapted from Wurmbrand (2014: 155, ex.41)
- a. [* (That) James Macpherson discovered the poems of Ossian], you said. Topicalization
 - b. [* (That) James Macpherson discovered the poems of Ossian] was widely believed. Subject movement
 - c. It seemed at the time [* (that) James Macpherson had discovered the poems of Ossian] Extraposition

If the embedded clause lacks a CP layer, there should not be successive cyclic movement through its edge. In other words, the *wh*-element in Spec,TP would move directly to the edge of the next phase, i.e. matrix ν P. The structure would be linearized at that point. The ordering statements after spell-out are given in (70):^{27,28}

- (70) Who did you say t_{who} wrote *Good Omens*?
- a. [ν P who_{α} << wrote << *Good Omens*] embedded ν P ordering statement

²⁶ A clarification note is in order here. Erlewine (2017) tries to derive *that*-trace effects combining some version of anti-locality and Fox & Pesetsky's (2005b;a) Cyclic Linearization. Erlewine (2017) fully adopts Fox & Pesetsky's model of Cyclic Linearization, and argues that if there is an overt complementizer, movement across it would yield an ordering paradox. It is important to remember that Fox & Pesetsky (2005b: 10) assume that "[s]pell-out pays attention only to the head of a chain, and ignores traces." Thus, without any further assumptions, Fox and Pesetsky's original Cyclic Linearization model does not rule out examples like (68). This also poses the same problem for McFadden & Sundaresan (2018).

²⁷ It is possible that on the absence of a CP layer, TP is a phase instead. This would require a flexible approach to phases (Bobaljik & Wurmbrand 2005; Bobaljik & Wurmbrand 2012; Bošković 2014; Harwood: 2015): if a phase is determined by the highest projection within an extended projection as proposed by Bošković (2014), the lack of an overt C passes down the phasehood properties to the immediate lower projection. That projection is TP. In that case, successive cyclic movement must target the edge of TP. The *wh*-subject in Spec,TP is already in the phase edge and should not undergo any further movement creating only a single intermediate copy. As opposed to (70), the structure would be spelled-out at the embedded TP as illustrated in (viii):

(viii) [TP_{phase} who_1 << T << ν P]

²⁸ Alternatively, some have proposed that in *that*-less clauses there is a null complementizer projecting a CP phase (Erlewine 2017; Davis 2021). Given that successive cyclic movement occurs to meet the needs of order preservation at PF, Erlewine (2017: 377-378) proposes that the *wh*-subject moves from Spec,TP directly onto the edge of the next higher phase across the null complementizer. That is, there is no need for the *wh*-subject to move to Spec,CP as that movement would be vacuous (i.e. nothing would be gained from it) and create a lethal ambiguity problem. However as Roumi Pancheva (p.c.) notes, in the context of object movement to Spec, ν P nothing is gained except that cyclicity requires it. Thus, there is a tension between vacuously moving and obeying cyclicity that this work overlooks.

(73) NP movement to the edge of OP_{Rel}-containing DP

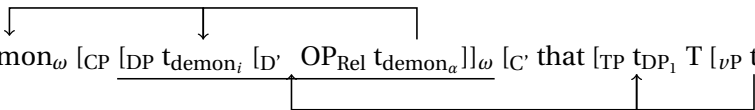
a. [_{DP} demon_i [_{D'} OP_{Rel} < demon >]]



b. [_{DP} demon_i << OP_{Rel} << demon_α] DP ordering statement

There is only one step of successive cyclicity, which entails that only one intermediate copy is left DP internally. Once the order inside the DP has been established, we can now proceed to the derivation of the subject relative clause in (72) provided in (74):

(74) [_{DP} The [_{NP} demon_ω [_{CP} [_{DP} t_{demon_i} [_{D'} OP_{Rel} t_{demon_α}]]_ω [_{C'} that [_{TP} t_{DP₁} T [_{vP} t_{DP_α} saved ...]]]]]]]



The DP is generated in Spec,*vP* as indicated by t_{DP_α}, and then it moves to Spec,TP. This is not the final landing site, since the DP must abandon this position and move across the overt relative complementizer *that*, onto its specifier. This leaves an intermediate copy indicated in (74) with t_{DP₁}. The last step is for the DP-internal NP, which is the head of the relative clause, to move out of that moved DP stranding the relative operator. This derivation results in the following ordering statements during linearization illustrated in (75), where the DP stands for the ordering statement given (73b):

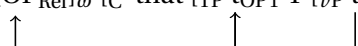
(75) Ordering statements by phase consistent with (74)

- a. [_{vP} DP_α << saved << the world] vP ordering statement
- b. [_{CP} DP_ω << that << DP₁ << vP] CP ordering statement
- c. [_{DP} the << demon_ω << CP] DP ordering statement

According to (75), there is no spell-out domain that contains two intermediate copies of the same element. In the case of (75b), even though the moved DPs are in Relativized Adjacency, DP₁ matches the definition of intermediate copy in (64), while DP_ω does not. What is more, these copies are not strictly identical in terms of features. Following insights from Cable (2010) and his Q-particle approach to A-bar operations, I adopt the idea that DPs containing a relative operator bear a feature [uQ_{Rel}:__] that they need to value against a relevant head. That head is the complementizer *that* which bears [Q_{Rel}]. Thus, while DP₁ in Spec,TP is [NOM, +WH, uQ_{Rel}:__], DP_ω in Spec,CP has valued its feature after the relevant movement step to this position. As a result, its feature composition is now distinct: [NOM, +WH, uQ_{Rel}: *val*]. As a result, the necessary conditions for the Two-Copy Filter do not apply and the sentence is allowed.

With respect to the head external analysis of relative clauses (Chomsky 1977; Heim & Kratzer 1998), the only difference is the fact that there is no DP-internal movement of the NP. This NP is generated outside of the relative clause, as part of the nominal hosting it. Thus, there is only A-bar movement of the relative operator to both Spec,TP and subsequently to Spec,CP. However, the approach adopted here makes no different predictions: the copy in Spec,TP is intermediate, but the one in Spec,CP is final and contains the fully valued OP_{Rel}. Thus, the Two-Copy filter does not apply, successfully ruling in subject relative clauses. A sample derivation is given in (76) and the relevant spell-out domains are in (77):²⁹

(76) [_{DP} The demon [_{CP} [OP_{Rel}]_ω [_{C'} that [_{TP} t_{OP₁} T [_{vP} t_{OP_α} saved the world]]]]]]]



²⁹ There is an third possible analysis of relative clauses, namely the matching analysis proposed originally in Lees (1960) and developed in more detail in Sauerland (1998; 2003) and Hulsey & Sauerland (2006). According to the matching analysis, the DP containing the relative operator and the internal NP head ends up in Spec,CP and moves no further. As a result, given the definition of what constitutes an intermediate copy, that A-bar moved DP counts as a final copy and is thus exempt from the filter.

