Simplifying MATCH WORD: Evidence from English functional categories*

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February 2018

1 Introduction

Most researchers investigating the syntax-prosody interface would agree that prosodic structure resembles syntactic structure, up to a point. One specific point of resemblance is the tendency for lexical items, such as nouns, verbs and adjectives, to correspond to prosodic words. In *Match Theory* (Selkirk, 2009, 2011), this correspondence is enforced with a MATCH WORD constraint or principle: syntactic heads ought to be mapped to prosodic words.

Yet at the same time, there is invariably a caveat to any statement of the MATCH WORD principle or constraint: it should only apply to *lexical* syntactic heads (N^0s, V^0s, Adj^0s, ...). Function words, given their cross-linguistically robust tendency to reduce, cliticize or otherwise shrink from prominence, are generally considered 'exempt' from governance by MATCH WORD. The idea predates Match Theory: conditions of this type have been frequently proposed in literature on the syntax-prosody interface (Nespor and Vogel 1986; Truckenbrodt 1999; Hale and Selkirk 1987 among many others). The purpose of this paper is to argue that this idea is misguided, and that MATCH WORD indiscriminately demands that all syntactic heads, lexical and functional, be mapped to prosodic words. In doing so, MATCH WORD is brought in line with its fellow constraint MATCH PHRASE, which Elfner (2012) has argued applies to the phrasal projections of both lexical and functional categories too.

But if we can no longer rely on a discriminating MATCH WORD principle, how do we account for the pervasive phonological reduction of function words? I follow a long line of work, and argue that function words' requirement for prosodic reduction comes from their lexical entries, and I operationalize this idea using the technology of *prosodic subcategozation frames* (Inkelas, 1989; Inkelas and Zec, 1990; Bennett et al., to appear). During prosodic structure-building, then, there will be instances where MATCH WORD will demand that a functional head Fnc^0 maps to a prosodic word, while Fnc^0's own lexical entry will demand that it be prosodically reduced in some way. In these cases, Fnc^0's lexical requirements will

*Huge thanks to Ryan Bennett for his help and encouragement throughout this project. Thanks also to Jim Wood, Jason Shaw, Matt Barros, the Yale Phonology Reading Group, and audiences at NELS48 and LSA 2018. All errors are my own.

usually, but not always, win out. In this way, Match Theory is integrated with theories that allow lexically-specific prosodic idiosyncrasy.

This paper first lays out the relevant background on the prosodic hierarchy, the syntax-prosody interface, Match Theory and the treatment of function words therein, before moving on to the main proposal in section 3. Section 4 discusses two major empirical advantages of the proposal and section 5 considers some false predictions of the alternative ‘mainstream’ model (that MATCH WORD systematically ignores functional heads). Finally, section 6 considers some potential further empirical advantages of the proposal, concerning the behavior of contracted negation *-n’t*.

2 The syntax-prosody interface

In this section I lay out the necessary background to the proposal. Section 2.1 introduces the prosodic hierarchy, and section 2.3 lays out the current state of Match Theory. Section 2.4 then discusses how function words have been dealt with, or not dealt with, by Match Theory and its precursors.

2.1 The prosodic hierarchy

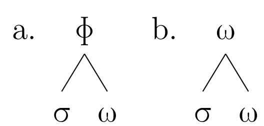
The prosodic categories assumed in this paper are shown in (1), a widely-adopted version of the prosodic hierarchy argued for, most notably, by Ito and Mester (2009c, 2012, 2013).

(1)

Symbol	Name
ι	intonational phrase
ϕ	phonological phrase
ω	prosodic word
F	foot
σ	syllable

Selkirk (1984) introduced the *Strict Layering* hypothesis, which holds that a prosodic node can dominate only nodes whose category is one step down on the prosodic hierarchy. Strict Layering rules out ‘level-skipping’ structures like (2a) and recursive structures like (2b).

(2)



However, I follow recent developments in prosodic phonology arguing that both level-skipping and recursion are not only permitted but frequent. Recursion at the level of the prosodic word and above has been argued for by Ladd (1986); Inkelas (1989); Selkirk (1996); Wagner (2005, 2010); Ito and Mester (2007, 2009a,b,c, 2012) and Elfner (2012, 2015), among others. There may be constraints militating against these violations of Strict Layering (Selkirk, 1996) (though see Kabak and Revithiadou 2009 for arguments against anti-recursion constraints) but they are not relevant for the analysis presented here.

Having introduced the prosodic hierarchy, we can now look at a broad organizational principle for how prosodic structures correspond to syntactic structures.

2.2 Indirect reference theories of syntax-prosody mapping

Indirect reference theories, of which Match Theory is a recent iteration, hold that prosodic structure is the result of a negotiation between two competing pressures. On the one hand, there is pressure for the prosodic structure to correspond in particular ways to syntactic structure, and on the other hand there is pressure for prosodic structure to satisfy independent well-formedness conditions, which do not make reference to syntax. Sometimes these pressures come into competition, and this competition can be modelled in Optimality Theory.

To give a toy illustration, a bare plural DP like *dogs* may have the syntactic structure in (3).

(3) [DP [D^0 Ø] [N^0 dogs]]

DP
D^0 N^0
Ø dogs

And let's assume that there are only two possible output prosodic structures, shown in (4). Even before detailing any syntax-prosody mapping constraints, it is immediately clear that the prosodic structure in (4a) is more isomorphic, more faithful or 'more corresponding' to the syntax than that in (4b).

(4) a. [ϕ [ω Ø] [ω dogs]] b. [ϕ [ω dogs]]

Yet (4a) is (almost certainly) not the correct prosodic structure. We can assume, following Anderson (2008); Selkirk and Lee (2015) and Kandybowicz (2015), that there is a very strong, perhaps inviolable prohibition against phonetically empty prosodic constituents. Given these two possible outputs, then, this pressure to not have empty prosodic constituents would overcome the pressure to maximize syntax-prosody isomorphism, and (4b) would win. Couching this in Optimality-Theoretic terms, we can make use of the two informally-stated constraints in (5), ranked and put to use in the tableau in (6).[1]

(5) a. NoEmpty: Prosodic constituents are not empty.
b. Match: Syntactic and prosodic structure match.

[1]The reader may object to this particular example, on the grounds that a better explanation would be that empty prosodic constituents are never found in candidate output structures (i.e. they are not part of GEN). Since the example is intended only to illustrate the workings of the system, I do not take a position on this.

(6)

[$_{DP}$ D^0 dogs]	NoEmpty	Match
☞ a. ($_{\phi}$($_{\omega}$dogs))		*
b. ($_{\phi}$($_{\omega}\emptyset$)($_{\omega}$dogs))	*!	

Having set up the principles of the system, we now turn to Match Theory. This sets us up for the discussion of function words at the syntax-prosody interface in section 2.4.

2.3 Match Theory

Match Theory provides a formal account of the pressure for certain prosodic categories to correspond to certain syntactic categories (Selkirk, 2009, 2011). Some generally-assumed category mappings are shown in (7).

(7)

Prosodic	Syntactic
ι	CP (with illocutionary force) or ForceP
ϕ	XP
ω	X^0

For the three syntactic objects governed by Match Theory, there is a constraint (or pair of constraints) enforcing the mapping.[2]

(8) a. Match Clause: Enforces ForceP$\leftrightarrow\iota$ correspondence
b. Match Phrase: Enforces XP$\leftrightarrow\phi$ correspondence
c. Match Word: Enforces $X^0\leftrightarrow\omega$ correspondence

For example, if the NP *hungry dog* has the syntax in (9a), the ideal prosodic structure would be (9b).

(9) a. [$_{NP}$ [$_{Adj^0}$ hungry] [$_{N^0}$ dog]] b. [$_{\phi}$ [$_{\omega}$ hungry] [$_{\omega}$ dog]]

In (9), every X^0 has a corresponding ω and every XP has a corresponding ϕ, and likewise every ω has a corresponding X^0 and every ϕ has a corresponding XP. If these really are the correct syntactic and prosodic structures (setting aside for now any concerns about the Adj^0 *hungry* failing to project an AdjP), no violations of Match Word or Match Phrase are incurred.

However, not all X^0s and XPs can be mapped to ωs and ϕs. To take the example from the previous subsection, the null determiner in the bare plural DP *dogs* cannot be mapped to a ω (or any other prosodic category). Reduced function words, which are the focus of this paper, also fail to correspond to ωs. If Match Word applies to functional categories (and

[2] I have deliberately failed to separate out 'syntax→prosody' ('max') and 'prosody→syntax' ('dep') constraints, as is frequently done (eg. Elfner 2012; Weir 2012; Clemens 2014). Separating them out would not affect the analysis here, as every cliticizing English function word induces a violation of both types of constraint, and so both the S→P and P→S Match Word constraints would be ranked in the same stratum in the cases under consideration. The issue is flagged again in footnote 8.

I argue that it does), both null and reduced functional categories will incur a violation of Match Word.

I also assume that, in general, phrasal projections consisting of only one prosodic word are not mapped to a ϕ. That is, the syntactic structure in (10a) is mapped to the lone ω in (10b) rather than the unary-branching ϕ in (10c).[3]

(10) a. [DP [D^0 Ø] [N^0 dogs]] b. ω dogs c. *[ϕ [ω dogs]]

To account for this violation of Match Phrase, I assume that a high-ranked constraint Binarity(ϕ), defined in (11), generally rules out unary-branching ϕs (see Ghini 1993; Inkelas and Zec 1995; Selkirk 2000; Elordieta 2007; Ito and Mester 2009a; Elfner 2012 and Bennett et al. 2015, 2016 for discussion of binarity constraints in phrase-level prosody). The tableau in (12) shows how this constraint, outranking Match Phrase, causes the structure in (10b) to beat that in (10c).

