PROSODY AND SYNTAX OF ARGUMENT AND ADVERBIAL CLAUSES

FATIMA HAMLAOUI & KRISZTA SZENDRŐI

1. Introduction

When it comes to the prosody of complex sentences, it has long been observed that English tends to display an asymmetry between so-called 'root' and 'non-root' sentences or clauses, where only the former constitute their own higher level prosodic unit, while the latter only optionally do so. Syntactically speaking, Emonds (1969) offers the definition of root sentences given in (1).

(1) Root sentence (Emonds, 1969, 6)
A root sentence will mean either the highest S in a tree, an S immediately dominated by the highest S or the reported S in direct discourse. (Hooper and Thompson, 1973, 465)

Downing (1970), whose work is based on Emonds' insight that root clauses are obligatorily set off by "commas" (i.e pauses) and whose main goal it is to predict them, offers a slightly revised definition of root sentences, given in (2).

(2) Root sentence (Downing, 1970, 30)
A root sentence is any sentence which is not dominated by a predicative sentence. (where "A predicative sentence is any sentence in which the S node immediately dominates a VP".)

Downing also alternatively offers the definition in (3), using the notion of "command" (Langacker (1969) and Ross (1967, 338)).[1]

(3) Root sentence (Downing, 1970, 31)
A root sentence is any sentence that is not commanded by a VP node.

In addition to simple sentences, root-clauses are understood to include parenthetical expressions (4), non-restrictive relative clauses (5), tag questions (6), vocatives (7), as well as some left/right dislocated phrases (8) and (9) (Nespor and Vogel, 1986, 188).

(4) Lions [as you know] are dangerous.

(5) My brother [who absolutely loves animals] just bought himself an exotic tropical bird.

(6) That's Theodore's cat [isn't it?]

(7) [Clarence] I'd like you to meet Mr. Smith.

(8) [Good heavens] there's a bear in the back yard.

(9) They are so cute [those Australian koalas].

Theses bracketed fragments, which do not all seem to constitute clauses/sentences of their own in a strict syntactic sense, constitute domains onto which 'an intonational contour is spread' (Selkirk (1978, 130), Nespor and Vogel (1986, 187)). In this respect, they are typically considered to contrast with restrictive relative clauses (10), complement clauses (11) and at least some adverbial clauses (12),

[1] "Node A of a phrase marker commands node B if neither node dominates the other, and if node B is dominated by the first node S above A" (Downing, 1970, 197).

which are intonationally integrated to their context (Nespor and Vogel, 1986, 196-198).

(10) [That kind old lady always buys fresh meat for the stray cats that live in the park].

(11) [I thought that you already knew that Gertrude was moving to southern Italy].

(12) [Paul called Paula before Carla called Carl].

How to best capture the above relation between clauses and major prosodic chunks is still a matter of debate. A number of studies have argued that the speech flow is organized into a finite set of hierarchically organized phonological domains to which phonological rules are sensitive (Selkirk, 1978; Nespor and Vogel, 1982, 1986, among others). These domains more or less reflect syntactic constituency although other factors such as speech rate and prosodic weight have been shown to play a role too (e.g. Gee and Grosjean, 1983, 1987, on prosodic weight). In fact, different traditions place a different amount of emphasis on the contribution of syntax. In those works that regard the role of syntactic constituency as central in determining postlexical prosodic domains, a number of different proposals have been put forward. At earlier stages, the prosodic categories often reflected particular properties of the language that was studied. For example Minor and Major Phrase were used for Japanese, also sometimes called Accentual and Intermediate Phrase (a.o. Haraguchi, 1977; Beckman and Pierrehumbert, 1986; Kubozono, 1988). Nowadays, a consensus has been reached in Prosodic Phonology to distinguish only two different prosodic categories above the word level: the phonological phrase and the Intonation Phrase (Ito and Mester, 2012; Selkirk, 2009, 2011).

As a rule of thumb, the phonological phrase (PP or ϕ) corresponds to lexical XPs (Truckenbrodt, 1999; Selkirk, 2011) and the Intonation Phrase (IP or ι) to syntactic clauses (Truckenbrodt, 2005; Selkirk, 2005, 2009, 2011; Hamlaoui and Szendrői, 2015). Form this perspective, the above discussed root and non-root clauses differ on whether they map onto an Intonation Phrase of their own. What exactly constitutes a "clause" and a fortiori a "root clause" has been regularly debated. Although there is considerable overlap between the theories, a consensus has not yet been reached. We will come back to this issue in Section 3.

As far as the relations between the prosodic units are concerned, it was originally assumed that they constitute exocentric categories organized in a hierarchical fashion: that every unit would only contain units of the immediately lower level. This is known as the Strict Layer Hypothesis (SLH) (Selkirk (1984, 26), Nespor and Vogel (1986)). But already in the 1980s, certain phenomena were identified that called into question a strict formulation of the SLH. In particular, Ladd (1986) noted that a more elegant analysis can be given for structures involving certain appositives and parentheticals in English if one allows for recursivity, i.e. the idea that any prosodic category could include a prosodic category of the same type. Under this view, a weaker version of the SLH that prohibits higher level categories to be included inside lower level categories still remains. This move, which is widely accepted by now (Truckenbrodt, 2002; Féry and Truckenbrodt, 2005; Wagner, 2005, 2010; Ito and Mester, 2007, 2009; Selkirk, 2009, 2011; Elfner, 2012), brings prosodic structure closer to syntactic structure in the sense that it introduces an intrinsically hierarchical organization in what has been previously perceived as a flat structure. Nevertheless, crucial differences remain. First, prosodic structure remains exocentric. Second, prosodic phrasing can be and often is influenced by non-syntactic considerations such as prosodic well-formedness constraints (e.g.

size constraints), information-structural constraints (e.g. AlignTopic, Stress-Focus) or processing considerations (e.g. saliency of domain edges).

In the present chapter, we concentrate on two types of embedded clauses, i.e. arguments and adverbials, and consider whether there is a systematic correlation between the nature of the clause (subject/complement/adjunct) and/or its syntactic position (e.g. extraposed, high or low-attached, verb adjacent) and its prosodic status. The chapter is structured as follows. In Section 2, we discuss the prosodic realization of these types of embedded clauses in English and the mapping proposals that have recently been made and their respective predictions. Section 3 concentrates on cross-linguistic variation in the realization of these embedded sentences and the challenges it brings for the various mapping algorithms/constraints that relate clauses to intonational phrases. Section 4 discusses more complex cases of intonational phrasing, involving information structural considerations. Section 5 concludes the paper.