- (77) Ordering statements by phase consistent with (76)
- | | | |
|----|--|----------------------------|
| a. | [ν P OP $_{\alpha}$ << saved << the world] | ν P ordering statement |
| b. | [CP OP $_{\omega}$ << that << OP $_1$ << ν P] | CP ordering statement |
| c. | [DP the << demon << CP] | DP ordering statement |

In addition to this, the proposal developed here avoids the problems noted in subsection 3.2 with respect to phonological phrasing and low vs. high attachments. The proposal says nothing about how prosodification should be carried out, and the reason why subject relatives are acceptable is due to the lack of a lethal ambiguity created by intermediate copies. Additionally, the low vs. high attachment debate, which posed a problem for [Kandybowicz \(2006a\)](#) who claimed prosodic boundaries mattered, does not arise under the Two-Copy Filter: both a high and a low attachment are predicted to be possible by the grammar if there are two potential antecedents; the filter does not block any attachment possibilities.

5.2.4 *That-trace* effects and phonological repairs (I): Focus

So far I have only applied the proposal to the cases in which narrow syntactic decisions, such as the merger of a TP (instead of a CP) and the adverb intervention effect, impede the application of the Two-Copy Filter. However, as observed by [Kandybowicz \(2006a\)](#) and [Sato & Dobashi \(2016\)](#), there are a series of non-narrow syntactic phenomena that ameliorate the effects. These include focus, ellipsis ([Merchant 2001](#)), and resumptive pronouns.

I discussed in section 2 that when the element immediately following the complementizer, which is typically a verb, bears narrow focus, an amelioration is reported by some speakers (as indicated with %). This same amelioration is shown to occur if in the C-Aux-V sequence, the V bears narrow focus.³⁰ This amelioration disappears if another element which is not the verb and is separated from the complementizer by other overt material bears focus. This is illustrated in (78):

- (78) Narrow Focus on the V following C ameliorates the effects
- % I know you don't care who bought her rollerblades to Robin, but who do you think that LOANED her rollerblades to Robin?
 - * I know you don't care who loaned her rollerblades to Zeke, but who do you think that loaned her rollerblades TO ROBIN?
 - % I know you don't care who could loan her rollerblades to Robin, but who do you think that WILL loan her rollerblades to Robin?
 - % I know you don't care who could sell her rollerblades to Robin, but who do you think that will LOAN her rollerblades to Robin?

In (78a) and (78c) narrow focus falls on the element that upon externalization of the utterance follows the overt complementizer. Their amelioration effects obtain. The fact that (78c) with narrow focus on *will* is acceptable can be taken as evidence that [Sato & Dobashi's](#) PF condition requires some modification. On the contrary, if the narrow focus bearer is not immediately adjacent to the complementizer and is not part of the Aux-V complex as in (78b), no amelioration occurs. Amelioration can still occur in some cases as in (78d), though.

Syntactically the sentences in (78) are derived in the same way as (68): there are two intermediate copies in Relativized Adjacency. Thus the Two-Copy Filter should rule them out during the linearization stages, due to the lethal ambiguity problem. However, I propose that there is

³⁰ Examples like these (78c-78d) were not discussed by [Kandybowicz \(2006a\)](#) and [Sato & Dobashi \(2016\)](#).

a repair triggered by focus during the prosodic phrasing after linearization that overrides the Two-Copy Filter.

As argued at length in sections 2 and 3, after spell-out of the morpho-syntactic information, the phonological input determines the phonetic output representation which includes the prosodification of the spelled-out material. At this stage, I argued that, by default, a complementizer would phrase with material following it (e.g. a verb) because function words cannot form a prosodic phrase on their own as captured by (11). I slightly modify this condition as (79):

(79) Prosodic phrasing of function words

Unstressed function words cannot form a prosodic phrase on their own.

Then during prosodification, I argued in section 4 that unpronounced copies (reduced by the relevant mechanism of chain reduction) do not count for prosodification, and the remaining structure is handed to prosody to establish a phonological representation. This means that the relevant phrasing of the examples in (78) should be as (80) where traces are omitted and only the relevant structure is included:

(80) Default Prosodic Phrasing for (78) based on Selkirk (2000: 247, ex.27)

- | | | |
|----|---|---------|
| a. | (<i>p_{hP}</i> that LOANED) (<i>p_{hP}</i> her rollerblades) (<i>p_{hP}</i> to Robin) | = (78a) |
| b. | (<i>p_{hP}</i> that loaned her rollerblades) (<i>p_{hP}</i> TO ROBIN) | = (78b) |
| c. | (<i>p_{hP}</i> that WILL) (<i>p_{hP}</i> loan her rollerblades) (<i>p_{hP}</i> to Robin) | = (78c) |
| d. | (<i>p_{hP}</i> that will LOAN) (her rollerblades) (<i>p_{hP}</i> to Robin) | = (78d) |

On its own (79) makes no repair at all, but we need to consider two important factors at stake here. The first one is the visibility of right edges of prosodic phrases in English. Virtually all theories of the syntax-phonology interface consider right edges to be relevant for prosodic phrasing (Gussenhoven 1983; 2004; Selkirk 1984; 1995; 2000; Truckenbrodt 1995; 2007). The second one is the observation made by Kratzer & Selkirk (2020: 25) that the impact of a syntactically focused-marked constituent should be captured as a constraint on prosodic structure. That said, I propose the following repair in (81):

(81) Salvation by Focus

A *-marked structure involving a complementizer, ruled out during linearization can be repaired during prosodification if

- a. the prosodic phrase Φ that contains the complementizer satisfies (79), and
- b. the right edge of Φ is aligned with a focused constituent.

According to Selkirk (2000), focus on a constituent places a phonological phrase boundary to the right of that constituent and forces it to prosodify with the preceding material.³¹ This entails that if the main verb is focused as in (78a) and (78d), the prosodic structure must be as in (80a) and (80d) respectively. In the case of (78b), the focused item does not phrase with the phonological phrase containing the complementizer and the Salvation by Focus rule does not override the Two-Copy Filter. The reformulation of (11) as (79) is crucial here because contrastively stressed auxiliaries like WILL in (78c), prosodified as (80c), may support a PhP on their own due to the additional prosodic weight that makes them behave kin to a full lexical category.

What is more, (79) receives support from the fact that there is no *that-trace* effect in right node raising where the clause-final complementizers bear contrastive stress or focus (Chene 1995; 2000; 2001) (82-83):

(82) Right Node Raising and absence of *that-trace* effects (I)

³¹ In the case of verbal arguments, prosodification with the preceding material depends on weight factors.