(11) Binarity(ϕ): ϕs are binary-branching.

(12)

$[_{DP}$ D^0 dogs]	Binarity(ϕ)	MW	MP
☞ a. $(_{\omega}$dogs)		*	*
b. $(_{\phi}$ $(_{\omega}$dogs))	*!	*	

We have therefore seen how a high-ranked prosodic well-formedness constraint—Binarity(ϕ)—can account for certain violations of Match Phrase. In section 3, I extend this idea to account for the prosodic status of function words, introducing a new high-ranked constraint SubCat. First, however, I document how previous theoretical approaches to function word prosody have tended to take a different tack.

2.4 The problem of function words

As has been known for a long time, function words tend to have a different prosody from lexical words. While lexical words tend to require a stressed syllable, function words lack

[3] The claim that XPs consisting only of a single ω are not generally mapped to ϕs is not always explicitly stated, but underlies much work on a variety of languages. See Clemens (2014) and Bennett et al. (2016) for explicit theoretical discussion of the issue.

Regarding English in particular, we can show that XPs consisting only of a single ω are not generally mapped to ϕs by using Beckman and Pierrehumbert's (1986) diagnostic for the right edge of an English Major Phrase (=ϕ, for our purposes). They propose that this edge is marked by the presence of an H- or L- phrase accent (see also Selkirk 2000). So *John's owl* in (i-a) may constitute a ϕ and so can be followed by a L- phrase accent. Crucially, however, *John* in (i-b) cannot be followed by a L- phrase accent (outside of special information-structural circumstances). I take this to mean that *John*, constituting a lone ω, cannot be parsed into a unary-branching ϕ.

(i) a. John's $\text{owl}_{\text{(L-)}}$ looks scary.
b. $\text{John}_{\text{(*L-)}}$ looks scary.

this requirement, and their vowels are generally unstressed and reduced to a schwa. (13) shows a preposition, an auxiliary and a determiner all taking a reduced form.

(13) a. Mary sat [ət] home.
b. John [əd] left.
c. Ellen visited [ðə] doctor.

I follow the analysis of Ito and Mester (2009b,a), based on a similar analysis in Selkirk (1996), that English prepositions, auxiliaries and determiners have the prosodic category of 'bare' syllables, and form recursive prosodic words with their complement.[4] So each of the function words in (13) integrates into prosodic structure as follows:[5]

(14) a. [ω [σ [ət]] [ω home]] b. [ω [σ [əd]] [ω left]] c. [ω [σ [ðə]] [ω doctor]]

Throughout this paper, I refer to function words as 'cliticizing' into an adjacent ω, but this is a purely phonological use of the term, and I make no claim about these forms having special *syntactic* behavior.

So function words are X^0s in the syntax—P^0s, Aux^0s and D^0s among others—and yet they consistently fail to map to ωs. How to explain this? The consensus choice in the literature, which I argue against in this paper, is that the syntax-prosody mapping principles simply 'ignore' function words in some respect. To give an example from the pre-Match Theory literature, Truckenbrodt's (1999) *Lexical Category Condition*, is stated in (15) (emphasis mine).

(15) Lexical Category Condition (Truckenbrodt, 1999, 224)
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.

This idea has been carried over virtually wholesale into work making use of Match Theory. (16) provides three recent statements of MATCH WORD principles and constraints (emphases mine).

(16) a. Weir (2012, 111)
The edges of a *lexical* word [...] are mapped to the edges of a Prosodic Word (ω).
b. Elfner (2012, 241)
[A]ssign one violation for every *lexical* word in the syntactic component that does not stand in a correspondence relation with a prosodic word in the phonological component.

[4]I limit the discussion here to monosyllabic function words. See section 3.1 and footnote 18 for some discussion of polysyllabic function words.

[5]Again, I do not provide evidence that these are indeed the correct structures, as Ito and Mester (2009b,a) do so extensively.

c. Bennett et al. (2015, 34)
Phonological words correspond to heads of syntactic phrases—*verbs, nouns, adjectives*, and so on, the basic building blocks of the syntactic system.

The following discussion from (Selkirk, 2011, 453) is also instructive (emphasis mine and bracket notation altered):

> [I]t's likely that lexical and functional phrasal projections—LexP and FncP—have to be distinguished [...] The functional vs. lexical distinction is important for syntactic-prosodic correspondence at the word level (Fnc^0 vs. Lex^0): lexical category words are standardly parsed as prosodic words (ω), while functional category words like determiners, complementizers, prepositions, auxiliary verbs, etc.—in particular the monosyllabic versions of these—are not [...] If *instead of a general Match XP this correspondence constraint were limited to lexical categories*, then, on the basis of the syntactic structure $[_{\mathrm{VP}}$ Verb $[_{\mathrm{FncP}}$ Fnc NP]], the ϕ-domain structure $(_{\phi}$Verb Fnc $(_{\phi}$NP)) would be predicted [...]

Similar claims can be found in Selkirk (1984, 1995, 2011); Hale and Selkirk (1987); Selkirk and Shen (1990); Truckenbrodt (2007); Chung (2003); Werle (2009); Selkirk and Lee (2015), among others.

The common thread running through these works is that there is no impetus to parse function words as ωs. Yet the corollary of this—that the phrasal projections of functional categories should not be parsed as ϕs—has been challenged. For instance, Elfner (2012) shows that small clauses and TPs in Irish, both of which are headed by a functional category, are preferentially mapped to ϕs. Furthermore, a large body of evidence has shown that coordinated phrases are generally parsed into a prosodic constituent to the exclusion of material outside of the coordination (Price et al., 1991; Fougeron and Keating, 1997; Wagner, 2005, 2010; Féry and Truckenbrodt, 2005; Féry, 2010; Kentner and Féry, 2013). On the assumption that coordinations are headed by functional categories (Munn, 1993), we have another case of a functional projection apparently governed by MATCH PHRASE.[6] In this paper, I take this kind of a challenge to its conclusion, and argue that neither MATCH PHRASE *nor* MATCH WORD distinguish functional and lexical categories.

In the next section, I first offer an alternative to the 'MATCH WORD doesn't care about functional categories' analysis (henceforth the 'lexical-only MATCH WORD' analysis), invoking the idea of violable prosodic subcategorization frames. Section 4 then provides several empirical advantages of this analysis. Following that, section 5 highlights some predictions of the lexical-only MATCH WORD analysis which can be shown to be false.

3 Violable prosodic subcategorization frames

We saw in section 2.3 that a constraint BINARITY(ϕ) outranks MATCH PHRASE, overruling the pressure for the bare plural NP/DP *dogs* to map to a phonological phrase. This is the

[6] I also have a suspicion that if one looked for it, one would find evidence that possessed DPs—also headed by a functional category—are preferentially phrased into a single phonological phrase cross-linguistically, though I do not take up the task here.

kind of explanation Optimality Theory is designed to model, and in this section I offer a similarly OT-friendly account of the prosodic behavior of English function words.

We can start by noting that some morphemes exhibit idiosyncratic behavior in terms of how they integrate into their surrounding prosodic structure. It has been proposed that this behavior should be determined by the morpheme's lexical entry—that is, by prosodic 'pre-specification'—and one powerful way of encoding prosodic pre-specification is with *prosodic subcategorization frames* (Inkelas, 1989; Inkelas and Zec, 1990; Zec, 2005; Bennett et al., to appear). I propose, therefore, that the constraint that outranks MATCH WORD and MATCH PHRASE, causing function words to behave in the idiosyncratic ways that they do, is SUBCAT, a constraint whose job is to force lexical items to adhere to their prosodic subcategorization frame.

To see how prosodic subcategorization frames work, consider the following examples from English derivational morphology (taken from Inkelas 1989). The prefix *un-* is pre-specified with the frame in (17), which should be read as '*un-* requires that its mother node and sister node be category ω, and *un-* must be the left branch'. When attached to a word like *finished*, the resulting prosodic structure is the one in (17a), and not (17b). The ω-boundary between *un-* and *finished* therefore blocks typical antepenultimate stress assignment for adjectives.

(17) Subcategorization frame for *un-*: [$_ω$ un- [$_ω$ ...]]

a. [$_ω$ ùn- [$_ω$ fínished]]

b. *[$_ω$ ún- finished]

By contrast, the prosodic subcategorization frame associated with the synonymous prefix *in-*, shown in (18), has a different effect—it merely requires that its mother node be of category ω. Therefore, assuming that simpler structures are preferred over more complex ones, *in-* will integrate into the minimal prosodic word containing the stem, giving the prosodic structure in (18b) rather than that in (18a). Consequently, standard antepenultimate adjectival stress is assigned without a hitch.

(18) Subcategorization frame for *in-*: [$_ω$ in- [...]]

a. *[$_ω$ ìn- [$_ω$ fínite]]

b. [$_ω$ ín- finite]

In (17) and (18), prosodic subcategorization frames are associated with morphological affixes rather than separate morphological words. However, numerous authors have productively associated prosodic subcategorization frames with syntactically more independent items, including prepositions (Zec, 2005), object pronouns (Chung, 2003) and (within one paper), object clitics, *wh*-words, aspect markers and markers of sentential negation (Bennett et al., to appear).

Now that we have established how prosodic subcategorization frames work, I propose two subcategorization frames for English functional elements: a 'right-cliticizing' frame, for prepositions, auxiliaries and determiners, and a 'left-cliticizing' frame, for object pronouns and contracted negation *-n't*.

3.1 A right-cliticizing frame

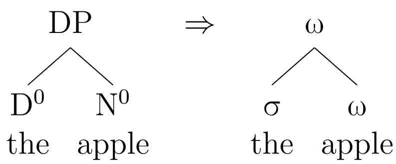
I propose that most English prepositions, auxiliaries and determiners come pre-equipped with the prosodic subcategorization frame in (19).