2. Syntax-phonology mapping of argument and adverbial clauses

2.1. **Some empirical facts from English.**

In English, Intonation Phrase boundaries are often identified by means of various tonal and durational phenomena, most often associated with their 'terminal portion' or right edge. Based on a number of previous studies (Lieberman, 1967; Gleason, 1961; Trager and Smith, 1957), Downing (1970, 7-8) identifies intonational phrases as having their own intonational contour and terminal juncture and as realizing only one primary stress (also called 'nuclear' or 'sentence' stress). In more recent works, such as Selkirk (2005, 12), a final rising contour, noted L-H% in Pierrehumbert (1980)'s theory of English intonation, or its alternative deep final fall (L-L%) are also central in diagnosing intonational phrases. In this theory, boundary tones (noted with the %

symbol) only appear at Intonation Phrase edges. Additionally, words preceding a major prosodic break tend to show an increased duration, and more specifically a syllable-final lengthening (Selkirk, 1984; Ladd, 1986; Beckman and Edwards, 1990; Price et al., 1991; van den Berg et al., 1992; Taglicht, 1998).

As mentioned in the Introduction, there is a widespread tendency to associate intonational phrases with the presence of pauses. Studies like Price et al. (1991, 2968) find that major prosodic boundaries are indeed often associated with a pause (in 23% (out of 212 utterances) of level 4 and 67% (out of 25 utterances) of level 5 break indices), whereas minor prosodic breaks are not. According to Selkirk (2005, 12), citing work by Beckman and Edwards (1990) and Beckman and Ayers-Elam (1997), the temporal juncture is greater at an Intonation Phrase edge than at the edge of phrases lower down in the prosodic hierarchy. Note however that, as made clear in Downing's dissertation, a perceived juncture does not necessarily imply an actual pause in the sense of a 'cessation of phonation'.

According to Ladd (1986, 1988), the Intonation Phrase is also the domain of declination, i.e. 'the gradual F0 decline often observed over the course of phrases or utterances' (Ladd, 1988, 530) or, in an Autosegmental approach to intonation, the 'setting of register for the realization of tone' (Selkirk, 1995b, 556). Concomitant to this, an upward pitch reset is indicative of the start or the left-edge of an intonation phrase, with non-initial intonational phrases showing only a partial reset (Ladd, 1988). Depending on the language, (partial) resets can also be found at the left-edge of other prosodic domains (i.e. phonological phrases), but the ones at the beginning of intonational phrases generally reach higher tonal targets (van den Berg et al., 1992).

2.1.1. *Subject clauses.* Although a lot of work has been done on the prosody of English, there remains a number of gaps as to the obligatory and optional prosody and phrasing of some of the clauses that are of interest to us in this chapter. Subject clauses, in particular, do not seem to have been the object of as much systematic attention as other types of embedded clauses. From a syntactic perspective, and as extensively discussed, for instance, in Lohndal (2014, and references therein), there is no agreement as to whether sentential subjects occupy the canonical subject position – and should thus be expected to prosodically behave as other non-root clauses – or whether they are more akin to topics and occupy a higher position within the clausal spine, one that would potentially make them a root clause. We will come back to the realization of this type of argument clause in Section 3, as experimental data has been discussed in other (Germanic) languages.

2.1.2. *Complements clauses.* Complement clauses, when in their base position, are a typical example of non-root clauses, i.e. they normally do not introduce their own Intonation Phraseboundaries. This is illustrated in the example in (13) where, despite its significant length, the clausal complement does not form a separate intonational phrase.

(13) $_{\text{IP}}(\ _{\text{PP}}(\text{Bi}^{\text{H*}}\text{lly thought his fa}^{\text{!H*}}\text{ther was a me}^{\text{!H*}}\text{rchant}^{\text{L-}})_{\text{PP}}\ _{\text{PP}}(\wedge \text{ and his mo}^{\text{H*}}\text{ther was a secret a}^{\text{!H*}}\text{gent}^{\text{L-L\%}})_{\text{PP}}\ )_{\text{IP}}$. (adapted from Selkirk, 2005, 11)

Metrically strong syllables carry a high pitch accent (H*). Every H* is downstepped (symbolized with !) with respect to the preceding one within the same phonological phrase (PP) and an (minor) upward reset (noted with the $\wedge$ symbol) takes place at the start of the second PP. The phrasing of the example in (13) is

to be contrasted with the one of the example in (14), where the conjoined clause is a root clause and introduces its own intonation phrase.

(14) $_{\text{IP}}(\ _{\text{PP}}(\text{Bi}^{\text{H*}}\text{lly thought his fa}^{\text{!H*}}\text{ther was a me}^{\text{!H*}}\text{rchant}^{\text{L-H\%}})_{\text{PP}})_{\text{IP}}$ || $_{\text{IP}}(_{\text{PP}}(\wedge\wedge\text{! and his fa}^{\text{H*}}\text{ther was a secret a}^{\text{!H*}}\text{gent}^{\text{L-L\%}})_{\text{PP}}\ )_{\text{IP}}$. (adapted from Selkirk, 2005, 11)

According to Selkirk, example (14) differs from (13) in that a boundary tone is found on *merchant*, indicating the right edge of an intonational phrase. The reset at the start of the conjoined clause is more significant than in (13), without however going back to the register of the first Intonation Phrase and thus being downstepped with respect to it, as indicated by the ! symbol following the $\wedge$ symbols. A pause (noted ||) is also perceived between the two conjuncts.

Interestingly, and as already noted by Downing (1970, 90-91), direct quote complements of the type in (15) do insert their own Intonation Phrase boundaries.

(15) [[Ann said] ["I'll make you some sandwiches"]].

Although they are not generally included in the lists of root clauses, direct quote complements behave like ones and seem to constitute a challenge for the definitions of root sentences given in (1) to (3). Rather than altering the definition of root clauses to fit these complement clauses in, Downing proposes a "Quote Detachment" operation by which these complements are syntactically extraposed and (Chomsky-)adjoined to the highest S. He acknowledges, though, that this is problematic in examples like (16) and (17), in which the quote is not sentence final.

(16) John reported that Ann said "I feel better" rather weakly yesterday.

(17) His saying "you are another" was uncalled for.

