Functional Categories and Prosodic Phrasing in English:

Evidence from *That*-Trace Effects and Pronominal Object Shift [*]

Abstract: One central working hypothesis in the Minimalist Program is that the core properties of the language faculty are to be explained in terms of interface conditions. We suggest here an interface-oriented analysis of the two phenomena – *that*-trace effects and pronominal object shift – which have steadfastly resisted a syntactic explanation despite more than three decades of rather intense generative research. We propose that function words cannot form a prosodic phrase on their own. This analysis straightforwardly derives the core paradigm regarding the two phenomena and the systematic exceptions triggered by several prosodic strategies including contrastive focal stress, adverbs and auxiliary reduction.

Keywords: prosodic phrasing, that-trace effect, pronominal object shift, syntax-phonology interface, minimalist program, interface conditions

1.   Introduction

Since the advent of the Minimalist Program (Chomsky 1995, 2000, 2001, 2004), which attempts to provide a principled explanation for the design of the faculty of language from interface conditions, investigations of the nature and function of the syntax-phonology interface have come to the forefront of the generative enterprise. Accordingly, a wide variety of the phenomena that

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once were discussed strictly in syntactic terms such as the Empty Category Principle (ECP) within the Government-and-Binding (GB) Theory (Chomsky 1981, 1986a, b) have been reanalyzed in recent years with special reference to the way the syntactic computation interacts with the sound-related component (Bošković 2001; Bošković and Lasnik 2003; Merchant 2001; An 2007; Richards 2010). Richards (2010) represents the most comprehensive research to date that seriously investigates an interface approach to certain erstwhile syntactic phenomena. Richards suggests that whether a language has overt *wh*-movement or not, a parametric property that has been simply stipulated by the strength of the interrogative feature in the literature (Chomsky 1995), is predictable from the position of the interrogative C (initial vs. final) and its prosodic alignment structure (right-vs. left-edge). He argues that languages attempt to minimize the number of minor prosodic boundaries between a *wh*-phrase and the C in one of two ways: either by directly manipulating the prosody so that the two words belong in the same prosodic domain as in Japanese or by syntactically moving the *wh*-phrase as close as possible to the C as in English.

The purpose of this article is to investigate further empirical and theoretical consequences of this interface-oriented approach to two other phenomena – *that*-trace effects and pronominal object shift – which in our view have heretofore steadfastly resisted a purely syntactic explanation despite more than three decades of rather intensive generative research. Specifically, we propose (1) as our central hypothesis at the syntax-phonology interface.

(1) Inactivity of Function Words for Prosodic Phrasing at the Syntax-Phonology Interface

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

This condition has its roots in Trunckenbrodt's (1999: 226) *Lexical Category Condition* and Selkirk's (1984: 226) *Principle of Categorial Invisibility of Function Words,* both of which state that function words are invisible with respect to prosodic algorithms and constraints at the syntax-phonology mapping. We demonstrate that this condition provides a straightforward explanation for the core paradigm and systematic exceptions noted in the literature concerning the afore-mentioned two phenomena.

The article is organized as follows. In section 2, we discuss the *that*-trace effect, a quintessential case of the subject-object asymmetry which was captured by the ECP within the GB theory. We propose that this effect arises due to the violation of (1). When a local subject is extracted from a clause headed by *that*, this extraction prevents the C from forming a phonological phrase with a lexical word that follows it. As a result, the extraction creates a configuration that violates (1). This analysis provides a principled explanation for the amelioration effects triggered by a) sentential adverbs (Bresnan 1977; Barss and Déprez 1986; Culicover 1993; Browning 1996), b) contrastive stress (Drury 1999: Kandybowicz 2006), and c) auxiliary contraction (Kandybowicz 2006). We compare our analysis with two recent alternative analyses presented by Kandybowicz (2006) and Hasegawa (2003). We show that our analysis is superior to these analyses on both empirical and conceptual grounds. Empirically, our analysis can be extended to obligatory pronominal shift, a move that is not possible in these analyses specifically designed to account for the *that*-trace effect. We further point out that the two analyses cannot capture the observation, originally due to Browning (1996), that embedded topicalized material, unlike adverbs, cannot bring about the

amelioration effect. This observation directly falls out from (1), once we take seriously the particular intonational contour created by topicalization (Nespor and Vogel 1986; Truckenbrodt 1995). Conceptually, both Kandybowicz's and Hasegawa's analyses make a crucial reference to the notion of traces/gaps, but this reference is controversial. Our analysis is free from this problem in that it stands on the independently motivated assumption that function words are invisible at the level of prosodic phrasing. In section 3, we turn to obligatory prononomainl object shift, another case which we believe has resisted a purely syntactic explanation (Johnson 1991: Lasnik 1999). Johnson observes that in verb + particle constructions, a direct object can occur either before or after a particle but must precede the particle when it is a weak pronoun. We show that this observation is a straightforward consequence of (1) because weak pronouns must form a phonological phrase with a lexical word that occurs immediately before the pronouns. Section 4 is the conclusion.