(19) $[_{\omega}\ \text{Fnc}^0\ [\ \ldots\ ]]$

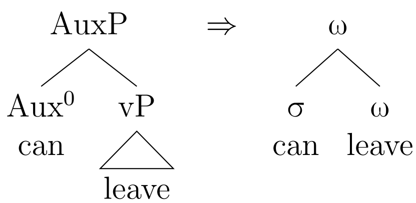
This should be read as ‘Fnc^0 requires its mother node to be category ω, and it requires a sister node of any category on its right’.

The effect of being associated with this frame is to force cliticization into whatever prosodic word shows up to the right of Fnc^0. The mappings in (20) all show functional elements cliticizing into their complements.

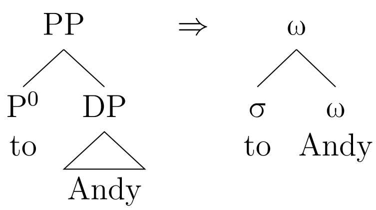
(20) a.



b.



c.



This behavior is derived by SubCat, which enforces adherence to prosodic subcategorization frames, outranking both Match Word and Match Phrase. The three constraints are given formal definitions in (21), and the tableau deriving the prosodic structure of *to Andy* is shown in (22).[7]

(21) a. <u>SubCat(X)</u>
Assign one violation for every instance of morpheme X whose prosodic subcategorization frame is not satisfied.

b. <u>Match Word</u>
Assign one violation for every X^0 that does not correspond to a ω, and for every ω that does not correspond to a X^0.

c. <u>Match Phrase</u>
Assign one violation for every XP that does not correspond to a ϕ, and for every

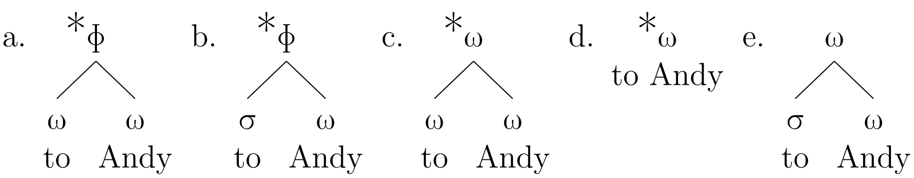
[7]Two things are worth noting about this tableau: firstly, candidates that violate Binarity(ϕ) are not shown. Secondly, not all Match Phrase violations are shown. Clearly all the candidates violate Match Phrase at least once by failing to map the DP/NP *Andy* to a ϕ. When every candidate induces the same violation, I generally do not show the shared violation mark in the tableau to reduce clutter, though I violate this rule of thumb where it would be helpful for expository purposes.

ϕ that does not correspond to a XP.

(22)

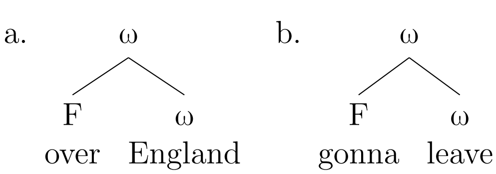
[$_{PP}$ to [$_{DP}$ Andy]]	SUBCAT(*to*)	MW	MP
a. ($_{ϕ}$ ($_{ω}$ to)($_{ω}$ Andy))	∗!		
b. ($_{ϕ}$ to ($_{ω}$ Andy))	∗!	∗	
c. ($_{ω}$ ($_{ω}$ to)($_{ω}$ Andy))	∗!	∗	∗
d. ($_{ω}$ to Andy)		∗∗∗	∗
☞ e. ($_{ω}$ to ($_{ω}$ Andy))		∗∗	∗

Crucially, note that losing candidates (a-c) fare better than the winner when evaluated by MATCH WORD and MATCH PHRASE, yet because they each involve a violation of SUBCAT they are doomed. To make this point as clear as possible, it is worth going through why each candidate, restated in (23), receives the violation marks that it does.

(23)


Candidate (a) is the most MATCH-adherent of the bunch, and were it not for the prosodic subcategorization frame associated with *to*, it would be the winner. Candidate (b) maps the PP node to a ϕ, just like candidate (a), but induces one more MATCH WORD violation than candidate (a) by failing to map the P^0 head *to* to a ω. Candidate (c) earns its MATCH WORD violation mark by being guilty of different sin: it includes a ω that corresponds to no single X^0. Furthermore, it receives its MATCH PHRASE violation by failing to map PP to a ϕ. Despite its failings, however, it *still* scores better on the MATCH constraints than the winner, candidate (e). Skipping to candidate (e), we see that it has all the combined sins of candidates (b) and (c): it fails to map P^0 to a ω, it contains a 'spurious' ω that doesn't correspond to any X^0, and it fails to map PP to a ϕ. Yet because it's the only candidate to satisfy SUBCAT, it beats them. Finally, candidate (d) also manages to satisfy SUBCAT, yet it includes an extra MATCH WORD violation—by failing to map *Andy* to a ω—and so it is beaten by candidate (e).[8]

Before moving on, two points merit discussion. Firstly, there is the behavior of disyllabic function words. I follow Ito and Mester (2009a) and assume that (at least some) disyllabic prepositions and auxiliaries cliticize, as feet rather than syllables, into the ω to their left. These cases are discussed in more detail in section 4.2.

(24)


[8]We see here that separating out MATCH WORD into a 'syntax→prosody' mapping constraint and a 'prosody→syntax' mapping constraint (cf. footnote 2) would have no effect on the winner, provided that both constraints remain ranked below SUBCAT. One of candidate (e)'s MATCH WORD violations comes from failing to contain a ω corresponding to the syntactic head P^0 (a 'syntax→prosody' violation), and the other comes from containing a ω that does not correspond to any X^0 (a 'syntax→prosody' violation).

The second point is that there is variation in the behavior of auxiliaries. One class of auxiliaries is necessarily realized with, at minimum, one syllable. This list includes *can, should, could, might, will* and some forms of *be* (*are, were, was, been*). These are the auxiliaries to which the pattern described here most cleanly applies (as in (20b)). A second class of auxiliaries, however, may be optionally reduced to a non-syllabic consonant in certain environments. These include the forms of *have* and some forms of *be*, reducing to -*'m, -'s, -'d* and -*'ve*, as well as *would*, reducing to -*'d.* Regarding these 'very reduced' auxiliaries, Kaisse (1985) and Anderson (2008) argue that they form a prosodic constituent with material to their left. This would mean that their prosodic subcategorization frame is necessarily different from that in (19), although in these cases there is an interaction with syntax. I set this issue aside for now and provide some thoughts in the conclusion.

The next section introduces a second prosodic subcategorization frame for English functional categories, which is essentially the mirror image of the first.

3.2 A left-cliticizing frame

I propose that weak object pronouns and contracted negation -*n't* are associated with the prosodic subcategorization frame in (25), which is essentially a mirrored version of (19).

(25) $[_{\omega}$ [...] Fnc^{0}]

Focusing for now on weak object pronouns, this frame accounts for their tendency to phonologically encliticize into the preceding prosodic word:[9]

(26) Teachers need [əm]. (=them)

The mapping is derived in the tableau in (27), again with all of the more Match-compliant candidates (a-c) losing out to the candidate that satisfies SubCat.

(27)

$[_{VP}$ need them]	SubCat(*them*)	MW	MP
a. $(_{\phi}$ $(_{\omega}$ need)$(_{\omega}$ them))	∗!		
b. $(_{\phi}$ $(_{\omega}$ need) them)	∗!	∗	
c. $(_{\omega}$ $(_{\omega}$ need)$(_{\omega}$ them))	∗!	∗	∗
d. $(_{\omega}$ need them)		∗∗∗	∗
☞ e. $(_{\omega}$ $(_{\omega}$ need) them)		∗∗	∗

Note that here, I assume that English [verb+pronoun] sequences have the prosodic structure in (28), just as is proposed by Selkirk (1996). In the current proposal we have been

[9] Selkirk (1996) states that object pronouns may optionally be pronounced in strong (unreduced) form, even outside of focus contexts. This is in contrast to proclitic function words, which can only appear in strong form in focused or stranded contexts. While I disagree somewhat with her judgments—pronouncing *them* as /ðəm/ in (26) sounds quite unnatural to me, and certainly no better than pronouncing *tu* as /tu/ in the PP *to Katie*—this variability could be accounted for within the lexical entries of the function words themselves. Rather than a lexical item being categorically associated with a prosodic subcategorization frame, it could be probabilistically associated with it, in the same manner that lexical items may be probabilistically associated with Vocabulary Items (Adger and Smith, 2005; Parrott, 2007).

able to simply specify the left-cliticizing behavior of object pronouns as a lexical idiosyncrasy, using the frame in (25). However, Selkirk is forced to posit a *syntactic* cliticization operation where object pronouns cliticize into the verb that selects them. This causes the [verb+pronoun] constituent to be parsed as a single lexical word, and so be mapped to single prosodic word. For her, if this syntactic cliticization (essentially head-movement) did not happen then object pronouns would end up treated in the same way as stranded prepositions, on which see section 4.1.

(28) ω

ω σ
need 'em

The difficulty with Selkirk's account is that the syntactic cliticization operation is not well-motivated for English. For one thing, it is hard to provide any evidence that the verb and pronoun form a complex syntactic head: verbs in English do not undergo head movement to T or C, so we can't check to see whether the pronoun will tag along with them as they undergo head movement. Similarly, there are no syntactic positions that license pronouns that do not also license full DPs. Conversely, it *is* possible to provide evidence that object pronouns will phonologically cliticize into at least one element that is not a verb—prepositions, as shown in (29).