In (16) and (17), the quotes do not however, according to him, form separate intonational phrases. More investigations seem needed regarding both the syntax and the prosody of these sentences. If direct quote complement clauses however happen to occupy a similar structural position as their non-quotative alternative, i.e. in the scope of the quotative verb, and systematically form an Intonation Phrase of their own, this would suggest that the phrasing of some embedded clauses is not due to their syntactic location, but rather to their semantic/discursive status. We come back to this point in Section 2.2, when we discuss the role of illocutionary force and speech acts.

2.1.3. *Adverbial clauses.* Adverbial clauses represent a much larger and diverse set than argument clauses. When it comes to their prosodic realization, the type of relation they express (e.g. adversative, causative, consecutive, causal, manner etc.) does not seem to play a central role. The examples in (18) and (19), from Selkirk (2005), suggest that their structural position and in particular their attachment height is however crucial.

(18) $_{\text{IP}}(\ _{\text{PP}}(\text{Ci}^{\text{H*}}\text{ndy isn't pla}^{\text{!H*}}\text{nting a ga}^{\text{!H*}}\text{rden}^{\text{L-}})_{\text{PP}}$
$_{\text{PP}}(\text{becau}^{\text{H*}}\text{se she lo}^{\text{!H*}}\text{ves toma}^{\text{!H*}}\text{toes}^{\text{L-L\%}})_{\text{PP}}\ )_{\text{IP}}$.

(19) $_{\text{IP}}(\ _{\text{PP}}(\text{Ci}^{\text{H*}}\text{ndy isn't pla}^{\text{!H*}}\text{nting a ga}^{\text{!H*}}\text{rden}^{\text{L-H\%}})_{\text{PP}})_{\text{IP}}$
$\|\ _{\text{IP}}(_{\text{PP}}(\wedge\wedge\ \text{becau}^{\text{H*}}\text{se she lo}^{\text{!H*}}\text{ves toma}^{\text{!H*}}\text{toes}^{\text{L-L\%}})_{\text{PP}}\ )_{\text{IP}}$.

Example (18), where the embedded clause is in the scope of the negation, excludes the content of the *because*-clause as the reason for planting a garden. With this

interpretation, the adverbial clause is usually treated as a VP modifier, i.e. an instance of low adjunction (Rutherford, 1970; Sæbø, 1991; Charnavel, 2017). In that case, it does not form a separate intonational phrase, which is consistent with Emonds and Downing's prediction as, in that syntactic configuration it is not a root clause. In contrast, when the *because*-clause provides the reason for planting a garden, as in (19), it is a case of high attachment (to the root node) and the embedded clause comes with its own Intonation Phrase breaks.

Rutherford (1970, 97), who focuses on the structural analysis of the contrast illustrated in (18) and (19), provides numerous examples in which a comma intonation allows to distinguish between a "restrictive" interpretation of adverbial clauses, in (20-a) to (27-a), and a "non-restrictive" one (in his terminology), in (20-b) to (27-b).

(20) a. He's not coming to class because he's sick.
b. He's not coming to class, because he just called from San Diego.

(21) a. She loves her husband (even) though he beats her.
b. She loves her husband, (al)though (I know) he beats her.

(22) a. Mary won't marry John if I have anything to *say* about it.
b. Mary won't marry John, if *I* have anything to say about it.

(23) a. Mary will marry John unless the fortune teller is too pessimistic.
b. Mary will marry John, unless the fortune teller is too pessimistic.

(24) a. He'll take his umbrella in case it rains.
b. He'll take his umbrella, in case you're wondering.

(25) a. Mary will marry John whether the fortune teller predicts it or not.

b. Mary will marry John, whether the fortune teller predicts it or not.

(26) a. He kept looking at me as if I had {something/*anything} to do with his punishment.

b. He kept looking at me, as if *I* had {?something/anything} to do with his punishment.

(27) a. Thou shalt not kill as the Bible says.

b. Thou shalt not kill, as the Bible says.

Additionally, in the case of *while*-clauses, Downing (1970, 82) observes that they only phrase separately from the main clause when they express a coordinate adversative clause, as in (28), and not an adverbial clause of duration, as in (29).

(28) The men worked, / {while/whereas/but} the woman talked.

(29) The men worked while the sun was shining.

In Rutherford (1970)'s analysis, the "non-restrictive" adverbial clauses are treated as coming from a high sentence, headed by a performative that has been deleted. Their relation to the main clause is thus looser than the "restrictive" adverbials'.

Left-peripheral *if*-clauses are also described by Selkirk (2005) as phrasing separately from the main clause, as illustrated in example (30). According to her, this is consistent with Emonds' treatment of this type of clauses as root clauses.

(30) $_{\text{IP}}$(If you had a llama)$_{\text{IP}}$, $_{\text{IP}}$(could you ride it)$_{\text{IP}}$?

Downing (1970, 49), who assumes that the base position of English adverbial clauses is within VP (i.e. to the right of the main verb and its complements) and

that the surbordinate-matrix order is obtained by leftward extraposition (Ross, 1967, 309), also reports a difference in intonational phrasing between (31) and (32) (adapted from Downing).

(31) $_{\text{IP}}$(We can talk after we eat)$_{\text{IP}}$.

(32) $_{\text{IP}}$(After we eat)$_{\text{IP}}$ $_{\text{IP}}$(we can talk)$_{\text{IP}}$.

In (31), the embedded clause is attached low and, according to him, phrases together with the main clause, while in (32), it is attached to the root and phrases separately. Again, this seems consistent with the root/non-root clause distinction. Downing however notes that being separated from the main clause by a pause is not a property of leftward adverbial clauses only, but of any leftward adverbial, be it a clause or not. This is illustrated with the examples in (33) to (37), where the break following the adverbial is symbolized with /.

(33) While sleeping / I heard the phone ringing.

(34) When empty / the container weighs 14 ounces.

(35) Empty / the container weighs 14 ounces.

(36) In the afternoon / everyone went swimming.

(37) Tonight / I want to relax home.

Downing also contrast sentences (38) and (39) which, according to him, provide evidence for the fact that a root clause inserts its own Intonation Phrase breaks and that a break is only found if the adverbial is moved out of it. The perceived break in (38) is thus simply the left edge of the root clause.

(38) Tomorrow / I promised that he would be there.

(39) I promised that tomorrow he would be there.