2.   *That*-Trace Effects and Prosodic Phrasing of Functional Categories

The *that*-trace effect (Perlmutter 1968; Chomsky and Lasnik 1977) is the phenomenon where *that* cannot be followed immediately by a trace in languages such as English. Example (2a) illustrates this effect. Direct objects and adjuncts behave differently from subjects because they do not exhibit the effect, as illustrated in (2b) and (2c), respectively.

(2) a.   Who$_i$ do you think [(***that**) t_i wrote the book]?   (subject extraction)

b.   What$_i$ do you think [(**that**) Bill wrote t_i]?   (object extraction)

4

c.   Why$_i$ do you think [(**that**) Bill wrote the book t_i]? (adjunct extraction)

This subject-non subject asymmetry has been standardly taken in the GB literature (Lasnik and Saito 1984, 1992) to arise from the Empty Category Principle (Chomsky 1986a, b). This principle states that traces must be properly governed, where proper government is either antecedent-government or head-government. Accordingly to this analysis, object traces are properly governed because objects are head-governed by the verbs. Subject traces are not properly governed because they are not selected by the verbs and the overt C somehow blocks the antecedent government of the original trace in subject position by the intermediate trace. As for the lack of the *that*-trace effect in (2c), Lasnik and Saito (1992) suggest that adjunct traces are licensed only at LF with respect to proper government whereas argument traces must be properly governed by S-Structure. Assuming further that *that* as a semantically vacuous element is erased at LF, the original trace in (2c) is properly governed by the intermediate trace in the same way that the subject trace is properly governed by the intermediate trace when *that* is eliminated in (2a).

2.1.   That-*Trace Effects and the Interface Properties of Function Words*

The ECP-based analysis reviewed above is not formulable within the current minimalist framework, which attempts to dispense with arbitrary geometric notions including government and to do away with conceptually unmotivated levels of representation such as S-structure. Our interface-oriented analysis, on the other hand, correctly predicts this subject-non-subject

asymmetry in a principled way that does not rely upon government as its central technical premise. Firstly, (2a) is ungrammatical with *that* because the C cannot form a prosodic phrase on its own. Given the prosodic phrasing of (2a), shown in (3), where the VP *wrote the book* forms its own phonological phrase to the exclusion of the C, (2a) violates 1). This violation does not occur in (3b, c). In these examples, *that* can form a phonological phrase with the lexical word that follows it (i.e., *Bill*), as represented in (3b, c), respectively

(3)a. * [$_{PhP}$ Who$_i$ do you think   [$_{PhP}$ **that** t_i [$_{PhP}$ wrote the book]]]

  b.   [$_{PhP}$ What$_i$ do you think   [$_{PhP}$ (**that**)   Bill wrote t_i]]

  c.   [$_{PhP}$ Why$_i$ do you think   [$_{PhP}$ (**that**)   Bill wrote the book t_i]?

There are two independent arguments showing that the *that*-trace effect is the by-product of the syntax-phonology interface rather than the result of syntactic principles such as ECP. One argument comes from sluicing. Drawing on the classical analysis presented by Ross (1969), Merchant (2001) argues that sluicing constructions in English, illustrated in (4a), are the product of the syntactic *wh*-movement followed by TP-deletion in the phonological component, as shown in (4b).

(4) a.   Somebody just left. – Guess who.

  b.   Somebody just left. – Guess [$_{CP}$ who [~~$_{TP}$ t_i just left~~]].

Our analysis predicts that the *that*-trace effect is eliminated once the TP that contains the offending phrasing like the one in (3a) is deleted. This prediction is borne out by (5a, b). (5a) illustrates the *that*-trace effect. (5b) crucially shows that TP-deletion nullifies the effect.