(29) a. The task is beneath [ə].[10] (=her)
b. Ellen waited for [əm]. (=them)

If we were to maintain that the phonological reduction of English weak object pronouns results from their syntactic head-movement into the X^0 that selects them, we would need to claim that English pronouns syntactically incorporate into prepositions too: another claim for which there is little syntactic evidence. I therefore suggest that the account presented here, in which the prosodic left-cliticizing property of an object pronoun is purely prosodic property and nothing to do with their syntax, is a better fit for the English data.

Object pronouns are not, I propose, the only morphemes in the language to come prespecified with a left-cliticizing prosodic subcategorization frame: contracted negation *-n't* has the same frame, though I leave discussion until section 6. In the next section, I discuss two major empirical advantages that the model outlined here has over the lexical-only Match Word model outlined in section 2.4.

4 Some advantages of the proposal

This section discusses two empirical advantages of the proposal advanced here. Firstly, the proposal gives a unified account of the behavior of function words 'stranded' at the edge of phonological domains. Secondly, it provides an account of English function words that fail to undergo phonological reduction.

[10]I provide descriptions and analyses of non-rhotic English, as Ito and Mester's (2009b) diagnostics for prosodic structure crucially rely on intrusive /r/ insertion, a feature of non-rhotic English only.

4.1 Stranded function words

Prepositions and auxiliaries in phrase-final position necessarily map to full prosodic words (Selkirk, 1996). The evidence for this is that their vowel cannot be reduced to schwa:

(30) a. The man Mary talked ($_\omega$ [tu]/*[tə]).
b. I won't help you, but Mary ($_\omega$ [kæn]/*[kən]).

This behavior can be derived from the analysis presented here: in these cases, where there is no material for the Fnc^0 to cliticize into, SubCat is necessarily violated. The candidate that least violates the Match constraints is then picked as the winner, as shown in (31).[11]

(31)

[$_{VP}$ talked [$_{PP}$ to]]	SubCat(*to*)	MW	MP
☞ a. ($_\phi$ ($_\omega$ talked)($_\omega$ to))	*		
b. ($_\phi$ ($_\omega$ talked) to)	*	*!	
c. ($_\omega$ ($_\omega$ talked)($_\omega$ to))	*	*!	*
d. ($_\omega$ ($_\omega$ talked) to)	*	*!*	*
e. ($_\omega$ talked to)	*	*!**	*

The same effect can be replicated with object pronouns—left-cliticizing elements—that occur at the beginning of a phonological phrase. As shown in (32), when object pronouns occur in phrase-initial position, they cannot be reduced.

(32) a. ($_\omega$ [ðɛm]/*[əm]) leaving was a surprise.
b. It's nice, ($_\omega$ [hɜː]/*[ə]) in town at last.

This behavior can be derived in the same way: left-cliticizing elements at the right edge of phonological phrases have nothing to cliticize onto, and so SubCat is necessarily violated. Consequently, the most Match-compliant candidate wins, as shown in (33).[12]

[11] I assume that other candidates involving altering the linear order of elements presented by the syntax (Bennett et al., 2016), or epenthesizing material after the preposition, are ruled out by other high-ranked constraints.

[12] All analyses of the prosody of stranded function words in English are plagued by the issue of why they cannot cliticize into following adjuncts:

(i) a. Who were you talking ($_\omega$ [tu]/*[tə]) yesterday?
b. Someone to talk ($_\omega$ [tu]/*[tə]) for yourself.

Selkirk's (1996) explanation is that function words cannot procliticize across the right edges of phonological phrases, which (without exception) coincide with the right edge of syntactic phrase boundaries. But in this model (based on Ito and Mester 2009a,b), we have abandoned the idea that the right edge of syntactic phrases necessarily correspond to phonological phrase boundaries—for instance, single-ω DPs do not project ϕs—and so this constraint cannot be responsible.

Perhaps a family of theories in Richards (2006); Kahnemuyipour (2003); Kratzer and Selkirk (2007); Elfner (2012) and others provides a solution. In these theories, prosodic structure-building, like syntactic structure-building, proceeds in *spell-out domains* or *phases* (Chomsky, 2000, 2001, 2008), of which there are (at least) two per clause. The intuition is that the prosodic structure that corresponds to each phase is 'locked in' and cannot be further internally manipulated, but can only be embedded inside more prosodic structure. If adjuncts like those in (i) are merged at a higher phase than the stranded prepositions, we might be able to explain the absence of procliticization. I leave this matter unresolved for now.

(33)

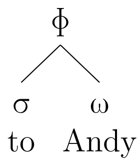
[$_{\text{DP}}$ them [$_{\text{VP}}$ leaving]]	SUBCAT(*them*)	MW	MP
☞ a. ($_\phi$ ($_\omega$ them)($_\omega$ leaving))	*		
b. ($_\phi$ them ($_\omega$ leaving))	*	*!	
c. ($_\omega$ ($_\omega$ them)($_\omega$ leaving))	*	*!	*
d. ($_\omega$ them ($_\omega$ leaving))	*	*!*	*
e. ($_\omega$ them leaving)	*	*!**	*

In this analysis, we have essentially reanalyzed the prosodic strengthening of function words in stranded positions as a TETU effect ("the emergence of the unmarked", McCarthy and Prince 1994): the more marked form (the reduced function word) is blocked in the stranded environment, and so its complementary unmarked form (the unreduced function word) emerges.

I now briefly discuss how this account avoids running into a technical problem that befalls Selkirk's (1996) analysis once we allow proclitics to form recursive phonological words.

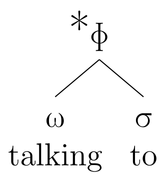
Selkirk argues that PPs like *to Andy* have the non-recursive structure in (34).[13]

(34)

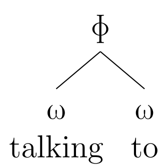


In her proposal, there is an inviolable Alignment constraint operative in English, which ensures that the right edge of a phonological phrase always aligns with the right edge of a prosodic word ('ALIGN(ϕ,R;ω,R)'). The structure in (34) satisfies it. The preposition-stranding structure in (35a), however, would violate it, and so the alternative candidate (35b), in which the preposition is 'promoted' to a ω, must be selected instead.

(35) a.

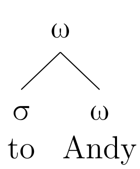


b.



Yet once we assume that function words create recursive prosodic words such as (36) (an assumption adopted wholesale from Ito and Mester 2009b,a), this explanation can no longer work.

(36)

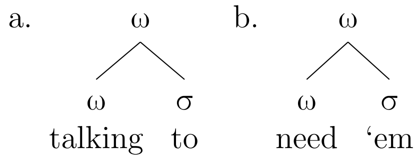


The reason is that it is impossible to create an Alignment constraint that would penalize the

[13]Selkirk's 'phonological phrase' is unlikely to be the same prosodic constituent that Beckman and Pierrehumbert (1986) call a 'phonological phrase', and identify as being followed by a L- or H- phrase accent, but the precise nature of the prosodic category is not important here—what's important is that the structure is not recursive.

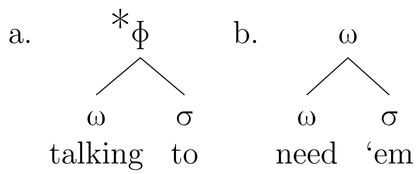
structure in (37a), while allowing the structure in (37b)—structurally, they are the same.[14]

(37)



In Selkirk's account, they formed prosodic constituents of different categories, shown in (38), and so they *could* be distinguished on the basis of prosody alone.

(38)



Fortunately, under the account here we can maintain the idea that both proclitics and enclitics form recursive prosodic words, while also accounting for their differing prosodic behavior. The structure in (37a) violates SubCat(*to*), while the structure in (37b) satisfies SubCat(*them*). We now move on to the second major empirical advantage of the proposal.

4.2 Unreduced function words

Not all function word can be phonologically reduced—some of them obligatorily form full ωs, with a stressed non-schwa vowel. One example of this is the demonstrative determiner *that*, which unlike the other determiners cannot have its vowel reduced to a schwa:[15]

(39) Bill baked ($_{\omega}$[ðæt]/*[ðət]) cake.

Demonstrative determiner *that* stands in a clear contrast to complementizer *that*, which *can* be reduced:

(40) Mary heard [ðət] Bill left.

The way that non-reducible function words are dealt with in the current analysis is simple: they just lack prosodic subcategorization frames. That is, at the syntax-prosody interface they are treated as regular 'lexical' words like *dogs*. Therefore SubCat is inactive, and the most Match-compliant prosodic representation is picked instead. That representation is the one in which the DP node is mapped to a ϕ and both contentful syntactic heads are mapped to ωs, as shown in the tableau in (41).

[14] It is possible to construct an alignment constraint that penalizes both structures in (37), by forcing the right edges of maximal ωs to line up with the right edges of minimal ωs (see Ito and Mester 2007 for discussion of the necessity of identifying prosodic constituents as maximal and minimal). But as stated, this would not help us here.

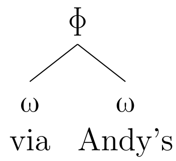
[15] To my knowledge it has not previously been claimed that determiner *that* occupies a ω unto itself. However, the phonetic results reported in Brown-Schmidt et al. (2005), who show that the vowel in unstressed *that* is on average significantly longer than the vowel in unstressed *it*, seem to support this claim.

(41)

[$_{DP}$ that cake]	SubCat	MW	MP
☞ a. ($_{\phi}$ ($_{\omega}$ that)($_{\omega}$ cake))			
b. ($_{\phi}$ that ($_{\omega}$ cake))		∗!	
c. ($_{\omega}$ ($_{\omega}$ that) ($_{\omega}$ cake))		∗!	∗
d. ($_{\omega}$ that ($_{\omega}$ cake))		∗!∗	∗
e. ($_{\omega}$ that cake)		∗!∗∗	∗

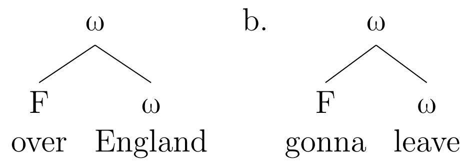
I also propose that we can analyze certain 'high-register' prepositions, such as *via*, in the same way. So the prosodic structure of *via Andy's* would be as in (42), and it would result from *via* lacking a prosodic sucategorization frame.