- a. ? Who does Ben wonder IF, __ and Mick thinks THAT, __ is ignoring the callings?
 b. ($_{IntP}$ ($_{PhP}$ who) ($_{PhP}$ does Ben) ($_{PhP}$ wonder IF)) ($_{IntP}$ ($_{PhP}$ and Mick) ($_{PhP}$ thinks THAT) ($_{PhP}$ is ignoring the callings))

(83) Right Node Raising and absence of *that-trace* effects (II)

- a. That's the guy Jim's been wondering IF, __ and Tom's been saying THAT, __ really likes Sue. (Chene 2000: 3, ex.14)
 b. ($_{IntP}$ ($_{PhP}$ That's the guy) ($_{PhP}$ Jim's been wondering IF)) ($_{IntP}$ ($_{PhP}$ and Tom's been saying THAT) ($_{PhP}$ really likes) ($_{PhP}$ Sue))

The major point of this section has been to argue that *that-trace* effects are due to linearization, not due to problems with prosody; although changes in prosodification can rescue an otherwise unlinearizable structure.

5.2.5 *That-trace* effects and phonological repairs (II): Ellipsis

The account has now a way to deal with the amelioration by focus while overriding the application of the PF filter. Another type of repair that is also prosodically sensitive involves the complete deletion of the offending structures that triggered the application of the Two-Copy filter. This is the “salvation by deletion” type of repair (Ross 1967; Lasnik 1999; 2001; Merchant 2001) illustrated in (85):

- (84) * Aziraphale said that some demon would save the world but I can't remember who_ω
 Aziraphale said [_{CP} t_2 that t_1 would [_{VP} t_α save the world.]]
 (85) Aziraphale said that some demon would save the world but I can't remember who_ω
 Aziraphale said [_{CP} ~~who₂ that who₁ would [_{VP} who_α save the world.]]~~

The ordering statement created at the embedded CP level, i.e. [_{CP} who₂ << that << who₁ << νP], involved two identical intermediate copies in Relativized Adjacency. As a result, when spelled out, the CP triggers the application of the filter. However, the problematic statement has now been deleted in (85) removing the star assigned after linearization. Since the non-elided counterpart in (84) has maintained the offending ordering statement, the star remains rendering the sentence ungrammatical.

5.2.6 *That-trace* effects and phonological repairs (III): Resumptive pronouns

There is one other way that *that-trace* effects can be ameliorated at PF. That is resumption in Spec,TP. Some examples include (18) repeated below as (86):

(86) Amelioration by resumption

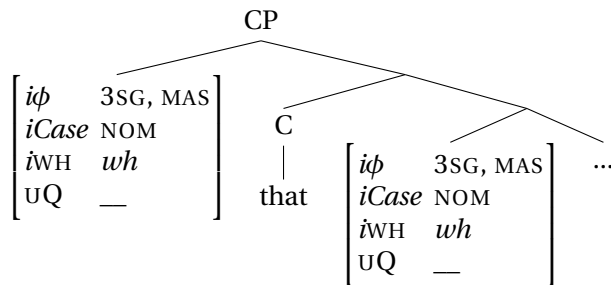
- a. [_{DP} Which author]_i is everyone saying that the publisher predicts that *he*_i would be adored? (=18a)
 b. [_{DP} Which author]_i is everyone saying that the publisher predicts that [_{DP} *the guy*]_i would be adored? (=18b)
 c. [_{DP} Which woman]_i does no Englishman even wonder whether *she*_i will make a good wife? Sells (1984: 477)
 d. ? [_{DP} Which picture of John]_i were you wondering whether *it*_i was going to win the prize at the exhibition? Pesetsky (1998: 362)

The literature on resumptive pronouns (and epithets) is extensive and it has been debated whether resumptive pronouns actually involve movement and spell-out of a lower copy (Engdahl

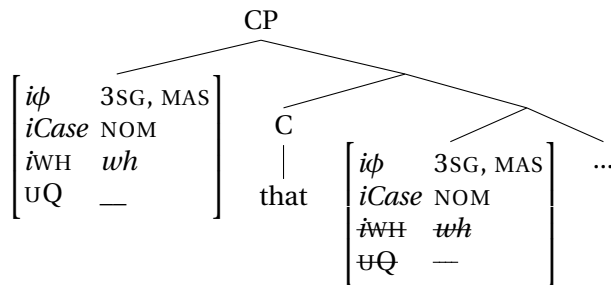
1980; 1985; Aoun, Choueiri & Hornstein 2001; Boeckx 2003; Kandybowicz 2006b; Sichel 2014) or not (McCloskey 1990; Rouveret 2002; 2008), or whether it is an issue of cross-linguistic difference (see Rouveret 2011 for an overview). Here, I adopt the former view, and namely Sichel’s (2014) finding that when a gap is unavailable, a resumptive pronoun may be used. This generalization fits the cases at hand. The gap in Spec,TP is impossible as the sentence would be ungrammatical due to the application of the Two-Copy filter: there are two identical copies of the same A-bar moved constituent. Suppose, however, that an operation of Impoverishment (Bonet 1991; Noyer 1992; Halle & Marantz 1993), taking place after linearization but before Vocabulary Insertion, were to delete some of the features on the copy occupying Spec,TP. Then the two intermediate copies contained within the same spell-out domain, i.e. CP, would be morphosyntactically (and morphophonologically) distinct.

Given that one of the necessary conditions for the Two-Copy filter is that the two copies are featurally identical, the application of an impoverishment rule to the copy on Spec,TP would override the filter from applying (88):

(87) After Spell-out and Linearization $\Rightarrow * \langle WH_2 \rangle, \langle WH_1 \rangle$



(88) Impoverishment



The deletion of the A-bar features leaves the DP with its remaining ϕ and case features.³² This is enough to affect morphophonological exponence, and for the chain reduction mechanism (Chomsky 1993; Nunes 1995; 2004) to recognize the lower copy as non-identical, and be spelled out. This distinctness caused by the deletion of features at PF avoids the lethal ambiguity that might have survived otherwise. In fact, this repair reminds us of Acekma’s (2001) analysis of identical complementizers in Dutch, and *spurious se* and other PCC repairs addressed in subsection 5.1. The only difference is that in Dutch, the set of all features under the C node are deleted and the default form of the complementizer emerges. In the case of the PCC repairs discussed, the relevant feature that was deleted was [PERSON] (Bonet 1991; 1994; 1995; Anagnostopoulou 2003; Nevins 2007; 2011; Walkow 2012; Pancheva & Zubizarreta 2017). Similarly to this later set of repairs, in the *that-trace* effect with resumption case, only a subset of all those features under the relevant node is deleted.

³² It is possible that there are other features that are deleted on top of the A-bar features. This is by no means an exhaustive list. The goal is to show that impoverishment applies to a subset of features born by the copy in Spec,TP yielding it distinct enough from the higher copy in the same spell-out domain. For example, in the case of Asante Twi, which also has a resumptive strategy to avoid *that-trace* effect violations, discussed by Kandybowicz (2006a;b), the relevant feature that is deleted is [PERSON], as in the *spurious se* case and other PCC repairs.