As this difference in phrasing is also observed with clausal adverbs in (40) and (41), the same conclusion can be reached that the perceived break is the left edge of the main clause rather than associated with the right edge of the adverbial clause. Note that Downing's (1970, 52-53) account of the phrasing of left-peripheral *if*-clauses thus differs from Selkirk's in (30). Downing further notes that an intonational break is only obligatory if the adverbial clause originates from a root clause, i.e. in (40)a and (41)a). It is optional in (40)b and (41)b.

(40) a. If you go to that meeting, / you may be arrested.

b. I wonder if you are aware of the fact that if you go to that meeting (/) you may be arrested.

(41) a. Because they went to the meeting, / they were arrested.

b. If because they went to that meeting (/) they were arrested, / the situation is worse than we thought.

Further examples of left-peripheral adverbial clauses from Downing (1970, 53) are given in (42) to (44), which share a similar phrasing. He notes that the equivalent participial phrases also display this prosody.

(42) When he had finished his task, / he locked up and went home.

(43) Since you are an old friend of the family / you have a right to know.

(44) Then John turned to me / and (he) remarked how hot it was.

In sum, in English complex sentences, both argument and adverbial clauses seem to be prosodically integrated to the main clause when they are in situ or attach in a position that is in the scope of the main verb. Whenever clauses are right or left-extraposed or their attachment site is simply higher within the sentence structure, they tend to phrase separately from the main clause. In the latter case, it is not always clear whether they form an Intonation Phrase of their own (i.e. introduce both their own left and right Intonation Phrase edges), or whether they are simply embedded in a prosodic domain that encompasses the entire sentence and contains an Intonation Phrase corresponding to the main clause (i.e. the break that separates them from the rest of the sentence originates from the main clause and not from the subordinate clause itself). Before turning to cross-linguistic variation in intonational phrasing, let us first turn to the theoretical treatments that have been proposed to account for intonational phrasing.

2.2. **Proposed theoretical treatments.** Inspired by Emonds (1969)'s observation that root clauses are set off by a comma intonation, Downing (1970, 31) formulates the rule given in (45).

(45) Obligatory Boundary Insertion (OBI)
[Intonational] phrase boundaries [IPs] are inserted as leftmost and rightmost immediate constituents of every root S node that appears in any postcyclic derived P-marker.

Translated into the Prosodic Hierarchy Theory (a.o Selkirk, 1984, and subsequent work), this means that a root clause is taken by Downing to insert both a left and a right Intonation Phrase boundary. Example (46) to (52) schematize the phrasing of the various types of complex sentences considered so far.

(46) $_{\text{IP}}$(subject clause + main clause)$_{\text{IP}}$

(47) $_{\text{IP}}$($_{\text{IP}}$(topicalized subject clause)$_{\text{IP}}$ $_{\text{IP}}$(main clause)$_{\text{IP}}$)$_{\text{IP}}$

(48) $_{\text{IP}}$(main clause + complement clause)$_{\text{IP}}$

(49) $_{\text{IP}}$($_{\text{IP}}$(main clause)$_{\text{IP}}$ $_{\text{IP}}$(extraposed complement clause)$_{\text{IP}}$)$_{\text{IP}}$

(50) $_{\text{IP}}$(main clause + in situ adverbial clause)$_{\text{IP}}$

(51) $_{\text{IP}}$($_{\text{IP}}$(main clause)$_{\text{IP}}$ $_{\text{IP}}$(coordinate adversative clause)$_{\text{IP}}$)$_{\text{IP}}$

(52) $_{\text{IP}}$(adverbial/adverbial clause $_{\text{IP}}$(main clause)$_{\text{IP}}$)$_{\text{IP}}$

Given the definition in (45), this means that the complement clause in (48) or the subject clause in (46) do not form their own intonational phrase, as they are not directly connected to the root. In contrast, the extraposed complement clause in (49) and the topicalised subject clause in (47) do form their own Intonation Phrase as they are directly attached to the root.

As visible in (46) to (52), Downing's approach is compatible with a recursive view of phonological structure. In that sense, it contrasts with a number of subsequent proposals, which assume the Strict Layer Hypothesis (Selkirk, 1984; Nespor and Vogel, 1986). This is the case for instance of the approach proposed by Nespor and Vogel (1986), which assumes that intonational phrases are formed by the rule in (53).

(53) Intonation Phrase Formation

a. *I domain*

An I domain may consist of

(i) all the ϕs in a string that is not structurally attached to the sentence tree at the level of S-structure, or

(ii) any remaining sequence of adjacent ϕs in a root sentence.

b. *I construction*

Join into an n-ary branching I all ϕs included in a string delimited by the definition of the domain of I.

When several intonational phrases belong to the same larger prosodic domain, this domain is distinct and called the "phonological utterance" (U) (54).

(54) Phonological Utterance Formation

a. *U domain*

The domain of U consists of all the Is corresponding to X^n in the syntactic tree.

b. *U construction*

Join into an n-ary branching U all Is included in a string delimited by the definition of the domain of U.

Although Nespor and Vogel acknowledge previous observations by Downing and Emonds as to the connection between syntactic fragments of a certain type and obligatory intonational breaks, their own approach does not incorporate a privileged relation between Intonation Phrases and a specific syntactic category. They assume, as illustrated in (55), that any fragment surrounding an Intonation Phrase (here the parenthetical) can constitute an Intonation Phrase of its own (adapted from Nespor and Vogel (1986, 189)).

(55) $_{\text{IP}}$(Lions)$_{\text{IP}}$ $_{\text{IP}}$(as you know)$_{\text{IP}}$ $_{\text{IP}}$(are dangerous)$_{\text{IP}}$.

But as Ladd (1986) observed, such utterances actually support the case for recursive, nested intonational phrases once, as noted by Cooper and Sorensen (1981) and Kutik et al. (1983), we take into account the declination observed in such sentences. What they observe is that the declination in the matrix clause is the same with or without the parenthetical, suggesting the recursive prosodic structure in (56).

(56) $_{\text{IP}}$(The book on the table, $_{\text{IP}}$(it seems to me,)$_{\text{IP}}$ was a gift from my mother)$_{\text{IP}}$.