(42)



Note that not all disyllabic function words have this prosodic behavior: Ito and Mester (2009a) propose that disyllabic prepositions like *over* and disyllabic auxiliaries like *gonna* have the structure in (43), repeated from (24). As mentioned in section 3.1, the prosodic behavior of these function words can be captured in the same way that we capture the behavior of their monoyllabic brethren, with a rightward ω-adjoining prosodic subcategorization frame.

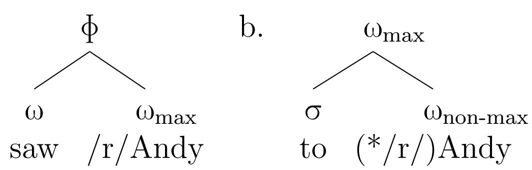
(43) a. b.



So why should we think that *via* is different? My empirical justification comes from Ito and Mester's own test for ω-adjunction vs. ϕ-adjunction in English. Essentially, on the basis of a similar analysis by McCarthy 1993, Ito and Mester (2009b) propose the following statement for the distribution of intrusive /r/ in non-rhotic English: intrusive /r/ is epenthesized in the onset of a maximal ω, but *not* in the onset of a non-maximal ω, where a maximal ω is a ω that is not dominated by any other ω.

We can illustrate this with the infamous 'function word gap', in which intrusive /r/ fails to appear at the juncture between a function word and a lexical word: *Andy* in (44a) constitutes a maximal ω, thus permitting an intrusive /r/ in its onset, while *Andy* in (44a) does not constitute a maximal ω, and so intrusive /r/ is blocked.

(44) a. b.



If we apply this test to *via*, we find that intrusive /r/ is indeed permitted between *via* and its complement.[16] This stands in contrast with disyllabic auxiliaries like *gonna*, which do not license a following intrusive /r/, as we would expect given the structure in (43).

(45) a. We went via (/r/)Andy's.
b. We're gonna (*/r/)eat.

If Ito and Mester's test is valid, we are forced to assume that the complement of *via* is a maximal ω—an assumption that is compatible with the structure in (42), but not a structure like those in (43).[17, 18]

In this section, we have seen that the analysis presented here provides two empirical advantages over a lexical-only Match Word analysis: it allows for a simple analysis of the phenomenon whereby 'stranded' function words become full prosodic words, and it allows us to easily capture the behavior of certain function words that behave prosodically like lexical words. The next section more directly argues against the lexical-only Match Word analysis, pointing out two false predictions that the theory makes, and showing how the theory advanced here fares better.

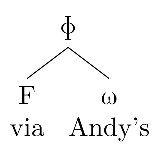
5 The irreducibility of lexical information

Lexical-only Match Word theories make two false predictions, both of which disappear under the theory advanced here, in which functional items may be pre-equipped with prosodic subcategorization frames. The first prediction is that all functional items within a language should behave in the same way, and the second prediction is that non-isomorphism between syntactic and prosodic structure should be minimized wherever possible. Both of these predictions can be shown to be false thanks to the pervasiveness of prosodic idiosyncrasy projected by functional elements.

[16]This judgment comes from the author, a native speaker of British English, and two other speakers of the same variety.

[17]Ito and Mester's diagnostic in fact does not rule out a structure like (i), since *Andy's* still constitutes a maximal ω. I set this possibility aside for now.

(i)



[18]Note that this result places us a in a position of huge uncertainty with respect to the prosodic status of most polysyllabic function words, including many common prepositions like *over*, *under*, *without*, *behind*, etc. Since the intrusive /r/ test can be applied to a very small portion of the polysyllabic functional lexicon—just those function words ending in [ə], all of which derive from contractions ending in *to* or, to a lesser extent, *of*—Ito and Mester (2009a) are forced to apply the test those words ending in [ə] (e.g. *gonna, shoulda, wanna, supposeta*) and extrapolate the results to the whole polysyllabic functional lexicon. Yet as we have seen, not all polysyllabic functional items behave alike, and so this extrapolation is not justifiable. Therefore, polysyllabic function words like *over* could plausibly be analyzed as having the structure in (43), or that in (42). Testing the difference between the two would have to rely on diagnostics other than /r/-insertion. If no diagnostics are available, either to the researcher or the child learner, it's possible that there is a large amount of redundant individual variation in the underlying prosodic representations of these polysyllabic function words.

Note that throughout this section, I assume that lexical-only Match Word analyses specifically disallow functional items from projecting any idiosyncratic prosodic information. While it is possible to imagine a model in which prosodic pre-specification in the lexicon is permitted *and* Match Word ignores functional heads, this model would be essentially identical to the one I argue for here, except that it would lose the advantages outlined in the previous section: the account of stranded function words in section 4.1, and the account of generally-unreduced function words in section 4.2, both rely on Match Word applying to function words.

5.1 False prediction 1: All Fnc should be treated equally

If Match Word does not govern the prosodic behavior of functional items, and they are not pre-specified with any idiosyncratic prosodic information, we should expect that all functional items within a language should be treated in the same way. We have already seen one problem for this in English: prepositions, auxiliaries and determiners cliticize rightwards (section 3.1), while object pronouns cliticize leftwards (3.2). However, Selkirk (1996), anticipating this problem, proposes that object pronouns undergo syntactic incorporation into the verb, meaning that they are treated as a single morphosyntactic word at the syntax-prosody interface. Whatever the merits of this analysis (see section 3.2 for some arguments against it), the fact remains that across languages, different function words exhibit different, often idiosyncratic, prosodic behaviors.

To give an example from Serbian, Zec (2005) shows that function words come in two prosodic classes, which she terms 'free' and 'bound'. Free function words (when monosyllabic) adjoin at the ϕ level, as shown in (46).

(46) ($_{\phi}$ naš ($_{\omega}$ stûdio))
our studio
'our studio' (Zec, 2005, 83)

Bound function words, on the other hand, adjoin at the ω level:

(47) ($_{\omega}$ u ($_{\omega}$ pozorištu))
in theater
'in the theater' (Zec, 2005, 91)

One of Zec's pieces of evidence for this difference comes from the availability of 2nd-position clitics, whose distribution can be (at least partially) defined prosodically. The presence of a free function word in initial position will block the placement of a 2nd-position clitic after the first ω, as shown in (48a). A bound function word in the same position will not block the clitic, as in (48b), since it procliticizes into that function word.

(48) a. ***Mi** [$_{\omega}$ plavu] =*smo* kuću već videli.
we blue AUX.CL house already saw
('We already saw the blue house.')
b. [$_{\omega}$ **O=** [$_{\omega}$ plavu]] =*smo* kuću već čuli.
about.cl blue AUX.CL house already heard

'We have already heard about the blue house.'

(Zec, 2005, 92)

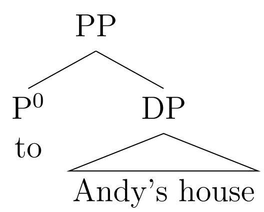
Prosodic differences between different classes of function words are examined in Nespor and Vogel (1986); Chung (2003); Bennett et al. (to appear), among others. Ultimately, any theory that assumes that the prosodic behavior of function words can be derived from their being ignored by Match Word will run up against these kind of difficulties.

5.2 False prediction 2: syntactic non-isomorphism should be minimized

If function words are ignored by Match Word, then we would expect that they are integrated into prosodic structure in whichever way is likely to cause least grief for Match Phrase and Match Word. In this subsection, I show that this is not borne out, and that function words can induce some prosodic structures that are dramatically *non*-isomorphic to their associated syntactic structure. These effects can be nicely captured with the model advanced here. I further show that it is not possible to blame other constraints for inducing these non-isomorphic syntactic structures: the cases that Selkirk's (1996) Exhaustivity constraint or Ito and Mester's (2009a) Parse-into-ω constraint could be responsible do not stand up to scrutiny.

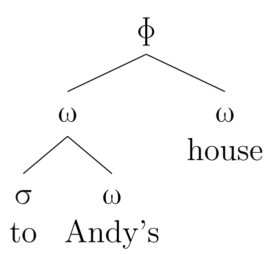
The instance of syntax-prosody non-isomorphism that we're interested in is what happens when right-cliticizing function words take complements composed of multiple prosodic words. An example is given in (49): a preposition takes a multi-ω complement.

(49)

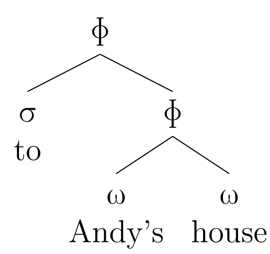


Assume that there are two candidate output prosodic structures for this syntactic structure, shown in (50).

(50) a.



b.



Going by appearances alone, it looks like (50b) is more isomorphic to the syntactic structure than (50a). Holding on to this intuition (to be refined), we can in fact show that (50a)—the less isomorphic structure—is the one we get. Recall Ito and Mester (2009b)'s (2009b) intrusive /r/ test: intrusive /r/ can be epenthesized in the onset of a maximal ω, but not in a non-maximal ω. If the structure in (50a) is the right one, we would predict that intrusive /r/ does *not* appear before *Andy's*—this is because *Andy's* does not constitute a maximal ω. By contrast if the structure in (50b) is the right one, we predict that intrusive /r/ *should* appear before *Andy's*, since *Andy's* is now a maximal ω.