(5) a. *   John said that someone would write a new textbook but I can't remember who$_i$ John said that t_i would write a new textbook.

b.   John said that someone would write a new textbook but I can't remember who$_i$ [$_{TP}$ ~~John said that t_i would write a textbook~~].

(Merchant 2001: XXX)

Suppose that the effect here were purely syntactic as it were so deemed in the classical ECP-approach. Then, we wrongly predict no contrast between (5a) and (5b) because an ECP violation is deemed a strictly syntactic violation (either checked at S-Structure or at LF).

The other argument that the *that*-trace effect is an interface phenomenon comes from Ackema's (2010) recent observation. It is widely acknowledged that parenthetical expressions such as *as*-clauses are invisible to the syntactic well-formedness of the host syntactic structures (Haegeman 1988; Espinal 1991; Potts 2002). For example, *as*-clauses do not disrupt the obligatory adjacency requirement between the verb and its direct object, as shown in (6a). Note that (6a) is grammatical even without any additional stress on the object, meaning that this example is not created by Heavy DP-Shift. This behavior is in direct contrast with (6b), which is ungrammatical due to the intervening adverb between the verb and its direct object.

7

(6) a.   Susan loves, as we are all aware, silly books.

   b. * Susan loves passionately silly books.

Ackema crucially observes, however, that as-parenthetical clauses, though syntactically inert, do

have the ameliorating effect on that-trace violations, as illustrated in (7).

(7)   Who$_i$ do you think that, as we are all aware, t_i loves silly books?

If parentheticals are not integrated into the syntactic derivation of their host, as shown in (6a),

then the ameliorating effect observed here remains mysterious under a classical syntactic

approach. The grammaticality of (7), however, naturally falls out from (1) under our interface

analysis because the C in (7) can form a prosodic phrase with the parenthetical expression that

immediately follows it (see section 2.2 for evidence that the same ameliorating effect is

observed with sentential adverbs). Ackema's observation thus provides further support for our

view that the *that*-trace effect is to be better understood as an interface constraint.

2.2.   *Salvation Effects Triggered by Sentence Adverbs, Contractive Focus and Reduction*

It is well known that the *that*-trace effect is ameliorated by several other prosodic strategies

than sluicing. Firstly, the effect is suspended when a sentential adverb is inserted between *that*

and the trace (Bresnan 1977; Barss and Deprez 1986; Culicover 1993; Browning 1996). This

observation is illustrated in (8a) with the *wh*-movement and in (8b) with relativization.

(8) a.　Who$_i$ do you think that **after years and years of cheating death** t_i finally died?

　　b.　the author$_i$ that the editors predict that **for all intents and purposes** t_i will be adored?

<div align="right">(Kandybowicz 2006: 222)</div>

The adverb effect here is a straightforward consequence of (1). The adverbs inserted in (8a, b) allow *that* to form a phonological phrase with them, as shown in (9a, b), respectively.

(9)a.　[$_{PhP}$ Who$_i$ do you think　[$_{PhP}$ that **after years and years of cheating death**　[$_{PhP}$ t_i finally died]]]

　　b.　[$_{PhP}$ the author [$_{PhP}$ that the editors predict　[$_{PhP}$ that **for all intents and purposes** [$_{PhP}$ t_i will be adored]]

It is not that all adverbs have the salvation effect. Hasegawa (2003) observes that adverbs such as *just* and *completely* cannot ameliorate the *that*-trace effect, as shown in (10a, b).

(10) a.　* Who$_i$ did she say that t_i **just** escaped death?

　　b. * the army$_i$ that we know that t_i **completely** destroyed the village　(Hasegawa 2003: 242)

It appears at first sight that the lack of the ameliorating effect in (10a, b) is problematic for our analysis but upon a closer examination this fact provides further support for it. As Hasegawa (2003) notes, the adverbs in (10a, b) must occur after the subject. As shown in

(11a-d), they must follow their local subjects. Note that, by way of comparison, the

sentential adverbs in (8a, b) can occur before their local subjects, as (12a, b) indicates.

(11) a. He **just** escaped death.

　　b. * **Just** he escaped death.

　　c. The army **completely** destroyed the village.

　　d. * **Completely** the army destroyed the village.　　　　(Hasegawa 2003: 242)

(12) a. **After years and years of cheating death** Mary finally died.

　　b. The editors predict that **for all intents and purposes** the author will be adored.

Given the relative ordering between the VP-adverbs and subjects, (8a), for instance, is parsed

as in (13). (13) violates (1) because *that* cannot form a prosodic phrase on its own.