One of the advantages of this repair by impoverishment is the fact that we are resorting to an operation that we know is independently necessary. There is no need, and in fact it would be redundant, to assume a separate mechanism to account for this repair. Besides, dealing with resumption in terms of a morpho-syntactic rule rather than a prosodic one eliminates the undesirable predictions made by Sato & Dobashi (2016) regarding the phonological phrasing of subject pronouns in embedded clauses, discussed in subsection 3.1.

5.3 The position of *that-trace* repairs within the broader theory of haplology

Strategies to avoid certain repetitions are typically captured as filters that make reference to both syntactic and phonological information. In an attempt to provide some unification for the haplological processes described cross-linguistically, Nevins (2012) proposes that the mapping from syntax to phonology undergoes four different stages, which may be characterized by a range of identity avoidance repairs and mechanisms available. The four stages include (i) dissimilation during linearization, (ii) dissimilation during initial prosodic phrasing, (iii) M-word internal dissimilation, and (iv) vocabulary-insertion-level dissimilation. The features identified by Nevins (2012: 87-88) for each stage are provided in (89):³³

(89) Nevins' (2012: 87-88) stages of syntax-phonological mapping

<p>St1 <u>Linearization-level dissimilation</u></p> <ul style="list-style-type: none"> - Phonologically insensitive - Reference to syntactic categories - Within the same spell-out domain. - Repairs: syntactic operations, which may be pre-emptive. 	<p>St3 <u>M-Word- internal dissimilation</u></p> <ul style="list-style-type: none"> - Phonologically insensitive - Reference to individual features - Not necessarily adjacent with M-Word - Repairs: deletion of individual features
<p>St2 <u>Prosodic-phrase-level dissimilation</u></p> <ul style="list-style-type: none"> - Prosodically-sensitive - No reference to individual features: total identity of affected terminal - Strict adjacency required - Repairs: complete deletion of a node, or of all features under a category node. 	<p>St4 <u>Vocabulary-Insertion-level dissimilation</u></p> <ul style="list-style-type: none"> - Phonologically sensitive - No reference to individual features - Operates under adjacency - Repairs: alternate allomorph selection, zero-insertion, coalescence

Given the set of features in (89), the neutralization of *that-trace* effects due to the presence of a null C and their amelioration due to adverb intervention fall under the first stage of the mapping: they are syntactic operations which are phonologically insensitive, i.e. merger of a particular X/XP in the narrow syntax. What is more, these occur before transfer of the relevant cycle to the interfaces. However the other set of repairs – namely focus, elipsis, and resumtive elements in Spec,TP – are not that easy to be categorized under this model. That is because for these repairs reference to phonological sensitivity and individual syntactic features is necessary, while the model proposed by Nevins does not allow haplology to do so, a concern already pointed out by Neeleman & Koot (2017: 28). Thus, we can think of these cases to be part of an intermediate stage, between Prosodic-phrase level dissimilation and M-word internal dissimilation. That

³³ These stages are intended to be temporally ordered. However, we should entertain the possibility that at least some prosody must happen after Vocabulary Insertion: one stage that is sensitive to words and is responsible for mapping the syntactic output to a preliminary prosodic structure; and another that is sensitive to readjustment rules triggered by the phonetic properties of the vocabulary items. This would align with Kratzer & Selkirk's (2020: 17) syntax-prosody architecture: after spell-out of morpho-syntactic material, there is a Phonological Input representation (PI). This PI determines the optimal Phonological Output representation (PO), which eventually feeds the phonetic realization.

is because the strategies require some compromise: they must be prosodically sensitive while making reference to individual features and relativized adjacency. Thus, I propose the model could be enriched with an intermediate level that can be referred to as *Morpho-prosodic level dissimilation* between stages (ii) and (iii) of Nevins. This level would have the characteristics in (90):

- (90) Morpho-prosodic-level dissimilation
- a. Prosodically sensitive (with gradient acceptability due to focus, pauses, stress).
 - b. Reference to individual (morpho-syntactic) features.
 - c. Relativized Adjacency required
 - d. Repairs: deletion of individual features (impoverishment), ellipsis, resumption, prosodic readjustment

The addition of this extra level to Nevins' (2012: 87-88) model is empirically adequate because it is able to unify the set of strategies discussed in this paper and should in principle dissipate Neeleman & Koot's (2017) concerns. Moreover, it is conceptually appropriate as we now have room for a set of haplological mechanisms to be phonologically and morpho-syntactically sensitive.

6 Conclusion

This paper has reviewed some proposals to *that-trace* effects based on prosodic ill-formedness made by Kandybowicz (2006a) and Sato & Dobashi (2016). These prosody-based proposals are interesting alternatives to purely structurally based accounts because they deal with a set of data that pose great challenges to most (if not all) narrow syntactic accounts. Nevertheless, I have raised some concerns that these two proposals have to face in order to be compelling alternatives. First of all, phonological phrases composed of only a complementizer or a complementizer and a trace should never be a potential output of prosodic phrasing to begin with; and there is empirical evidence from relative clauses and phonological processes – such as the tap insertion, palatalization and glottalization rules – that supports this argument. Second, it is unclear why traces or unpronounced copies should be relevant for prosodification as there is extensive evidence showing that they do not block or trigger the application of otherwise prosodically motivated processes at PF (Nespor & Vogel 1979; 1986; Nespor 1990; Selkirk 1984; 1986). The conclusion arrived at here after reviewing these proposals does not entail that prosody is not at all involved and that all that matters is narrow syntax. Instead, I have proposed that the effects and their amelioration are best explained if syntax and morphophonology reach a compromise at PF.

I captured this as an interface condition that prevents strict identity within the same spell-out domain after linearization. This filter, which I labeled the Two-Copy filter, bans two featurally identical intermediate copies from being processed at PF. Importantly, a distinction must be made between copies created by intermediate movement, on the one hand, and those copies created by external merge or internal merge in their final landing site, on the other. The grammar might then resort to different strategies to repair that identity or even prevent it from happening in the first place. I modeled these repairs as haplological processes which included syntactically marked but prosodically sensitive focus, ellipsis, and resumption. Moreover, I have argued that these processes fall under the view of the syntax-phonology mapping developed by Nevins (2012), with some modification. Namely, there should be a stage during this mapping that is both prosodically and syntactically sensitive, but also enable a more relaxed adjacency (i.e. Relativized Adjacency).

Ascribing *that-trace* effects to haplogy illuminates our understanding of why purely syntactic or prosodic accounts are unsatisfactory: they have problems extracting the generalizations that underlie the data. Additionally, the proposal locates language variation between the narrow syntax and the morpho-phonology module of the grammar, rather than in the narrow syntax itself.