This declination could also be viewed as evidence for the presence of a higher level category, Utterance Phrase, wrapping the whole utterance, but as Ladd (1986) eloquently argues, this is not a desirable option for several reasons. First, he reviews the phonetic markers of alleged Utterance Phrases compared to Intonational Phrases and remarks that they do not seem to be distinct enough to warrant a categorical difference between the two. Rather, it seems that there is a bunch of phonetic markers, which seem to cluster more, the larger the Intonation Phrase is. So, he argues for a quantitative, rather than a qualitative difference between the two.

Second, examples can easily be constructed, as in (57), where more than one level of embedding of intonational phrases seems to be warranted by the data.

(57) $_{?}$($_{\text{U}}$(Lions $_{\text{IP}}$(as you know)$_{\text{IP}}$ are dangerous)$_{\text{U}}$ $_{\text{U}}$(and the book on the table $_{\text{IP}}$(it seems to me)$_{\text{IP}}$ was a gift from my mother)$_{\text{U}}$)$_{?}$

One would then be forced to invent yet another category. Given that recursivity is intrinsically potentially infinite, this will not be practical.[2]

[2]See for instance Myrberg (2013, 110) for a recent, more detailed discussion of why declination is not an argument for the Utterance category and additional evidence from Swedish.

In Ladd's view, thus, prosodic structure is much more similar to syntactic structure than assumed before. Intonational phrases are not distinguished from Utterance Phrases, just as modern syntax does not distinguish S from CP. Although, the presence of such recursive, nested Intonational Phrases violates the Strict Layer Hypothesis in its strong form in (58), it is nevertheless compatible with a weaker formulation, which simply prohibits lower level categories to dominate higher level ones.

(58) A category of level i in the hierarchy immediately dominates a (sequence of) categories of level $i - 1$. (Selkirk, 1984, 26)

This weaker definition, and the ensuing availability of nested, recursive Intonational Phrases has since been widely adopted, and can be considered the standard approach.

Having settled this issue, let us now consider how different approaches propose to account for Downing's main findings. There are essentially two main issues that need an explanation. First, Downing showed that embedded clauses in their canonical in situ position typically do not map onto separate Intonational Phrases, despite having a syntactic structure that would correspond to an Intonation Phrase in a free-standing position. Second, the same embedded clauses nevertheless do map onto separate Intonational Phrases once they occupy a high extraposed position in the structure. Finally, we should also note that certain left/right asymmetries also seem to play a role in determining whether a particular embedded clause corresponds to its own Intonational Phrase.

Assuming the edge-alignment theory developed in Selkirk (1986, 1995a) – according to which, in a specific language, only one syntactic edge (i.e. left or right)

systematically aligns with a detectable prosodic edge –, as well as the Generalized Alignment in Optimality Theory (McCarthy and Prince, 1993; Prince and Smolensky, 2004), Truckenbrodt (2005, 287) and Selkirk (2005) respectively formulate the syntax-prosody alignment constraints given in (59) and (60).

(59) ALIGN-CP

The right edge of a CP must coincide with the right edge of an intonational phrase.

(60) Interface Constraint for Intonation Phrase in English

ALIGN R (CommaP, IP)

Align the R edge of a constituent of type Comma Phrase in syntactic (PF) representation with the R edge of a corresponding constituent of type Π_{CommaP} (= Intonational Phrase, IP) in phonological (PR) representation.

In the former approach, primarily motivated by data from German to be discussed in Section 3, any clause can form an Intonation Phrase and the notion of 'clause' is simply equated with CP. To ensure the distinction between root and non-root clauses, Truckenbrodt additionally offers the constraint in (61), reminiscent of the Wrap-XP constraint of Truckenbrodt (1999). In the case of embedded clauses, this constraint conflicts with ALIGN-CP and, if it outranks it, has the effect of blocking the introduction of clause-internal Intonation Phrase boundaries which would have the effect of splitting a root CP into several Intonational Phrases.

(61) WRAP-CP

Each CP is contained in a single intonational phrase.

To illustrate, a ranking of WRAP-CP above ALIGN-CP would have the effect of favoring the phrasing in (62), with only one large Intonational Phrase, over the one in (63), in which the embedded clause forms an Intonation Phrase of its own and splits the root CP into two Intonational Phrases.

(62) $_{\text{IP}}(_{\text{CP}}$ main clause ($_{\text{CP}}$ complement clause) $)_{\text{IP}}$

(63) $_{\text{IP}}(_{\text{CP}}$ main clause $_{\text{IP}}(_{\text{CP}}$ complement clause$)_{\text{IP}})_{\text{IP}}$

As we have seen above, (62) seems to be the correct phrasing in English. In Truckenbrodt's theory, it is to be expected that in other languages the more complex phrasing in (63) is manifested. In such languages, clauses would generally map onto Intonational Phrases, whether they are stand-alone or embedded in a larger complex sentence. Indeed such languages arguably exist. We will investigate different typological possibilities in the next section.

Remaining with English for the moment, we observe that the ranking WRAP-CP >> ALIGN-CP also correctly predicts the phrasing of English in situ subject and adverbial clauses, repeated below for convenience.

(46) $_{\text{IP}}$(subject clause + main clause)$_{\text{IP}}$

(50) $_{\text{IP}}$(main clause + in situ adverbial clause)$_{\text{IP}}$

It is, however, problematic in configurations in which there seems to be evidence for more complex intonational phrasing, as in the configurations repeated below for convenience.

(47) $_{\text{IP}}(_{\text{IP}}$(topicalized subject clause)$_{\text{IP}}$ $_{\text{IP}}$(main clause)$_{\text{IP}})_{\text{IP}}$

(49) $_{\text{IP}}(_{\text{IP}}$(main clause)$_{\text{IP}}$ $_{\text{IP}}$(extraposed complement clause)$_{\text{IP}})_{\text{IP}}$

(51) $_{\text{IP}}(_{\text{IP}}$(main clause)$_{\text{IP}}$ $_{\text{IP}}$(coordinate adversative clause)$_{\text{IP}})_{\text{IP}}$

(52) $_{\text{IP}}$(adverbial/adverbial clause $_{\text{IP}}$(main clause)$_{\text{IP}})_{\text{IP}}$

In such situations, the spirit of an Optimality Theoretic analysis should lead one to search for an independent higher-ranking constraint that would impose the complex phrasing in these cases, and these cases only. An obvious candidate would be one that refers to the high-extraposed position of the embedded clauses. Indeed, it has been independently proposed that constituents that are topical from an information-structural perspective form their own intonational phrases, as in (64) (Frascarelli, 2000; Feldhausen, 2010).