(13)　[$_{PhP}$ Who$_i$ did she say　[$_{PhP}$ that t_i　　[$_{PhP}$ **just** escaped death]]?

　　　　Secondly, contrastive focal stress on the verb in the subordinate clause mitigates the

that-trace violation (Drury 1999; Kandybowicz 2006). (14a, b) illustrate this mitigating effect.

(14) a. (?) Who$_i$ do you think that t_i **WROTE** *Barriers* (as opposed to say, *edited* it)?

　　b. * Who$_i$ do you **THINK** that t_i wrote *Barriers* (as opposed to say, *know*)?

10

c. * Who$_i$ do you think that t_i wrote *Barriers* **YESTERDAY** (as opposed to *a year ago*)?

<div align="right">(Kandybowicz 2006: 222-223)</div>

In (14a), the contrastive stress on *wrote* salvages what otherwise would result in a *that*-trace violation. Note that it is the verb which immediately follows the trace that has this salvation effect. Thus, as shown in (14b, c), focal stress on *think* or *yesterday* does not cause any improvement with respect to *that*-trace effects. Again, our analysis is straightforward. The emphatic stress on *wrote* in (14a) facilitates the prosodic phrasing shown in (15).

(15)   [$_{IntP}$ Who$_i$ do you think **that**] [$_{IntP}$ t_i WROTE Barriers]

Under this phrasing, *that* marks the end of the first intonational phrase. The second intonational phrase is initiated by WROTE. Selkirk (1996) observes that in English, monosyllabic function words may appear in either a weak/stressless form or a strong/stressed form depending on their positions in a clause, unlike a lexical category that always appears in a stressed/unreduced form. Crucial for our purposes is that function words must take the strong form at the right edge of a prosodic phrase. Consider (16a-c):

(16) a.   I can eat more than Sarah ***cán***.   [kæn], *[kən], *[kn]

  b.   Wherever Ray ***ís***, he's having a good time.   [ɪz], *[z]

c.   What did you look **át** yesterday?   [æt], *[ət]   (Selkirk 1996: 200)

All the italicized words in (16a-d) occur in strong variants because they stand at the right edge of their phonological phrases. The C in (15) is thus obligatorily realized as a strong/stressed form. Accordingly, (14a) does not violate (1). (14b, c) also naturally fall out from our analysis. The focal stress on *wrote* or on *yesterday* does not change the prosodic phrasing in a way that salvages the *that*-trace effect. In both examples, *that* is materialized as an unstressed word.

Note that our analysis makes another important prediction at this point. We predict that the *that*-trace effect disappears under Right-Node-Raising (RNR). Our reasoning is as follows. The elements that undergo RNR are obligatorily parsed as separate intonational phrases. Under this context, intonational boundaries occur, on one hand, between the first and the second conjunct, and, on the other hand, between the remaining material in the second conjunct and the shared/right-node-raised material, as shown in (17b) for (17a).

(17) a.   John could have planned, and Mary could have hosted, a huge party.

 b.   [$_{IntP}$ John could have planned] [$_{IntP}$ and Mary could have hosted] [$_{IntP}$ a huge party]

Given this independent fact, our analysis predicts that the *that*-trace effect should disappear when *that* occurs at the right-edge of the second conjunct as the result of RNR. This prediction is indeed verified. De Chene (1995, 2000, 2001) points out that the intonational boundary created by RNR ameliorates the *that*-trace violation, as shown in (18a, b).

(18) a. Who$_i$ does John doubt **whether** and Bill suspect **that** t_i cheated on the exam?

    b. That's the guy Jim's been wondering **if**, and Tom's been saying **that**, t_i really likes Sue.

                                                                   (Kandybowicz 2006: 222)

In (18a), for instance, the TP undergoes RNR into the sentence-final peripheral position. Thus, this example receives the intonational phrasing shown in (19).

(19)   [$_{IntP}$ Who$_i$ does John doubt **whether** [$_{IntP}$ and Bill suspect **that** [$_{IntP}$ t_i cheated on the exam]]]

In (19), *that* occurs at the right edge of the second intonational phrase. Thus, it must be realized as a full/stressed form. Accordingly, (1) is inapplicable.

      Thirdly, Kandybowicz (2006) points out that auxiliary reduction across a trace voids the *that*-trace effect. In (20a), *will* contracts itself to its immediately preceding, getting rid of what otherwise would yield a *that*-trace violation. A similar amelioration takes place in the relativization context in (20b).