References

- Abels, Klaus. 2003. *Successive Cyclicity, Anti-locality, and Adposition Stranding*. University of Connecticut dissertation.
- Abney, Steven. 1987. *The English noun phrase in its sentential aspect*. Massachusetts Institute of Technology dissertation.
- Ackema, Peter. 2001. Colliding complementizers in Dutch: another syntactic OCP effect. *Linguistic Inquiry* 32(4). 717–726.
- Ackema, Peter & Ad Neeleman. 2003. Context-Sensitive Spell-Out. *Natural Language and Linguistic Theory* 21(4). 681–735.
- Alexiadou, Artemis & Elena Anagnostopoulou. 1998. Parametrizing Agr: word order, V-movement and EPP-checking. *Natural Language and Linguistic Theory* 16(3). 491–539.
- Anagnostopoulou, Elena. 2003. *The syntax of ditransitives: Evidence from clitics*. Berlin: Mouton de Gruyter.
- Aoun, Joseph, Lina Choueiri & Norbert Hornstein. 2001. Resumption, movement, and derivational economy. *Linguistic Inquiry* 32(3). 371–403.
- Bennett, Ryan, Emily Elfner & Jim McCloskey. 2016. Lightest to the right: An apparently anomalous displacement in Irish. *Linguistic Inquiry* 4. 169–234.
- Bhatt, Rajesh. 2002. The raising analysis of relative clauses: evidence from adjectival modification. *Natural Language Semantics* 10(1). 43–90.
- Bobaljik, Jonathan David & Susi Wurmbrand. 2005. The Domain of Agreement. *Natural Language and Linguistic Theory* 23(4). 809–865.
- Bobaljik, Jonathan David & Susi Wurmbrand. 2012. Word Order and Scope: Transparent Interfaces and the 3/4 Signature. *Linguistic Inquiry* 43(3). 371–421. https://doi.org/10.1162/LING_a_00094.
- Boeckx, Cedric. 2003. *Islands and Chains: Resumption as Stranding*. John Benjamins Publishing Company.
- Bonet, Eulália. 1991. *Morphology after syntax: Pronominal clitics in Romance*. Cambridge, Massachusetts: Massachusetts Institute of Technology, PhD dissertation.
- Bonet, Eulália. 1994. The Person-Case Constraint: A Morphological Approach. In Heidi Harley & Colin Phillips (eds.), *The morphology-syntax connection*, 33–52. MIT.
- Bonet, Eulália. 1995. Feature Structure of Romance Clitics. *Natural Language and Linguistic Theory* 13(4). 607–647.
- Bonet, Eulália. 2008. The Person-Case Constraint and repair strategies. In Roberta D’Alessandro, Susann Fischer & Gunnar Hrafn Hrafnbjargarson (eds.), *Agreement restrictions*, 103–2008. Berlin: Mouton de Gruyter.
- Borer, Hagit. 1984. Restrictive relatives in modern Hebrew. *Natural Language and Linguistic Theory* 2(2). 219–260.
- Bokovi, eljko. 2007. On the Locality and Motivation of Move and Agree: An Even More Minimal Theory. *Linguistic Inquiry* 38(4). 589–644.
- Bokovi, eljko. 2014. Now I’m a Phase, Now I’m Not a Phase: On the Variability of Phases with Extraction and Ellipsis. *Linguistic Inquiry* 45(1). 27–89.

- Bokovi, eljko. 2016. On the timing of labeling: Deducing Comp-trace effects, the Subject Condition, the Adjunct Condition, and tucking in from labeling. *The Linguistic Review* 33(1). 17–66.
- Bresnan, Joan. 1977. Variables in the theory of transformations. In Peter Culicover, Thomas Wasow & Adrian Akmajian (eds.), *Formal syntax*, 157–196. Academic Press.
- Brillman, Ruth & Aron Hirsch. 2016. An anti-locality account of English subject/non-subject asymmetries. In *Proceedings of cls 50*.
- Browning, Marguerite. 1996. CP Recursion and that-t Effects. *Linguistic Inquiry* 27(2). 237–256.
- Cable, Seth. 2010. *The Grammar of Q: Q-Particles, Wh-Movement and Pied-Piping*. Oxford: Oxford University Press.
- Camacho, José. 2013. *Null subjects*. Cambridge: Cambridge University Press.
- Chene, Brent de. 1995. Complementizer-trace effects and the ECP. *Geneva Generative Papers* 3. 1–4.
- Chene, Brent de. 2000. Prosody and subject traces. Ms., Waseda University.
- Chene, Brent de. 2001. Prosody and subject traces. Poster presented at the workshop *Prosody in Processing*, Utrecht University, OTS, 6 July.
- Chomsky, Noam. 1977. On wh-movement. In P Culicover, T Wasow & A Akmajian (eds.), *Formal syntax*. New York, New York: Academic Press.
- Chomsky, Noam. 1982. *Some concepts and consequences of the theory of government and binding*. Cambridge, Massachusetts: MIT Press. 110.
- Chomsky, Noam. 1993. A minimalist program for linguistic theory. In Ken Hale & Jay Keyser (eds.), *The view from Building 20*, 1–52. Cambridge, Massachusetts: MIT Press.
- Chomsky, Noam. 1994. *Bare phrase structure*. Cambridge, MA: MITWPL.
- Chomsky, Noam. 1995. *The minimalist program*. Cambridge, Massachusetts: MIT Press.
- Chomsky, Noam. 2000. Minimalist inquiries: the framework. In Roger Martin, David Michaels & Juan Uriagereka (eds.), *Step by step: essays on minimalist syntax in honor of howard lasnik*, 89–156. Cambridge, MA: MIT Press.
- Chomsky, Noam. 2001. Derivation by Phase. In Michael Kenstowicz (ed.), *Ken hale: a life in linguistics*, 1–52. Cambridge, MA: MIT Press.
- Chomsky, Noam. 2008. On Phases. In Robert Freidin, Carlos Otero & Maria Luisa Zubizarreta (eds.), *Foundational issues in linguistic theory: essays in honor of jean-roger vergnaud*, 133–166. Cambridge: MIT Press.
- Chung, Sandra. 1982. Unbounded Dependencies in Chamorro grammar. *Linguistic Inquiry* 13(1). 39–77.
- Chung, Sandra & James McCloskey. 1983. On the interpretation of certain island facts in GPSG. *Linguistic Inquiry* 14(4). 704–713.
- Citko, Barbara. 2014. *Phase Theory: An Introduction*. Cambridge, UK: Cambridge University Press.
- Culicover, Peter. 1993a. Evidence against ECP accounts of the that-t effect. *Linguistic Inquiry* 24(3). 557–561.
- Culicover, Peter. 1993b. The Adverb Effect: Evidence against ECP Accounts of the that-t Effect. In Amy J Schafer (ed.), *Proceedings of the north east linguistic society* 23, 97–111. University of Ottawa: Graduate Linguistic Student Association.
- D’Alessandro, Roberta & Tobias Scheer. 2015. Modular PIC. *Linguistic Inquiry* 46. 593–624.
- Davis, Colin. 2020a. Crossing and stranding at edges: On intermediate stranding and phase theory. *Glossa: a journal of general linguistics* 5(1). 1–32. <https://doi.org/10.5334/gjgl.854>.
- Davis, Colin. 2020b. *The linear limitations of syntactic derivations*. MIT dissertation.
- Davis, Colin. 2021. Possessor Licensing in Cyclical English: Evidence for Successive Cyclicity. https://doi.org/10.1162/ling_a_00369.