(64) Align-Topic, R (Feldhausen, 2010)

> Align the right edge of a [dislocated] topic constituent with the right edge of a prosodic phrase [ι/Intermediate phrase]

Although it is not trivially true, it is arguable that the high-extraposed clauses are topical in nature. If so, an account can be pursued invoking this information structure constraint, Align-Topic; the ranking Align-Topic >> Wrap-CP would give rise to the desired phrasing. Without going into further details, we can conclude that an Optimality Theoretic account making use of generalised alignment constraints, Wrap-CP and some higher-ranked information structural constraints can be constructed to account for the data Downing observed, and that this account would also open up interesting typological possibilities through the possible different rankings of the constraints in question.

Direct quotes need a similar treatment, in terms of an appropriate higher-ranked constraint, as they too, as Downing observed, form their own Intonational Phrases (see (15)). One possibility would be to adopt Downing's proposal and assume that direct quotations are syntactically adjoined to the root and then to assume some kind of more general constraint like ALIGN-TOPIC, which would also encompass non-topical root-adjoined clauses.

A potentially different route is offered by Selkirk's (2005) approach. She proposed that the syntactic constituent that is relevant to the formation of obligatory intonational phrases is Potts (2002, 2003, 2005)'s [+ comma]-marked phrase or Comma Phrase (CommaP), where both simple sentences and "supplements" (i.e. Downing's "root" sentences and root-like fragments) belong to this category. What [+ comma]-marked constituents have in common, according to Potts and Selkirk, is the fact that they express a speech act of their own.[3]

This unifying feature is an attractive side of the proposal. But we note that it rests on the need to find an independent and objective way, to determine what does or doesn't constitute a speech act, which is not always a simple matter. Nevertheless, as far as the English in situ data are concerned, this approach successfully predicts that in situ embedded clauses (i.e. (46), (48) and (50) above) do not form their own Intonation Phrase as they do not form separate Speech Acts.

Regarding the examples with high-extraposed clauses, the proposal is partially successful. As Selkirk points out, the constraint in (60) makes an interesting prediction. Whenever material is adjoined to the root sentence, an asymmetry between the intonational phrasing of right and left adjunction is predicted. Whereas

[3]From this perspective, the Intonation Phrase is not only formed based on syntactic but also on discourse/pragmatic considerations. We will come back to this point subsequently.

(root-level) right adjuncts necessarily follow the Intonation Phrase break introduced at the right edge of the root clause (see e.g. example (19)), the phrasing of (root-level) left adjuncts depends on their own status as a CommaP. If they are not themselves a CommaP (i.e. if they do not form their own Speech Act), it is predicted that they should not phrase separately as they do not insert an Intonation Phrase right edge of their own (Selkirk, 2005). This however seems insufficient to account for Downing's intuition regarding examples in (33) to (38) according to which the left-adjoined adverbials and adverbial clauses are separated from the main clause by the left edge of an Intonational Phrase, one introduced by the root clause itself. As the main clause minus the adverbial (clauses) do not seem to constitute a separate Speech Act, they are predicted, in Selkirk's approach, to simply phrase in the same Intonation Phrase as the preceding adverbial (clause). Note, however, that equally, an approach based on WRAP-CP, such as Truckenbrodt's, would need to be augmented to account for the phrasing difference between (47) and (52).

As far as direct quotes are concerned, it seems that these could easily be subsumed under the definition of CommaP, as they express a speech act of their own. This is apparent for instance if one observes that a question can be a direct quote inside a declarative main clause. If indeed direct quotes are CommaPs, Selkirk's proposal immediately accounts for their Intonational Phrase-status.

Overall, Selkirk (2005)'s approach tackles the issue that embedded clauses do not necessarily have the same prosodic status as free-standing ones by proposing an additional requirement for clauses to map onto Intonational Phrases, a semantic one, i.e. that they form their own Speech Acts. Typological differences, then, in this case, could arise from how important this additional requirement happens to be in a particular language.

A yet different approach was put forwards by Selkirk (2009, 2011) in her recent theory of the syntax-prosody mapping. In this proposal, called Match theory, it is argued that prosodic structure can show as much recursivity as syntactic structure. The most relevant constraint for the phrasing of complex sentences is the one given in (65).

(65) Match Clause

A clause in syntactic constituent structure must be matched by a constituent of a corresponding prosodic type in phonological representation, call it ι ['Intonational Phrase'].

Prosodic structure is thus, by default, assumed to be as faithful as possible to syntactic structure. Assuming minimalist phase theory (Chomsky, 2001) and that CP is a phase of the syntactic derivation, Selkirk (2009, 14) proposes that a clause and thus an Intonation Phrase correspond to CP's Spell-Out domain, i.e. the complement of C. But then how does this theory propose to account for the facts observed by Downing, i.e. that embedded clauses sometimes fail to form Intonational Phrases on their own? Selkirk (2009) proposes to identify the notion of 'syntactic clause' with one of the functional heads of Rizzi (1997)'s split CP, and more particularly Force^0, which represents the illocutionary force of the sentence. It is specifically assumed that only the clauses that are a complement of Force^0, i.e. those that have an illocutionary force of their own, would match with an Intonational Phrase. Going back to Selkirk (2005) and Potts (2005)'s idea of a CommaP, Selkirk (2009, fn.13) also maintains that the constituents that form an Intonation Phrase of their own constitute a Speech Act (see also Truckenbrodt

(2015)). In situ embedded clauses would be the complement of a different C head. Thus, Selkirk (2009, 15) offers the two versions of Match clause given in (66).

(66)

Match Clause: Spelling Out the complements of complementizer heads as ι

a. Match Force^0 Clause

$_{\text{ForceP}}$[Spec $_{\text{Force'}}$[Force^0 $_{\text{CP}}$[.....]]]

⇓ SPELL-OUT on the ForceP phase

$_{\iota}$(.....)$_{\iota}$

b. Match Comp^0 Clause

$_{\text{CP}}$[Spec $_{\text{C'}}$[Comp^0 $_{\text{FncP}}$[.....]]]

⇓ SPELL-OUT on any complementizer–level phase

$_{\iota}$(.....)$_{\iota}$

(where Comp^0 designates any functional head of the 'complementizer layer')

So, the fact that embedded clauses are sometimes different from free-standing ones is taken to be a direct reflex of their assumed difference in syntactic structure, one corresponds to ForceP, the other to some other kind of ComplementizerP.