(20) a. (?) Who do you suppose **that'll** leave early?

    b. (?) The author that the editor predicted **that'd b**e adored.   (Kandybowicz 2006: 222)

We analyze this observation as follows. It is well known in the literature on auxiliary reduction (King 1970; Lakoff 1970; Bresnan 1971; Kaisse 1983) that reduction when an auxiliary is

13

immediately followed by a gap created either by transformations or by deletion. Examples in

(21a, b) illustrate this blocking effect.

(21) a.   I am wondering where {**Mary is/*Mary's**}.   (*wh*-movement)

   b.   Murphy is taller than {**Gabe is/*Gabe's**}.   (comparative deletion)

Bresnan (1971) suggests that this blocking effect falls into place if auxiliaries are proclitics.

(21a, b) are unacceptable with auxiliary reduction because the auxiliaries then have nothing on

their right to contract onto. Given this suggestion, we maintain that the contracted auxiliary *'ll*

in (20a) first attaches to *leave* and that the unstressed C in turn attaches to the auxiliary +verb

complex. Under this view, *that* forms a prosodic phrase together with the following verb *leave*

thanks to the prior cliticization of the contracted auxiliary to the verb.

2.3.   *Other Alternative PF Analyses*

In this section, we compare our analysis of the *that*-trace effect with two recent alternative

analyses developed by Kandybowicz (2006) and Hasegawa (2003), both of which

independently pursue a non-syntactic, prosodic analysis of the same phenomenon.

        Kandybowicz (2006) proposes that in English, the linear sequence $\langle C^0, t \rangle$ is illicit

when C^0 and the trace are adjacent within the same prosodic phrase and C^0 is aligned with a

prosodic phrase boundary. Kandybowicz's constraint is defined as follows.

(22) PF Anti-Adjacency Filter on Cs and Traces

$*<C^0, t>$ iff:

i. C^0 & t are adjacent within a prosodic phrase AND

ii. C^0 is aligned with a prosodic phrase boundary   (Kandybowicz 2006: 223)

This constraint correctly accounts for the paradigm discussed above. Firstly, (2a) is bad because *that* and the *wh*-trace are adjacent within a single prosodic phrase Secondly, (8a) and (18a) are grammatical because *that* and the trace are no longer within a single prosodic phrase due to the adverbials and RNR-ed constituents, as shown in (23a) and (23b), respectively.

(23) a.   [$_{IntP}$ Who do you think that [$_{IntP}$ **after years and years of cheating death**]

         [$_{IntP}$ finally died]

     b.   [$_{IntP}$ Who does John doubt whether] [$_{IntP}$ and Bill suspect **that**] ____[$_{IntP}$ cheated

         on the exam]

Thirdly, the *that*-trace effect is void in (14a) because contrastive stress on the embedded verb disrupts the adjacency of *that* and the trace within a single prosodic phrase. The filter in (22) also correctly predicts that focusing any other material that would not disrupt the adjacency will not save the *that*-trace violation, as shown in (14b, c). The schematic representations for (14a-c) are shown in (24a-c), respectively.

(24) a.   [IntP Who did you think that] _____ [IntP WROTE *Barriers* yesterday]]?

   b.   [IntP Who did you THINK [IntP that __ wrote] [IntP *Barriers* yesterday]]?

   c.   [IntP Who did you think [IntP that __ wrote Barriers [IntP YESTERDAY]]]?

Finally, (20a, b) are grammatical, according to Kandybowicz, because auxiliary reduction

makes the *wh*-trace internal to C^0; as a result, the C and the trace do not count as adjacent, even

though they are in the same prosodic phrase.

   The reason why Kandybowicz includes (22ii) in his filter is to account for the

observation that the *that*-trace effect fails to obtain in matrix relativization cases such as (25).

(25)   [IntP the butler that __ murdered the maid]   (No IntP boundary before C^0)

<div align="right">(Kandybowicz 2006: 220)</div>

Kandybowicz observes that there is no intermediate IntP boundary separating C^0 from the

embedded clause, as shown in (25). This example does not exhibit the *that*-trace effect because

the C is not aligned with a prosodic phrase boundary. Notice that our analysis also correctly

predicts the grammaticality of (25). The C can form a phonological phrase with the lexical

word *murdered* because no prosodic boundary exists between the C and the verb.