- Dilley, Laura, Stefanie Shattuck-Hufnagel & Mari Ostendorf. 1996. Glottalization of word-initial vowels as a function of prosodic structure. *Journal of Phonetics* 24. 423–444.
- Dobashi, Yoshihito. 2003. *Phonological phrasing and syntactic derivation*. Cornell University, Ithaca, NY. dissertation.
- Doherty, Cathal. 1993. *Clauses without that: The case for bare sentential complementation in English*. University of California Santa Cruz dissertation.
- Douglas, Jamie. 2017. Unifying the *that*-trace and anti-*that*-trace effects. *Glossa: a journal of general linguistics* 2. 1–28.
- Elbourne, Paul. 2001. E-Type anaphora as NP Deletion. *Natural Language Semantics* 9(3). 241–288.
- Elfner, Emily. 2012. *Syntax-prosody interactions in Irish*. Amherst, MA: University of Massachusetts dissertation.
- Engdahl, Elisabet. 1980. *The Syntax and Semantics of Questions in Swedish*. Amherst, Massachusetts: University of Massachusetts dissertation.
- Engdahl, Elisabet. 1985. Parasitic Gaps, Resumptive Pronouns, and Subject Extractions. *Linguistics* 23. 3–44.
- Erlewine, Michael Yoshitaka. 2016. Anti-locality and optimality in Kaqchikel Agent Focus. *Natural Language and Linguistic Theory* 34(2). 429–479.
- Erlewine, Michael Yoshitaka. 2017. Why the null complementizer is special in complementizer-trace effects. In Claire Halpert, Hadas Kotek & Coppe van Urk (eds.), *A pesky set: papers for david pesetsky*, 371–380. MIT Working Papers in Linguistics.
- Erlewine, Michael Yoshitaka. 2020. Anti-locality and subject extraction. *Glossa* 5(1). 1–38.
- Fodor, Janet Dean. 2002. Prosodic disambiguation in silent reading. In Masako Hirotani (ed.), *Proceedings of north east linguistic society* 32, vol. 1, 113–132.
- Fox, Danny. 1999. Reconstruction, binding theory, and the interpretation of chains. *Linguistic Inquiry* 30(2). 157–196.
- Fox, Danny & David Pesetsky. 2005a. Cyclic Linearization and its interaction with other aspects of grammar: A reply. *Theoretical Linguistics* 31(1-2). 235–262. <https://doi.org/10.1515/thli.2005.31.1-2.235>.
- Fox, Danny & David Pesetsky. 2005b. Cyclic Linearization of syntactic structure. *Theoretical Linguistics* 31(1-2). 1–46.
- Goldsmith, John. 1979. On the thematic nature of *See*. *Linguistic Inquiry* 10(2). 347–352.
- Gussenhoven, Carlos. 1983. Focus, mode and the nucleus. *Journal of Linguistics* 19. 377–417.
- Gussenhoven, Carlos. 2004. *The Phonology of tone and intonation*. Cambridge: Cambridge University Press.
- Halle, Morris & Alec Marantz. 1993. Distributed Morphology and the Pieces of Inflection. In Kenneth Hale & Samuel Jay Keyser (eds.), *The view from building 20*, 111–176. Cambridge, Massachusetts: MIT Press.
- Harwood, William. 2015. Being progressive is just a phase: celebrating the uniqueness of progressive aspect under a phase-based analysis. *Natural Language and Linguistic Theory* 33(2). 523–573.
- Heck, Fabian & Malte Zimmermann. 2004. DPs and Phases. Ms., University of Leipzig & HU Berlin.
- Hegarty, Michael. 1991. *Adjunct extraction and chain configuration*. MIT dissertation.
- Heim, Irene & Angelika Kratzer. 1998. *Semantics in generative grammar*. Malden, MA: Blackwell.
- Hsu, Yu-yin. 2016. Sentence-Initial Modals as Focus Operators at CP in Chinese. In *Proceedings of cls* 51, 257–268. Chicago Linguistic Society.
- Hulsey, Sarah & Uli Sauerland. 2006. Sorting Out Relative Clauses. *Natural Language Semantics* 14(2). 111–137.
- Jaeggli, Osvaldo. 1982. *Topics in Romance Syntax*. Dordrecht Holland: Foris Publications.