As pointed out by Selkirk, typological differences between languages can be accounted for by different constraint rankings. Just like in Truckenbrodt's proposal involving WRAP-CP, here if MATCH-COMP^0-CLAUSE ranks high enough in a particular grammar, one would expect all clauses (and not only root clauses) to form Intonational Phrases. We will come back to this point in Section 3, as it seems that it is indeed the case that in some languages, e.g. Japanese, some non-root clauses also systematically form their own Intonational Phrase.

Turning now to the case of the high-extraposed clauses, in Match theory, a natural way to account for the fact that they are prosodically set off from the main clause by an Intonation Phrase left-edge corresponding to the left-edge of the main clause would be to assume that they are attached higher than the complement of ForceP. This would account for their phrasing directly based on their

syntactic positioning. Taking a closer look at Rizzi (1997, 297)'s structure of the complementizer system, given in (67) one of the issues facing this extension of Selkirk's approach is that ForceP itself is already the highest assumed category of the complementizer system.

(67) ForceP >> TopP* >> FocP >> TopP* >> FinP

But perhaps one could posit that high-extraposed clauses sit in [Spec, ForceP]. This syntactic configuration would result in the desired phrasing in (68) and (69)

(68) $_{\text{IP}}$(embedded clause $_{\text{IP}}$(main clause)$_{\text{IP}}$)$_{\text{IP}}$

(69) $_{\text{IP}}$($_{\text{IP}}$(main clause)$_{\text{IP}}$ embedded clause)$_{\text{IP}}$

In addition, in Match Theory, any clause that corresponds to a separate Speech Act, regardless of its position or size, also corresponds to an Intonation Phrase prosodically. This would give rise to the phrasing in (70) and (71). Direct quotes for instance fall under this category, as they come with their own illocutionary force (i.e. one can quote a question inside a declarative).

(70) $_{\text{IP}}$($_{\text{IP}}$(embedded clause)$_{\text{IP}}$ main clause)$_{\text{IP}}$

(71) $_{\text{IP}}$($_{\text{IP}}$(main clause)$_{\text{IP}}$ $_{\text{IP}}$(embedded clause)$_{\text{IP}}$)$_{\text{IP}}$

To sum up, the most innovative feature of Selkirk's Match Theory is that it assumes a more precise correspondence between syntactic and prosodic structure. By making reference to specific syntactic phrases (i.e. Force^0 and Comp^0) it introduces the potential for typological differences being the direct result of syntactic differences. Similarly, the specific syntactic position of a clause, i.e. high-extraposed

or in situ, would have direct repercussions for its prosodic phrasing in this theory. In addition, the theory incorporates the idea that Speech Acts automatically map onto Intonational Phrases from earlier approaches.

The final approach we would like to discuss is similar in the sense that it also assumes a more direct link between syntactic structure and prosodic structure than earlier approaches. Hamlaoui and Szendrői (2015, 2017), propose that the notion of 'clause' is tightly linked to the position of the verb, and particularly the highest projection occupied by the root verb (see (72)). This projection can vary both within and across languages, depending on the particular type of sentence considered.

(72) a. Syntax-to-prosody mapping

(i) ALIGN-L (HVP, ι)

Align the left edge of the highest projection whose head is overtly filled by the **root** verb, or verbal material with the left edge of an ι.

(ii) ALIGN-R (HVP, ι)

Align the right edge of the highest projection whose head is overtly filled by the **root** verb, or verbal material with the right edge of an ι.

b. Prosody-to-syntax mapping

(i) ALIGN-L (ι, HVP)

Align the left edge of an ι with the left edge of the highest projection whose head is overtly filled by the verb or verbal material.

(ii) ALIGN-R (ι, HVP)
Align the right edge of an ι with the right edge of the highest projection whose head is overtly filled by the verb or verbal material.

This approach makes the prediction that any embedded clause that is in the scope of the root verb should be prosodically integrated into the Intonation Phrase matching with a root clause. This is the case for English complex sentences containing an in situ subject clause, an in situ complement clause or an adverbial clause attached lower than the root verb. In contrast, any clause that attaches higher than the specifier of the projection hosting the root verb should be outside of the Intonation Phrase formed by the root clause. Given that it is the high attachment position of the extraposed clause that is assumed to be directly responsible for its phrasing, the default phrasing for complex sentences containing a right or left high-extraposed embedded clause is one in which the main clause remnant forms an Intonation Phrase, the entire sentence forms an Intonation Phrase, but the embedded clause itself is not an Intonation Phrase(cf. (68) and (69) above).

In this proposal the asymmetry between free-standing and embedded clauses, which as we noted several times above is potentially also a source of typological variation, is captured by an asymmetry between the syntax-to-phonology and the phonology-to-syntax mapping constraints. While syntax-to-phonology mapping only recognizes root verbs (i.e. main clause verbs in complex clauses, the only verb in a free-standing clause) and obligatorily maps root clauses' edges with Intonation Phraseboundaries (72-a), the phonology-to-syntax mapping constraints see both root and non-root (i.e. free-standing or embedded) clauses and simply ensure that Intonation Phraseboundaries, if present, correspond to syntactic clause boundaries

(72-b). This has the effect that embedded clauses are not required to map onto their own Intonation Phrase to satisfy the prosody-to-syntax mapping constraints, only root clauses are. But if other constraints (e.g. prosodic or discursive) favor them to do so, this does not violate any of the mapping constraints in (72).

In addition, just as Truckenbrodt's and Selkirk's earlier proposals, Hamlaoui and Szendrői's proposal also needs to be augmented to account for phrasing where the high-extraposed clause does not only phrase separately from the following material, but itself forms a separate intonational phrase, as in (70) and (71) above. As far as direct quotes are concerned, Hamlaoui and Szendrői's proposal needs to be augmented to account for these too (see Section 3). In addition to the mapping principles listed in (72) above, they also assume a set of mapping principles adopted from Selkirk (2011) and Truckenbrodt (2015), which ensure that Speech Acts correspond to Intonational Phrases. This ensures that direct quotes form their own Intonational Phrases.

To sum up, Hamlaoui and Szendrői's proposal is similar to Selkirk's Match Theory in that it advocates for a more direct correspondence between syntactic and prosodic structure. In particular, it argues that the surface position of the root verb is directly relevant for determining the syntactic chunk that corresponds to an Intonation Phrase. Its innovative feature compared to the previous proposals is that it accounts for potential typological differences by assuming a difference between the syntax-to-phonology and the phonology-to-syntax mapping constraints.