   Although our analysis agrees with Kandybowicz's in its insight that the *that*-trace effect

is phonological in nature, we believe that our analysis is free from certain conceptual and

empirical challenges that would face Kandybowicz's. Conceptually, it is a controversial

assumption that traces, the output of syntactic derivation, are visible at the level of prosodic phrasing. Kandybowicz assumes that (22) is "a PF anti-adjacency constraint on Cs and traces" (p. 223), an insight that goes back to Chomsky and Lasnik's (1977) filter-based conception of *that*-trace effects. However, this assumption begs the question why syntactic constructs such as traces ever affect what is essentially a post-syntactic phonological phenomenon because PF has been standardly assumed within the Minimalist Program to be a pure representation of the sound of a sentence derived from its syntactic structure via certain mapping algorithms (Selkirk 1984; Trunckenbrodt 1999). This point is clarified in Chomsky's (1995) definition of PF:

> PF is a representation in universal phonetics, with no indication of syntactic elements or relations among them (X-bar structure, binding, government, etc.). To be interpreted by the performance systems A-P, π must be constituted entirely of legitimate PF objects, that is, elements that have a uniform, language-independent interpretation at the interface. In that case we will say that π satisfies the condition of Full Interpretation (FI). If π fails FI, it does not provide appropriate instructions to the performance system. We take FI to be the convergence condition: if π satisfies FI, the derivation that formed it converges at PF; otherwise, it crashes at PF.
>
> (Chomsky 1995: 194)

Under this minimalist conception of PF, then, traces should not count as a legitimate object at PF, a conclusion that directly contracts Kandybowic'z central thesis that the *that*-trace effect is a PF phenomenon. This problem won't arise under our alternative theory. Our theory suggests that the relevant effect is captured at the interface level between syntactic derivation and PF where the syntactic structure is converted into a sequence of sounds with appropriate prosodic adjustments. Furthermore, our analysis does not make any reference to traces. Instead, all that

matters for the *that*-trace effect in our system is whether the weak/reduced C *that* can form a prosodic phrase with a lexical word that follows it. The assumption that empty categories, including traces, do not have any effect on the application of prosodic rules is also a commonly held assumption in the literature on prosodic phonology (Nespor and Scorretti 1985; Nesport and Vogel 1986; Borsley and Tallerman 1996; Tokizaki 2007). True, a number of phenomena, most importantly, *wanna*-contraction (Zwicky 1970; Zwicky and Pullum 1983; Lakoff 1970; King 1970; Bresnan 1971), have been argued to be conditioned by (a certain subtype of) traces. However, Nespor and Scorretti (1985) have convincingly shown that this contraction process is not affected by the presence of traces and have instead suggested a non-syntactic analysis for the phenomenon. Sato (in press) has independently proposed a new analysis of *wanna*-contraction within the Multiple Spell-Out Model of the minimalist framework (Chomsky 2000, 2001, 2004; Uriagereka 1999) that does not require any stipulation regarding the visibility of empty categories/traces/copies for the purposes of morpho-phonological adjustments at the syntax-phonology interface.

Empirically, Kandybowicz's filter is limited in its empirical scope in that it is tailored specifically for the *that*-trace effect in English and its systematic exceptions. On the other hand, our condition is not proposed to just cover this pattern but rather should be able to extend to several other ostensibly prosodic phenomena that have resisted an exclusively syntactic explanation in the GB theory. Indeed, in section 3, we show that the obligatory cliticization of a weak pronoun to the verb in verb-particle constructions, a pattern which would be mysterious under a purely syntactic account (Johnson 1991; Lasnik 1999), straightforwardly

falls out from our proposed condition. Furthermore, it is to be noted that under Kandybowic'z

analysis, the *that*-trace effect is lifted as long as the C and the trace are not within the same

prosodic boundary, an outcome that can be created, for example, by intervening adverbs.

However, this analysis cannot capture the observation, first pointed out by Browning (1996),

that embedded topicalized arguments, in contrast to adverbs, cannot mitigate the *that*-trace

violation. To illustrate this point, consider examples in (26a, b).

(26) a. * Who$_i$ did Leslie think that, **this present**, t_i Kim gave to?

     b. * Who$_i$ did Robin say that, **this present**, t_i gave Lee?   (Browning 1996: 250)

In (26a), *that* and the topicalized DP belong into two intonational domains, as shown in (27).