- Kandybowicz, Jason. 2006a. Comp-trace effects explained away. In Donald Baumer, David Montero & Michael Scanlon (eds.), *25th west coast conference on formal linguistics*, 220–228. Somerville, MA: Cascadilla.
- Kandybowicz, Jason. 2006b. *Conditions on multiple copy spell-out and the syntax-phonology interface*. University of California, Los Angeles dissertation.
- Kandybowicz, Jason. 2006c. On Fusion and Multiple Copy Spell-Out: The Case of Verb Repetition. In Jairo Nunes & Norbert Corver (eds.), *The copy theory of movement on the PF side*. Oxford University Press.
- Kandybowicz, Jason. 2015. On prosodic vacuity and verbal resumption in Asante Twi. *Linguistic Inquiry* 46. 243–272.
- Kayne, Richard. 1994. *The Antisymmetry of Syntax*. Cambridge, Massachusetts: MIT Press.
- Keine, Stefan. 2020. *Probes and their horizons*. Cambridge, MA: MIT Press.
- Kenesei, Istvaan & Irene Vogel. 1995. Focus and phonological structure. Ms., University of Szeged & University of Delaware.
- Khan, Sameer ud Dowla. 2008. *Intonational Phonology and Focus Prosody of Bengali*. University of California, Los Angeles dissertation.
- Kratzer, Angelika & Elisabeth Selkirk. 2020. Deconstructing information structure. *Glossa: a journal of general linguistics* 5(1). 1–53. <https://doi.org/10.5334/gjgl.968>.
- Lasnik, Howard. 1999. A note on pseudogapping. In Howard Lasnik (ed.), *Minimalist analysis*, 151–174. Oxford: Blackwell Publishers.
- Lasnik, Howard. 2001. When can you save a structure by destroying it? In Minjoo Kim & Uri Strauss (eds.), *Proceedings of the north east linguistic society 31*, 301–320. Georgetown University: GLSA.
- Leben, William. 1973. *Suprasegmental Phonology*. MIT dissertation.
- Lees, Robert. 1960. *The Grammar of English Nominalizations*. The Hague: Mouton.
- Legate, Julie Anne. 2003. Some Interface Properties of the Phase. *Linguistic Inquiry* 34(3). 506–516.
- Matushansky, Ora. 2005. Going through a phase. In Martha McGinnis & Norvin Richards (eds.), *Perspectives on phases*, 151–81. Cambridge, MA: MIT Working Papers in Linguistics.
- McCloskey, James. 2000. Quantifier Float and Wh-Movement in an Irish English. *Linguistic Inquiry* 31(1). 57–84.
- McCloskey, James. 2002. Resumption, Successive Cyclicity, and the Locality of Operations. In Samuel David Epstein & T Daniel Seely (eds.), *Derivation and explanation in the minimalist program*, 184–226. Malden, Massachusetts: Blackwell Publishing.
- McCloskey, Jim. 1990. Resumptive Pronouns, A'-binding and Levels of Representation in Irish. In Randall Hendrick (ed.), *Syntax of the modern celtic languages*, 199–248. New York, NY: Academic Press (Republished in *Resumptive Pronouns at the Interfaces*, edited by Alain Rouveret, 65–119. Amsterdam: John Benjamins Publishing Company).
- McFadden, Thomas & Sandhya Sundaresan. 2018. What the EPP and COMP-trace effects have in common: Constraining silent elements at the edge. *Glossa: a journal of general linguistics* 3(1).
- McGinnis, Martha. 2004. Lethal Ambiguity. *Linguistic Inquiry* 35(1). 47–95.
- Menn, Lise & Brian MacWhinney. 1984. The Repeated Morph Constraint: Toward an Explanation. *Language* 60. 519–541.
- Merchant, Jason. 2001. *The syntax of silence: sluicing, islands, and the theory of ellipsis*. Oxford: Oxford University Press.
- Neeleman, Ad & Hans van de Koot. 2006. Syntactic haplology. In Martin Everaert & Henk van Riemsdijk (eds.), *The wiley blackwell companion to syntax*, 1st editio, 685–710. John Wiley & Sons.
- Neeleman, Ad & Hans van de Koot. 2017. Syntactic Haplology. In Martin Everaert & Henk van Riemsdijk (eds.), *The wiley blackwell companion to syntax*, 2nd editio, 1–31. John Wiley & Sons.

- Nespor, Marina. 1990. On the Separation of Prosodic and Rhythmic Phonology. In Sharon Inkelas & Draga Zec (eds.), *The phonology-syntax connection*, 243–258. Chicago: University of Chicago Press.
- Nespor, Marina & Irene Vogel. 1979. Clash avoidance in Italian. *Linguistic Inquiry* 10(3). 467–482.
- Nespor, Marina & Irene Vogel. 1986. *Prosodic phonology*. Dordrecht, Holland ; Riverton, N.J.: Foris. xiv, 327.
- Nevins, Andrew. 2007. The Representation of Third Person and its Consequences for Person-Case Effects. *Natural Language and Linguistic Theory* 25(2). 273–313.
- Nevins, Andrew. 2011. Convergent Evidence for Rolling Up Catalan Adjectives. *Linguistic Inquiry* 42(2). 339–344.
- Nevins, Andrew. 2012. Haplological dissimilation at distinct stages of exponence. In Jochen Trommer (ed.), *The morphology and phonology of exponence*, 1st editio, 85–116. Oxford: Oxford University Press.
- Nissenbaum, Jon. 2000. *Investigations of covert phrase movement*. Cambridge, Massachusetts: Massachusetts Institute of Technology dissertation. 243.
- Noyer, Rolf. 1992. *Features, positions and affixes in autonomous morphological structure*. Cambridge, Massachusetts: Massachusetts Institute of Technology dissertation.
- Nunes, Jairo. 1995. *The copy theory of movement and linearization of chains in the Minimalist Program*. University of Maryland dissertation.
- Nunes, Jairo. 2004. *Linearization of Chains and Sideward Movement* (Linguistic Inquiry Monographs). Cambridge, Massachusetts: MIT Press.
- Ouhalla, Jamal. 1993. Subject-extraction, negation and the anti-agreement effect. *Natural Language and Linguistic Theory* 11(3). 477–518.
- Pancheva, Roumyana & Maria Luisa Zubizarreta. 2017. The Person Case Constraint: The syntactic encoding of perspective. *Natural Language and Linguistic Theory* 36. 1291–1337.
- Perlmutter, David. 1968. *Deep and surface constraints in syntax*. Massachusetts Institute of Technology dissertation.
- Perlmutter, David. 1971. *Deep and Surface Structure constraints in Syntax*. New York: Holt, Rinehart & Winston.
- Pesetsky, David. 1982. *Paths and categories*. Massachusetts Institute of Technology dissertation.
- Pesetsky, David. 1995. *Zero syntax*. Cambridge, Massachusetts: MIT Press. 351.
- Pesetsky, David. 1998. Some Optimality Principles of Sentence Pronunciation. In Pilar Barbosa, Danny Fox, Paul Hagstrom, Martha McGinnis & David Pesetsky (eds.), *Is the best good enough?*, 337–384. Cambridge, Massachusetts: MIT Press.
- Pesetsky, David. 2017. Complementizer-Trace effects. In Martin Everaert & Henk van Riemsdijk (eds.), *The wiley blackwell companion to syntax*, Second Edi. John Wiley & Sons.
- Pesetsky, David & Esther Torrego. 2001. T-to-C Movement: Causes and Consequences. In Michael Kenstowicz (ed.), *Ken Hale: a life in language*, 355–426. MIT Press.
- Pierrehumbert, Janet. 1994. Knowledge of variation. In *Papers from the 30th regional meeting of the chicago linguistics society*.
- Pierrehumbert, Janet & David Talkin. 1992. Lenition of /h/ and glottal stop. In G. Doherty & Robert Ladd (eds.), *Papers in laboratory phonology ii: gesture segment prosody*, 90–117. Cambridge: Cambridge University Press.
- Prieto, Pilar. 2006. Phonological phrasing in Spanish. In Fernando Martínez-Gil & Sonia Colina (eds.), *Optimality-theoretic studies in spanish phonology*, 39–61. Amsterdam: John Benjamins Publishing Company.
- Prince, Alan & Paul Smolensky. 1993. Optimality Theory: Constraint interaction in generative grammar. In *Technical report rucss tr-2, center for cognitive science*. Rutgers University, New Brunswick, NJ. Published, Malden, MA: Blackwell (2004).