Applying this test (51), we find that it is indeed impossible to epenthesize /r/ before a multi-ω complement, leading us to conclude that the non-isomorphic structure in (50a) is the correct one (also assumed by Ito and Mester 2009a). The same test is applied for the auxiliary *gonna* in (52), with the same result.

(51) a. t[ə] Andy's house
 b. *t[ə] [ɹ]Andy's house

(52) a. gonn[ə] eat cake
 b. *gonn[ə] [ɹ]eat cake

So why do we get the less-isomorphic structure over the more-isomorphic one? I propose that it is a consequence of the prosodic subcategorization frame associated with the functional element, being zealously enforced by the SubCat constraint. The tableau in (53) shows how the high-ranked SubCat constraint overrules the objections of Match Word and Match Phrase to select the non-isomorphic structure, in the way we are used to by now.

(53)

[$_{PP}$ to [$_{DP}$ Andy's house]]	SubCat	MW	MP
☞ a. ($_\phi$ ($_\omega$ to ($_\omega$ Andy's))($_\omega$ house))		*	*
b. ($_\phi$ to ($_\phi$ ($_\omega$ Andy's)($_\omega$ house))	*!		

This analysis requires defending from a number of possible objections and alternatives. I first discuss possible alternative analyses that make use of constraints which do *not* rely on prosodic pre-specification in the lexicon: Selkirk's (1996) Exhaustivity constraint or Ito and Mester's (2009a) Parse-into-ω constraint, for instance. I then discuss the possibility of avoiding the problem entirely by using appropriately-defined Match constraints, which would truly 'ignore' functional categories and projections, and show that this idea runs into the same problems.

Exhaustivity essentially punishes 'level-skipping' in the prosodic hierarchy. (50b) runs afoul of it, since a ϕ directly dominates a σ, while (50a) does not. Parse-into-ω punishes prosodic material that is not parsed into a ω. Again, (50b) runs afoul of it, while (50a) does not. For the input in (54), we see that they have essentially the same effect as SubCat.[19]

(54)

[$_{PP}$ to [$_{DP}$ Andy's house]]	Exh	Pω	MW	MP
☞ a. ($_\phi$ ($_\omega$ to ($_\omega$ Andy's))($_\omega$ house))			*	*
b. ($_\phi$ to ($_\phi$ ($_\omega$ Andy's)($_\omega$ house))	*!	*		

However, both of these constraints are fatally incomplete as accounts of the behavior of English right-cliticizing function words. The problem only becomes apparent when (49), or some equivalent large FncP, is embedded inside a larger structure. What happens is that neither Exhaustivity or Parse-into-ω are capable of forcing the function word to adjoin to its *right*, and they permit it to freely, and incorrectly, adjoin to its *left*. In the tableau in (55), candidate (b), in which the preposition left-adjoins into the preceding ω, racks up

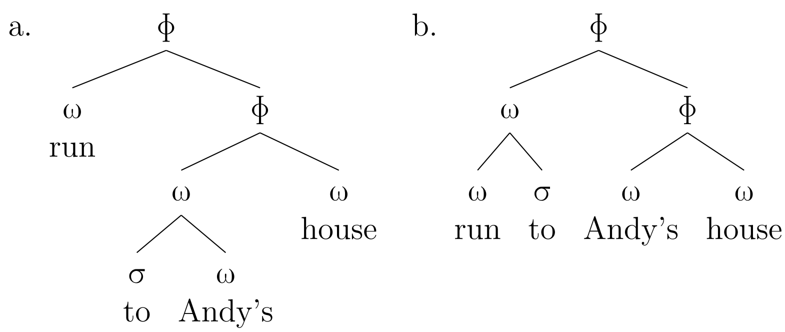
[19]Selkirk's (2011) Strong Start constraint would have the same effect, and the same problem.

the same number of Match Word and Match Phrase violations as the desired winner candidate (a). For clarity, the two candidates are shown as trees in (56).

(55)

[$_{\text{VP}}$ run [$_{\text{PP}}$ to [$_{\text{DP}}$ Andy's house]]]	Ex	Pω	MW	MP
☞ a. ($_{\phi}$($_{\omega}$run)**($_{\phi}$($_{\omega}$to($_{\omega}$Andy's))**($_{\omega}$house)))			*	*
☞ b. ($_{\phi}$**($_{\omega}$($_{\omega}$run)to)**($_{\phi}$($_{\omega}$Andy's)($_{\omega}$house)))			*	*
c. ($_{\phi}$($_{\omega}$run)($_{\phi}$to($_{\phi}$($_{\omega}$Andy's)($_{\omega}$house))))	*	*		

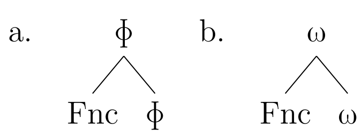
(56)



SubCat does not run up against this problem: candidate (a) will not trigger a violation, while candidate (b) will. Ito and Mester (2009a, 20) do make an oblique mention of this problem, stating that "[t]he general proclisis pattern of English means that *fnc* cannot cliticize to the left", but this is not encoded in their constraint ranking. To rectify this situation, a tiebreaking constraint would be necessary—one which prefers right-adjunction to left-adjunction for (certain) English function words. This would essentially be equivalent to SubCat, but it would lack the flexibility of that constraint and would apply indiscriminately to all function words, including those which we *do* want to cliticize leftwards, such as weak object pronouns (on which see section 3.2).

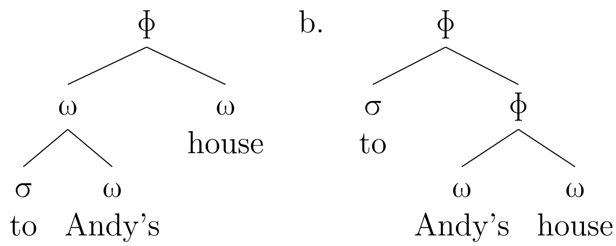
The reader might imagine that an alternative way of avoiding the problems caused by larger FncPs could involve redefining the Match constraints. If the Match constraints really do ignore function words, we could define them such that the ϕs in (57a) are viewed as the same ϕ, and the ωs in (57b) are viewed as the same ω—that is, adjoined functional items really would count as 'invisible' to the Match constraints.

(57)

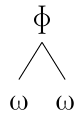


This would get us to a place where the two candidates in (50), repeated in (58), would be treated as equally valid by Match constraints: to the Match constraints, both structures would look like (59).

(58) a. b.



(59)



But once here, we end up with the same problem as we had before: what makes candidate (58a) beat (58b)? If we appeal to Selkirk's (1996) Exhaustivity constraint or Ito and Mester's (2009a) Parse-into-ω constraint, we end up with same problem that befell them when integrating the FncPs into larger prosodic structures, which is that structures in which proclitics procliticize fare just as well in the constraint ranking as structures in which proclitics *en*cliticize (see the tableau in (55)). Ultimately, we are required to stipulate, somewhere, that function words must cliticize rightwards. That is, we are forced to simply re-state the effects of a general preference for proclisis, which, as before, causes problems when dealing with the prosodic behavior of English enclitics. In a language with a greater range of prosodic behaviors for function words (e.g. Serbian, as discussed in section 5.1), this approach would be a complete non-starter.

In this section, therefore, we have seen that two predictions of a 'lexical-only Match Word' model are incorrect. Firstly, such a model predicts that all function words within one language should be prosodically parsed in the same way. We saw in section 3.2 that this is not even true for English, and the previous subsection (5.1) presented some cross-linguistic evidence for its falsity. Secondly, the model would predict that syntax-prosody non-isomorphism should be kept to a minimum when function words are involved. Again, we saw that this is *not* the case. Furthermore, attempts to account for attested non-isomorphisms without using prosodic pre-specification end up 'hardwiring' the prosodic behavior of particular classes of functional items into the grammar of that language, and essentially forcing *all* functional items to behave that way. This is undesirable, given the attested diversity of the behavior of function words within individual languages. In the next section, I pursue one further empirical consequence for the proposal advanced here, concerning the prosodic effects of contracted negation *-n't*.

6 *-n't* and some consequences

In this section, I discuss the prosodic behavior of one more English functional morpheme: contracted negation *-n't*. I then consider the implications of the *-n't* pattern, in which a right-cliticizing element abuts a left-cliticizing one, for other Fnc-Fnc sequences in English.

I propose that *-n't* is lexically pre-specified with the left-cliticizing prosodic subcategorization frame in (60).[20] This is the same frame as was proposed for weak object pronouns

[20]The clitic vs. affixal status of *-n't* was famously interrogated by Zwicky and Pullum (1983), with them

in section 3.2.

(60) [$_{\omega}$ [...] *-n't*]

This accounts for a fact that I do not believe has been widely noted: the addition of *-n't* forces its host auxiliary to become a full prosodic word. Compare (61a) with (61b), and (62a) with (62b).

(61) a. Bill [ˈhædn̩t] left.
b. *Bill [ədn̩t] left.

(62) a. Mary [ˈdʌzn̩t] care.
b. *Mary [dəzn̩t] care.

The examples in (61) provide the clearest contrast: *-n't* forces its host auxiliary *had* to appear in unreduced form, with an initial /h/ and word-level stress. The contrast in (62) is somewhat murkier, given the shorter phonetic distance between unreduced /ʌ/ and reduced [ə], but the effect on stress is the same: adding *-n't* forces *does* to bear word-level stress. The same can be said of monosyllabic negated auxiliaries such as *won't* and *can't*: they too cannot have their vowels reduced to [ə], and must be stressed as full lexical words.[21]

We can show that Fnc-Fnc sequences do not ordinarily coalesce into full ωs. The sequence of auxiliaries in (63a) can happily recursively cliticize into the structure in (63b), with neither of the auxiliaries receiving word-level stress.

(63) a. The unpleasant man had been speaking.