(27)   [$_{IntP}$ Who$_i$ did Leslie think [$_{IntP}$ that,   [$_{IntP}$ **this present**, [$_{IntP}$ t_i Kim gave to]]]]

Kandybowicz's analysis thus would wrongly predict that (27a) should be grammatical. Our

analysis correctly predicts this result. As indicated in (27), a topicalized expression constitutes

a self-contained intonational phrase (see Nespor and Vogel 1986 and Truckenbrodt 1995).

Then, the intonational phrasing for (27a) would be as in (28) under our alternative analysis.

(28)   [$_{IntP}$ Who$_i$ did Leslie think   [$_{IntP}$ that, [$_{IntP}$ this present], [$_{IntP}$ t_i Kim gave to]]]]?

Here, the topicalized DP creates an independent prosodic domain to the exclusion of any other

material that precedes or follows it. Note that *that* cannot surface as a strong form since it does

not stand at the right-edge of a prosodic phrase. Thus, *that* cannot form a prosodic phrase with

the DP. Our present analysis, of course, predicts that the violation of (1) does not occur if we

have other XPs such as sentential adverbs such as those shown in (8a, b), repeated here as (29a,

b), and polarity expressions such as *under no circumstances* illustrated in (29c, d).

(29) a.   Who$_i$ do you think that **after years and years of cheating death** t_i finally died?

b.   the author$_i$ that the editors predict that **for all intents and purposes** t_i will be adored?

c.   Who$_i$ did John say that **under no circumstances** t_i would run for president?

d.   Leslie is the person$_i$ who I said that **under no circumstances** t_i would run for president.

((29d) from Culicover 1993: 558)

The reason is that the adverbs/polarity expressions do not create an obligatory intonational

boundary as the topicalized DPs do in English.

Hasegawa (2003) also shares the central idea with our analysis that the true nature of the

that-trace effect is best understood in phonological terms. Specifically, Hasegawa argues that the

effect obtains at PF due to the idiosyncratic property of the weak C *that* as a learner that must attach

to the word that immediately follows it. As a result, the *that*-trace effect arises whenever this linear

adjacency is blocked by the intervening gap. His condition is stated in (30).

(30)   Phonological Condition on Cs

The C phonologically depends on the word that immediately follows it. Let us call this C+W (W=word). As a result, it becomes quite difficult (or impossible) to have a gap between the C and the word that immediately follows it.   (Hasegawa 2007: 240)

Let us see how Hasegawa's analysis covers the paradigm discussed thus far. Firstly, (2a) is bad because the gap created by *wh*-movement blocks *that* from leaning onto *wrote* to create *that + wrote* sequence. This disruption does not occur in (2b, c), which involve extraction of the direct object and adjunct elements, respectively. Secondly, the adverb effect illustrated in (8a, b) is also accounted for because the adverb can serve as the word that immediately follows *that*. Finally, Hasegawa suggests that, when *that* stands at the right edge of an intonational phrase, it receives weak stress and is realized as an independent prosodic word, an assumption that our analysis also adopts. As a result, (30) is no longer applicable. A similar analysis holds for the salvation effect triggered by the contrastive focus in (14a-c).

However, it is not clear under Hasegawa's analysis how auxiliary reduction could save what otherwise would end up as a *that*-trace violation. His analysis would wrongly predict that (20a, b) should be ungrammatical because the gap between the C and the reduced auxiliary should disrupt the linear adjacency between the two elements required for them to form a C+W. Hasegawa's analysis also cannot account for Browning's (1996) observation that the embedded topicalized expressions cannot save a *that*-trace violation. In (26a), the weak C *that* is adjacent to the lexical word that immediately follows it (i.e., *this*

21

present). Thus, nothing in (30) would seem to block the C from leaning on the topicalized DP.

We also believe that our analysis is superior to Hasegawa's alternative in terms of conceptual considerations. Hasegawa's analysis leaves it unclear why a C in its weak form must lean onto its immediately following word. Our analysis suggests a deeper explanation for this question; it is due to the prosodic requirement at the level of syntax-prosodic mapping that a function word cannot form a prosodic phrase on its own.

3.   Obligatory Pronoun Shift and the EPP at the Syntax-Phonology Interface

The nature of the so-called pronominal shift has not been seriously investigated in the generative literature, much less from the perspective of the syntax-phonology interface. In this section, we demonstrate that our proposed condition in (1) can be extended to cover obligatory pronominal object shift, another ostensibly prosodic phenomenon which has resisted a purely syntactic explanation within the GB theory/the Minimalist Program.