- Rackowski, Andrea & Norvin Richards. 2005. Phase Edge and Extraction: A Tagalog Case Study. *Linguistic Inquiry* 36(4). 565–599.
- Radford, Andrew. 1977. Counter-Filtering Rules. *York Papers in Linguistics* 7. 7–45.
- Radford, Andrew. 1979. The Functional Basis of Transformations. *Transactions of the Philological Society* 77. 1–42.
- Richards, Norvin. 2010. *Uttering Trees*. Cambridge, MA: MIT Press.
- Ritchart, Amanda, Grant Goodall & Mark Garellek. 2016. Prosody and the That-Trace Effect: An Experimental Study. In Kim Kyeong-min, Pocholo Umbal, Trevor Block, Queenie Chan, Tanie Cheng, Kelli Finney, Mara Katz, Shopie Nickel-Thompson & Lisa Shorten (eds.), *33rd west coast conference on formal linguistics*, 320–328. Somerville, MA: Cascadilla.
- Rizzi, Luigi. 1982. *Issues in Italian syntax*. Dordrecht, Holland: Foris Publications.
- Rizzi, Luigi. 1997. The fine structure of the left periphery. In Liliane Haegeman (ed.), *Elements of grammar*, 281–337. Dordrecht: Kluwer Academic Publishers.
- Ross, John. 1967. *Constraints on variables in syntax*. Massachusetts Institute of Technology dissertation.
- Rouveret, Alain. 2002. How Are Resumptive Pronouns Linked to the Periphery? In Pierre Pica & Johan Rooryck (eds.), *Linguistic variation yearbook 2*, 123–184. Amsterdam: John Benjamins Publishing Company.
- Rouveret, Alain. 2008. Phasal Agreement and Reconstruction. In Robert Freidin, Carlos Otero & Maria Luisa Zubizarreta (eds.), *Foundational issues in linguistic theory: essays in honor of jean-roger vergnaud*, 167–195. Cambridge, MA: MIT Press.
- Rouveret, Alain. 2011. Some issues in the theory of resumption: A perspective on early and recent research. In Alain Rouveret (ed.), *Resumptive pronouns at the interfaces*, 1–64. Amsterdam/Philadelphia: John Benjamins Publishing Company.
- Sandalo, Filomena & Hubert Truckenbrodt. 2002. Some notes on phonological phrasing in Brazilian Portuguese. *MIT Working Papers in Linguistics* 42(285-310).
- Sato, Yosuke & Yoshihito Dobashi. 2016. Prosodic phrasing and that-trace effects. *Linguistic Inquiry* 46(1). 1–42.
- Sauerland, Uli. 1998. Scope freezing. In Pius N Tamanji & Kiyomi Kusumoto (eds.), *Proceedings of the north east linguistic society*, 169–182. University of Toronto: Graduate Linguistic Student Association.
- Sauerland, Uli. 2003. Intermediate Adjunction with A-Movement. *Linguistic Inquiry* 34(2). 308–314.
- Selkirk, Elisabeth. 1984. *Phonology and syntax: the relation between sound and structure*. Cambridge, Mass.: MIT Press. xv, 476.
- Selkirk, Elisabeth. 1986. On Derived Domains in Sentence Phonology. *Phonology* 3. 371–405.
- Selkirk, Elisabeth. 1995. Sentence prosody: intonation, stress and phrasing. In J A Goldsmith (ed.), *The handbook of phonological theory*, 550–569. London: Blackwell Publishers.
- Selkirk, Elisabeth. 1996. The prosodic structure of function words. In James Morgan & Katherine Demuth (eds.), *Signal to syntax: bootstrapping from speech to grammar in early acquisition*, 187–214. Mahwah, NJ: Erlbaum.
- Selkirk, Elisabeth. 2000. The interaction of constraints on prosodic phrasing. In Merle Horne (ed.), *Prosody: theory and experiment. studies presented to gösta bruce*, 231–261. Dordrecht: Kluwer.
- Selkirk, Elisabeth. 2005. Comments on intonational phrasing in English. In Sónia Frota, Marina Vigário & Maria João Freitas (eds.), *Prosodies*, 11–58. Berlin: Mouton de Gruyter.
- Selkirk, Elisabeth. 2011. The syntax-phonology interface. In John Goldsmith, Jason Riggle & Alan Yu (eds.), *The handbook of phonological theory*, 435–483. Oxford: Blackwell.
- Sells, Peter. 1984. *Syntax and semantics of resumptive pronouns*. University of Massachusetts, Amherst dissertation.

- Sichel, Ivy. 2014. Resumptive Pronouns and Competition. *Linguistic Inquiry* 45. 655–693.
- Suñer, Margarita. 1994. V-Movement and the licensing of argumental wh-phrases in Spanish. *Natural Language and Linguistic Theory* 12. 335–372.
- Svenonius, Peter. 1994. C-selection as feature-checking. *Studia Linguistica* 48(2). 133–155.
- Toquero-Pérez, Luis Miguel. 2021. Revisiting extraction and subextraction patterns from arguments. *Linguistic Variation*. 1–86. <https://doi.org/10.1075/lv.20002.toq>.
- Truckenbrodt, Hubert. 1995. Extraposition from NP and Prosodic Structure. In Jill Beckman (ed.), *Proceedings of the north east linguistic society* 25, 503–518. University of Pennsylvania: Graduate Linguistic Student Association.
- Truckenbrodt, Hubert. 1999. On the relation between syntactic phrases and phonological phrases. *Linguistic Inquiry* 30(2). 219–255.
- Truckenbrodt, Hubert. 2007. The syntax-phonology interface. In Paul de Lacy (ed.), *The Cambridge handbook of phonology*, 435–456. Cambridge: Cambridge University Press.
- Tyler, Matthew. 2019. Simplifying Match Word: Evidence from English functional categories. *Glossa: a journal of general linguistics* 4(1). 1–32.
- Vergnaud, Jean-Roger. 1974. *French Relative Clauses*. Massachusetts Institute of Technology dissertation.
- Walkow, Martin. 2012. *Goals, Big and Small*. University of Massachusetts, PhD dissertation.
- Webelhuth, Gert. 1992. *Principles and Parameters of Syntactic Saturation*. Oxford: Oxford University Press.
- Weir, Andrew. 2012. Left-edge deletion in English and subject omission in diaries. *English Language and Linguistics* 16(1). 105–129.
- Wurmbrand, Susi. 2014. Merge: A syntactic approach to selection. In Peter Kosta, Steven Franks, Teodora Radeva-Bork & Lilia Schürcks (eds.), *Minimalism and beyond. radicalizing the interfaces*, 130–166. Amsterdam: John Benjamins.
- Zec, Draga. 2005. Prosodic differences among function words. *Phonology* 22(1). 77–112.
- Zubizarreta, Maria Luisa. 1994. El orden de palabras en español y el caso nominativo. [*Word order in Spanish and nominative case*]. In Violeta Demonte (ed.), *Nueva revista de filología hispánica vi*, 21–49. Mexico City: Colegio de México.