---

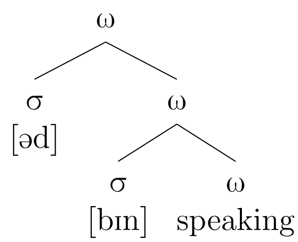
coming down firmly on the affixal side. However, the morphosyntactic clitic vs. affix status of *-n't* is not directly relevant to the discussion here. The only prerequisites for the discussion here are that *-n't* and its host auxiliary are each syntactic X^0s at the syntax-prosody interface. In a Distributed Morphology approach, this is compatible with *-n't* being a clitic or an affix (to the extent that the distinction has any theoretical significance in such an approach).

[21] Ito and Mester (2009a) argue that negated auxiliaries, monosyllabic and disyllabic, right-adjoin into the adjacent prosodic word as Feet, as is shown for *gonna* in (43). It is very hard to empirically distinguish between their proposal and the proposal here. However, Ito and Mester's evidence rests on evidence from intrusive /r/ of auxiliaries like *gonna*, but as discussed in footnote 18 we should be wary about extrapolating this to those function words on which the intrusive /r/ test cannot be applied.

A possible piece of evidence in favor of the analysis presented here—in which negated auxiliaries function as a full ωs—comes from what happens when they are integrated into a larger sentence. In answer B in (i), *won't* has the same prominence as *Adam*, implying it is treated as the same kind of prosodic category (a ω). In answer B', on the other hand, *gonna* necessarily has less prominence than *Adam*, implying that it is not of the same category (following Ito and Mester, a Foot adjoined into the adjacent ω). However, I leave empirical confirmation of this intuition for future work.

(i) A: What's going on here?
B: Adam won't leave.
B': Adam's gonna leave.

b.

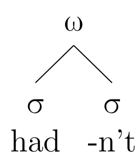


This prosodic property of *-n't* must therefore come from something lexically specific to it, something not shared with the auxiliaries. I argue that what sets *-n't* apart is its left-cliticizing prosodic subcategorization frame, shown in (60).

It works as follows: an auxiliary like *had* is pre-specified with a right-cliticizing frame, and *-n't* is pre-specified with a left-cliticizing frame. Upon being placed adjacent to each other by the syntax, both frames can be simultaneously satisfied by forming a ω. This is schematized in (64).

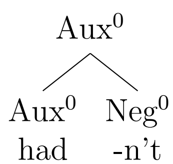
(64) *had* $[_{\omega}$ Fnc^0 [...]] *-n't* $[_{\omega}$ [...] Fnc^0]

⇓

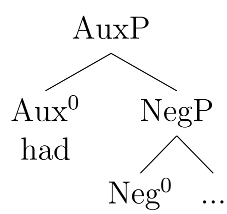


Note that this analysis holds whether or not the ω *hadn't* corresponds to an actual syntactic X^0 or not. If we believe that the syntax constructs a complex head composed of the two morphemes, as in (65a), then MATCH WORD is satisfied by this head corresponding to a ω. If, on the other hand, all the syntax does is place the heads adjacently in the clausal spine, as in (65b), then an extra MATCH WORD violation is triggered by the spurious ω that envelops the two separate heads. Nonetheless, in both cases, SUBCAT for both morphemes is satisfied, so the structure in (64) beats all SUBCAT-violating alternatives.

(65) a.



b.



If this analysis is correct, it has some intriguing consequences for other circumstances where a right-cliticizing function words abuts a left-cliticizing one. One very common instance of this comes when a preposition takes a pronoun as its complement. As shown in (66), this has at least two possible realizations. In (66a), *him* appears in unreduced form and the preposition cliticizes to it. In (66b) it is harder to tell what is going on, since it appears that both the preposition and the pronoun are in their reduced forms.

(66) a. Maisie waited [fəˈhɪm].
b. Maisie waited [f(ə)rɪm].

One potential analysis is that (66b) has the prosodic structure in (67). In this structure, the prosodic subcategorization frames of both elements are still satisfied. *Him* demands that its mother node be ω and that it have a sister to its left, and both of these requirements are satisfied. The same is true of *for*: it demands that its mother node be ω and that it have a sister to its right, and again both requirements are satisfied.[22]

(67)
$$\begin{array}{ccc} & \omega & \\ \omega & \sigma & \sigma \\ \text{waited} & \text{for} & \text{him} \end{array}$$

The wider applicability of such an analysis is a topic for future research, as is the cross-linguistic behavior of Fnc-Fnc sequences where the first Fnc cliticizes right and the second cliticizes left.[23]

7 Conclusion

Taking a step back, we have seen that Match Theory can be productively integrated with theories that permit prosodic idiosyncrasy to be projected from the lexicon. In the process we have managed to simplify Match Word such that it does not discriminate between lexical and functional categories, bringing it in line with Elfner's (2012) non-discriminating Match Phrase contraint, and derive a range of empirical phenomena within the English functional domain. I now briefly discuss two open issues, the first relating to further, unexplained restrictions on function word reduction, the other relating to mismatches between an element's lexical/functional status and its ω/clitic status.

7.1 Further restrictions on prosodic reduction

As has been discussed since Bresnan (1978), certain reduced auxiliaries are banned in environments in which they should be prosodically supported. For instance, the 'very reduced' auxiliaries (those which can reduce to non-syllabic consonants, see section 3.1) encliticize onto material to their left. Yet Pullum and Zwicky (1997) catalog a series of syntactic environments in which they are banned, despite having viable hosts to their left, including when they abut ellipsis sites or the traces of movement:

(68) a. *I've left home and they've ~~left home~~ too.
b. *I'm not sure where$_i$ Mary's t_i.

[22] At this point, the distinction between vertical and horizontal prosodic subcategorization frames becomes crucial (see Bennett et al., to appear, for discussion). If the frame associated with *for* specified that its sister node be a ω ('horizontal subcategorization'), the structure in (67) would not satisfy it. By contrast, by only specifying that its mother node be a ω ('vertical subcategorization'), its frame *can* be satisfied by the structure in (67).

[23] Zec (2005) discusses a similar kind of configuration for Serbian, and Bennett et al. (2016, :220–226) do so for Irish.

The account presented in this paper cannot capture the unacceptability of these examples, as the enclitic auxiliaries are satisfying their prosodic subcategorization frames and, according to the conditions laid out here, should be acceptable.

I leave open whether these effects should be captured by further prosodic restrictions, or whether they are syntactic in nature.

7.2 On the lexical/functional distinction

This paper makes the strong claim that the lexical/functional distinction has no significance at the syntax-prosody interface. The relevant distinction is whether or not a particular lexical entry, inserted at a particular syntactic head, comes equipped with a prosodic subcategorization frame. It is true that *most* function words are associated with these frames, but, as we saw, not all of them are—for instance, within English the demonstrative determiner *that* seems a good candidate for a functional item that lacks a frame.

We might wonder, then, whether the reverse situation exists. That is, are there any clearly lexical (i.e not functional) words whose exceptional prosodic behavior should be captured with prosodic subcategorization frames? The answer within English seems to be 'no', and in general, prosodic reduction of unambiguously lexical words seems very rare or unattested. One promising contender is the class of prosodically deficient/proclitic verbs in Chamorro described by Chung (2003, 2017), although the verbs in question are not unambiguously lexical rather than functional. Another analysis that applies prosodic subcategorization frames to lexical words is Hsu (2015). He argues that variability in the application of liaison to word-final nasal vowels in French results from variability in their prosodification, and he encodes this variability with prosodic subcategorization frames. However, in more recent work, he argues for an alternative analysis that does not make use of prosodic pre-specification (Hsu 2018). Kaisse (2017) discusses data from Macedonian, in which certain very frequent noun+adjective collocations constitute a single domain for stress assignment, and suggests that in these cases one or both of the lexical items may fail to project its own prosodic word. But here, prosodic reduction is a property of the collocation rather than the word itself, and so could not be straightforwardly captured in the framework of prosodic subcategorization frames.

So it does seem that while function words often lack prosodic subcategorization frames, it is almost unheard of for lexical words to possess them. To explain this asymmetry, we might look to a diachronic explanation: it's possible that in the course of a grammaticalization cline, prosodic change from a ω to a clitic either tracks or follows, but rarely if ever precedes, the syntactic-semantic change from a lexical to a functional head. I leave this issue for others to consider.

References

Adger, David, and Jennifer Smith. 2005. Variation and the minimalist program. In *Syntax and variation: Reconciling the biological and the social*, eds. Leonie Cornips and Karen P. Corrigan, 149–178.

Anderson, Stephen R. 2008. English reduced auxiliaries really are simple clitics. *Lingue e linguaggio* 7 (2): 169–186.

Beckman, Mary, and Janet Pierrehumbert. 1986. Intonational structure in English and Japanese. *Phonology* 3: 255–309.

Bennett, Ryan, Emily Elfner, and James McCloskey. 2015. Pronouns and prosody in Irish. In *Proceedings of the XIV International Congress of Celtic Studies. Maynooth 2011*, eds. Liam Breatnach, Ruairí Ó hUiginn, Damian McManus, and Katharine Simms, 19–74. Dublin: Dublin Institute for Advanced Studies, School of Celtic Studies.

Bennett, Ryan, Emily Elfner, and James McCloskey. 2016. Lightest to the right: an apparently anomalous displacement in Irish. *Linguistic Inquiry* 47 (2): 169–234.

Bennett, Ryan, Boris Harizanov, and Robert Henderson. to appear. Prosodic smothering in Macedonian and Kaqchikel. *Linguistic Inquiry*.

Bresnan, Joan. 1978. Contraction and the transformational cycle in English.

Brown-Schmidt, Sarah, Donna K. Byron, and Michael K. Tanenhaus. 2005. Beyond salience: Interpretation of personal and demonstrative pronouns. *Journal of Memory and Language* 53 (2): 292–313.