The effect of obligatory pronominal shift is observed in (31a, b) and (32a, b).

(31) a.   Mikey looked **the reference** up.

    b.   Mikey looked up **the reference**.   (Johnson 1991: 593)

(32) a.   Mikey looked **it** up.

    b. * Mikey looked up **it**.   (Johnson 1991: 594)

The contrast here illustrates that a full DP object of the particle in verb + particle constructions can appear either before or after the particle whereas a pronominal object of the same particle can only occur before the particle. The same contrast obtains in *make-out* constructions. As the comparison of (33a, b) and (34a, b) illustrate, a full DP can appear on either side of the particle, unlike a simplex pronoun, which must appear before the particle.

(33) a.　Mikey made out **George** to be a liar.

　　b.　Mikey made **George** out to be a liar.　　　　　(Johnson 1991: 595)

(34) a.　 Mikey made **him** out to be a liar.

　　b. * Mikey made out **him** to be a liar.　　　　　(Johnson 1991: 595)

Lasnik (1999) suggests a purely syntactic account for this contrast. The EPP-assignment to trigger overt object shift (i.e., the movement of a direct object into [Spec, AgrO] in his system) is optional for full NPs but obligatory for simplex pronouns. However, this analysis is far from satisfactory because it is a mere re-statement of the underlying issue in technical terms. This suggests that a syntactic explanation of the pattern is not promising. We propose instead that the contrastive distribution with regards to the position of full NPs vs. simplex pronouns in verb + particle constructions is best explained as a further consequence of (1). Recall that function words in their unstressed/weak forms cannot form a prosodic phrase on their own. Let us hypothesize that a simplex pronoun, being prosodically deficient, must be parsed in the same

prosodic phrase with a lexical word, just as the unstressed C must form a prosodic phrase with its following lexical word such as sentential adverbs. Under this analysis, (34b) is ungrammatical because *him* cannot prosodically attach to a lexical word (i.e., *made*) due to the intervention of the particle *out*. This prosodic deficiency is removed in the alternative V + pronoun +particle order shown in (34a), where the pronoun can attach to the preceding verb. On the other hand, this restriction does not hold for full NPs such as *George*, as shown in (33a, b), because (1) does not apply to an independent lexical word. The same approach applies to the other examples in (31-32).

At this point, our analysis makes one prediction. According to our hypothesis, the obligatory pre-particle position of simplex weak pronouns is due to the fact that they cannot form a prosodic phrase on their own and hence must attach themselves to the preceding lexical word. Given this observation, we predict that simplex pronouns should in principle be able to occur in the post-particle position as long as they are realized as stressesed words. This prediction is borne out. Johnson (1991) observes that simplex pronouns can stay in the post-particle position under three conditions: either a) when they receive contrastive focus stress, b) when they occur in a coordinate structure, or c) when they are replaced with a demonstrative such as *that*. These three strategies are illustrated in (35a-c), respectively.

(35) a.   Mikey made out **THEM** to be liars!

   b.   Mikey made out **her and him** to be liars.

   c.   Mikey made out **that** to be false.   (Johnson 1991: 595)

The pattern observed here is exactly what is predicted under our current analysis. Firstly, the contrastively focused pronoun *them* can occur in the V + particle +pronoun order because *them* is not a reduced function word in this context. Secondly, an otherwise simplex pronoun can prosodically lean on the following material making the whole behave as an independent prosodic word. Finally, the demonstrative *that* can occur after the particle if we assume that English demonstratives are complex, where the initial consonant actually represents the definiteness (Chomsky 1995: 338; see also Leu 2008 for independent evidence for this claim).

4.   Conclusions

This article has suggested an interface approach to two phenomena – the *that*-trace effect and obligatory pronominal shift – which have long been deemed the exclusive empirical domains of syntax for the last few decades of generative research. We have argued, however, that the true nature of these phenomena can best be revealed once we investigate them from the perspective of the syntax-phonology interface. We have proposed that weak function words cannot form a prosodic phrase on its own. We have shown that this condition provides a principled explanation for a wide variety of the traditional observations regarding the *that*-trace effect and pronominal shift in English which have resisted a purely syntactic explanation in the literature. It remains to be seen whether our condition can be extended further to cover many other empirical areas that hint at the relevance of prosodic factors both within English and across languages. We leave this important task for further investigations.

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