Chomsky, Noam. 2000. Minimalist Inquiries: the Framework. In *Step by step: Essays on minimalist syntax in honor of Howard Lasnik*, eds. Roger Martin, David Michaels, and Juan Uriagereka. Cambridge, MA: MIT Press.

Chomsky, Noam. 2001. Derivation by phase. In *Ken Hale: A Life in Language*, ed. Michael Kenstowicz, 1–52. Cambridge, MA: MIT Press.

Chomsky, Noam. 2008. On phases. In *Foundational issues in linguistic theory. Essays in honor of Jean-Roger Vergnaud*, eds. Robert Freidin, Carlos Otero, and Maria Luisa Zubizarreta, 133–166. MIT Press.

Chung, Sandra. 2003. The syntax and prosody of weak pronouns in Chamorro. *Linguistic Inquiry* 34 (4): 547–599.

Chung, Sandra. 2017. Another way around causatives in Chamorro. In *On looking into words (and beyond): Structures, Relations, Analyses*, eds. Claire Bowern, Laurence Horn, and Raffaella Zanuttini, 263–288. Berlin: Language Sciences Press.

Clemens, Lauren Eby. 2014. Prosodic noun incorporation and verb-initial syntax. PhD Thesis, Harvard University.

Elfner, Emily. 2012. Syntax-prosody interactions in Irish. PhD diss, University of Massachusetts, Amherst, MA.

Elfner, Emily. 2015. Recursion in prosodic phrasing: Evidence from Connemara Irish. *Natural Language & Linguistic Theory* 33 (4): 1169–1208.

Elordieta, Gorka. 2007. Minimum size constraints on intermediate phrases. In *Proceedings of the 16th International Congress of Phonetic Sciences (Saarbrucken)*, 1021–1024.

Fougeron, Cécile, and Patricia A. Keating. 1997. Articulatory strengthening at edges of prosodic domains. *The journal of the acoustical society of America* 101: 3728–3740.

Féry, Caroline. 2010. Recursion in prosodic structure. *Phonological Studies* 13: 51–60.

Féry, Caroline, and Hubert Truckenbrodt. 2005. Sisterhood and tonal scaling. *Studia Linguistica* 59 (2-3): 223–243.

Ghini, Mirco. 1993. Phi-formation in Italian: A new proposal. *Toronto working papers in linguistics* 12 (2): 41–78.

Hale, Kenneth, and Elisabeth Selkirk. 1987. Government and tonal phrasing in Papago.

Phonology 4: 151–184.

Hsu, Brian. 2015. Constraining exceptionality as prosody-morphology mismatch: a study of French nasal vowels. *Proceedings of the 49th Annual Meeting of the Chicago Linguistics Society* 49.

Hsu, Brian. 2018. Exceptional prosodification effects revisited in Gradient Harmonic Grammar. Ms., UNC Chapel Hill.

Inkelas, Sharon. 1989. *Prosodic constituency in the lexicon*. New York: Garland.

Inkelas, Sharon, and Draga Zec. 1990. *The phonology-syntax connection*. University of Chicago Press.

Inkelas, Sharon, and Draga Zec. 1995. The syntax-phonology interface. In *The handbook of phonological theory*, ed. John A. Goldsmith, 535–549. Cambridge, MA: Blackwell.

Ito, Junko, and Armin Mester. 2007. Prosodic adjunction in Japanese compounds. In *Formal Approaches to Japanese Linguistics (FAJL 4)*, eds. Yoichi Miyamoto and Masao Ochi, Vol. 4, 97–112. Cambridge, MA: MIT Working Papers in Linguistics.

Ito, Junko, and Armin Mester. 2009a. The extended prosodic word. In *Phonological domains: Universals and deviations*, eds. Janet Grijzenhout and Boris Kabak, 135–194. Berlin.

Ito, Junko, and Armin Mester. 2009b. The onset of the prosodic word. In *Phonological argumentation: Essays on evidence and motivation*, ed. Steve Parker, 227–260. London: Equinox.

Ito, Junko, and Armin Mester. 2009c. Trimming the prosodic hierarchy. In *Prosody matters: Essays in honor of Elisabeth Selkirk*, eds. Toni Borowsky, Shigeto Kawahara, Takahito Shinya, and Mariko Sugahara, 280–303. London: Equinox.

Ito, Junko, and Armin Mester. 2012. Recursive prosodic phrasing in Japanese. In *Prosody matters: Essays in honor of Elisabeth Selkirk*, ed. Toni Borowsky, 280–303.

Ito, Junko, and Armin Mester. 2013. Prosodic subcategories in Japanese. *Lingua* 124: 20–40.

Kabak, Baris, and Anthi Revithiadou. 2009. An interface approach to prosodic word recursion. In *Phonological Domains: Universals and Deviations*, eds. Janet Grijzenhout and Baris Kabak, 105–133. New York.

Kahnemuyipour, Arsalan. 2003. Syntactic categories and Persian stress. *Natural Language & Linguistic Theory* 21 (2): 333–379.

Kaisse, Ellen. 2017. The domain of stress assignment: Word-boundedness and frequent collocation. In *On looking into words (and beyond): Structures, relations, analyses*, eds. Claire Bowern, Laurence Horn, and Raffaella Zanuttini, 17–40. Berlin: Language Sciences Press.

Kaisse, Ellen M. 1985. *Connected speech: the interaction of syntax and phonology*. New York: Academic Press.

Kandybowicz, Jason. 2015. On prosodic vacuity and verbal resumption in Asante Twi. *Linguistic Inquiry* 46 (2): 243–272.

Kentner, Gerrit, and Caroline Féry. 2013. A new approach to prosodic grouping. *The Linguistic Review* 30 (2): 277–311.

Kratzer, Angelika, and Elisabeth Selkirk. 2007. Phase theory and prosodic spellout: The case of verbs. *The Linguistic Review* 24 (2-3): 93–135.

Ladd, D. Robert. 1986. Intonational phrasing: The case for recursive prosodic structure. *Phonology* 3: 311–340.

McCarthy, John J. 1993. A case of surface constraint violation. *Canadian Journal of Linguistics* 38: 127–153.

McCarthy, John J., and Alan S. Prince. 1994. The emergence of the unmarked: Optimality in prosodic morphology. In *NELS 24*, 333–379. Amherst, MA: GLSA Publications.

Munn, Alan. 1993. Topics in the syntax and semantics of coordinate structures. PhD Thesis, University of Maryland at College Park.

Nespor, Marina, and Irene Vogel. 1986. *Prosodic phonology*. Berlin: Mouton de Gruyter.

Parrott, Jeffrey K. 2007. Distributed morphological mechanisms of Labovian variation in morphosyntax. PhD Thesis, Georgetown University.

Price, Patti J., Mari Ostendorf, Stefanie Shattuck-Hufnagel, and Cynthia Fong. 1991. The use of prosody in syntactic disambiguation. *the Journal of the Acoustical Society of America* 90 (6): 2956–2970.

Pullum, Geoffrey K., and Arnold M. Zwicky. 1997. Licensing of prosodic features by syntactic rules: the key to auxiliary reduction. Paper presented at the annual meeting of the Linguistic Society of America, Chicago.

Richards, Marc. 2006. Weak pronouns, object shift, and multiple spell-out: Evidence for phases at the PF-interface. In *Minimalist essays*, ed. Cedric Boeckx, 160–181. Amsterdam: John Benjamins.

Selkirk, Elisabeth. 1984. *Phonology and syntax: the relation between sound and structure*. Cambridge, MA: MIT Press.

Selkirk, Elisabeth. 1995. Sentence prosody: Intonation, stress, and phrasing. In *The Handbook of Phonological Theory*, ed. A. Goldsmith, 550–569. Oxford: Blackwell.

Selkirk, Elisabeth. 1996. The prosodic structure of function words. In *Signal to syntax: bootstrapping from speech to grammar in early acquisition*, eds. James L. Morgan and Katherine Demuth, 187–214. Mahwah, NJ: Erlbaum.

Selkirk, Elisabeth. 2000. The interaction of constraints on prosodic phrasing. In *Prosody: Theory and experiment*, 231–261. Springer.

Selkirk, Elisabeth. 2009. On clause and intonational phrase in Japanese: The syntactic grounding of prosodic constituent structure. *Gengo Kenkyu* 136: 35–73.

Selkirk, Elisabeth. 2011. The syntax-phonology interface. In *The Handbook of Phonological Theory*, eds. John Goldsmith, Jason Riggle, and Alan Yu, 435–483. Blackwell.

Selkirk, Elisabeth, and Seunghun Julio Lee. 2015. Constituency in sentence phonology: an introduction. *Phonology* 32 (1): 1–18.

Selkirk, Elisabeth, and Tong Shen. 1990. Prosodic domains in Shanghai Chinese. In *The phonology-syntax connection*, eds. Sharon Inkelas and Draga Zec, Vol. 313, 313–338. Stanford, CA: CSLI Publications.

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 *The Cambridge Handbook of Phonology*, ed. Paul de Lacy, 435–456. Cambridge: Cambridge University Press.

Wagner, Michael. 2005. Prosody and recursion. PhD diss, MIT.

Wagner, Michael. 2010. Prosody and recursion in coordinate structures and beyond. *Natural Language & Linguistic Theory* 28 (1): 183–237.

Weir, Andrew. 2012. Left-edge deletion in English and subject omission in diaries. *English Language and Linguistics* 16 (1): 105–129.

Werle, Adam. 2009. Word, phrase, and clitic prosody in Bosnian, Serbian, and Croatian. PhD diss, University of Massachusetts.

Zec, Draga. 2005. Prosodic differences among function words. *Phonology* 22 (1): 77–112.
Zwicky, Arnold M., and Geoffrey K. Pullum. 1983. Cliticization vs. inflection: English *n't*. *Language* 59: 502–513.