To summarize, the various syntax-phonology mapping theories discussed in this section differ in the following respects:

- whether only one edge or both syntactic edges map onto an Intonation Phrase Intonation Phraseboundary AND whether prosodic recursion is the universal default or not,
- the exact definition of "clause" (i.e. CP, complement of Force, complement of C, highest projection occupied by the root verb),
- how the root/non-root distinction in terms of Intonation Phase-mapping is to be captured (i.e. a combination of WRAP+ALIGN constraints, separate constraints for two types of clauses, syntax-phonology mapping associated with syntax-mediated discourse-phonology mapping constraints)

3. CROSS-LINGUISTIC VARIATION IN THE SYNTAX-PROSODY MAPPING OF ARGUMENT AND ADVERBIAL CLAUSES

Data on the syntax-prosody mapping of argument and adverbial clauses in in situ position and in extraposed positions is not available systematically for many languages. Rather, there is relevant data available from many languages, which together are still informative in a theoretical sense about the breadth of variation in this area.

3.1. **Subject clauses.** Just like for English, subject clauses do not seem to have attracted a lot of attention and little seems to be known about whether and how systematically they are prosodically integrated to the rest of the clause. According to Downing's definition of a root clause, subject clauses might have different status depending on their structural position in different languages. The prosody of complex sentences containing a subject clause has been described by Truckenbrodt (2005), who examines the productions of a speaker of Austrian German. German is an interesting case as it is a V2 language. If the sentential subject is located in Spec,CP and the verb in C, it seems to us that the constraints discussed in

Section 2.2 make different predictions as to the default phrasing of this type of complex sentence (based on their syntax only). Truckenbrodt (2005) predicts the phrasing in (73), in which the right edge of the Intonation Phrase corresponding to the sentential subject (and its corresponding left edge) is optional (due to his proposed tie between WRAP-CP and ALIGN-CP). Selkirk (2009, 2011) predicts two different structures, corresponding respectively to (74) and (75), depending on how her two constraints rank.[4] Another factor that might be relevant for Selkirk's analysis is the assumed syntactic analysis of the subject clause itself. Given that subject clauses always start with an overt complementizer, it is possible that sometimes that complementizer would be of the type that triggers obligatory phrasing of the subject clause as its own Intonational Phrase. Hamlaoui and Szendrői (2017) predict the obligatory presence of a single intonational phrase, as in (76). However, their proposed syntax-to-prosody mapping allows for an additional rightward Intonation Phrase boundary at the edge of the subject clause, as in (73), if required by some other constraint.

(73) $_{\text{IP}}(_{\text{IP}}(\text{subject clause})_{\text{IP}}$ rest of main clause$)_{\text{IP}}$

(74) $_{\text{IP}}(\text{subject clause }_{\text{IP}}(\text{rest of main clause})_{\text{IP}})_{\text{IP}}$ (MATCH-FORCE)

(75) $_{\text{IP}}(_{\text{IP}}(\text{subject clause})_{\text{IP}}\ _{\text{IP}}(\text{rest of main clause})_{\text{IP}})_{\text{IP}}$ (MATCH-C)

(76) $_{\text{IP}}(\text{subject clause + rest of main clause})_{\text{IP}}$

Using declination and (Intonational Phrase-final) upstep as the main correlates for intonational phrasing, Truckenbrodt reports that in this dialect of German,

[4]Note, however, that some additional assumptions need to be applied to make sure that the finite main verb sitting in C will phrase together with its linearly following sister TenseP, given the exact wording of the definition in (66). One could perhaps assume it is a right-leaning clitic.

sentential subjects form their own intonational phrase. Example (77), adapted from Truckenbrodt, illustrates this type of sentence.

(77) [$_{CP}$ [$_{CP}$ Dass die Leh$^{L^*+H}$rerin dem Leh$^{!L^*+H}$rer eine War$^{\wedge\wedge L^*+H}$nung geben will$^{L\text{-}H\%}$] hat die Han$^{L^*+H}$nelore gewun$^{H^*+L}$dert$^{L\%}$]

The prosody of subject clauses is also briefly discussed in Kandybowicz (2017) who focuses on four Tano languages, spoken in Ghana: Krachi, Bono, Wasa and Asante Twi. Using final L% as well as pause duration to diagnose the right edge of Intonation Phrases, Kandybowicz (2017, 126) argues that subject clauses also form their own Intonation Phrase in Krachi. An example is given in (78).

(78) $_{IP}$(Kɛ Kofí ´ɛ-kya-wŭ)$_{IP}$ $_{IP}$(mě ódum ´ɛ-fwɪ)$_{IP}$.
COMP Kofi PST-dance-CL.DET 1ST.SG heart PST-boil
'That kofi danced angered me (i.e. made my heart boil).'

According to Kandybowicz (2017, 129), a similar phrasing is observed in Bono. Example (79) illustrates a complex sentence containing a clausal subject in this language.

(79) $_{IP}$(S´ɛ Kofí kûm akoko k˜ɛ)$_{IP}$ $_{IP}$(y˘ɛ Áma nwanwa)$_{IP}$
COMP Kofi kill.PST chicken the do Ama strange/surprise
'That Kofi slaughtered the chicken surprised Ama.'

Data from more languages and speakers are needed to establish the systematicity of this pattern and how to best account for it, so we leave the issue of the phrasing of subject clauses open.

3.2. **Complement clauses.** Turning to complement clauses, many languages seem to behave exactly like in English in prosodically integrating them with the

main clause. This is the case of Turkish *ki*-headed finite complement clauses (Kan, 2009), illustrated in (80), Hungarian (Hamlaoui and Szendrői, 2017), in (81), or Basaá (Hamlaoui and Szendrői, 2017), in (82).

(80) $_{\text{IP}}$(Duy-du$^{\text{L+H*}}$-k ki$^{\text{H-}}$ Numan-lar$^{\text{!H*}}$ Alman$^{\text{!H*}}$ya-ya
hear-PAST-1PL comp Numan-PL Germany-DAT
yerleş-iyor-muş$^{\text{L-L\%}}$)$_{\text{IP}}$.
settle-FUT-EVID
'We heard that the Numans are settling in Germany'. (Kan, 2009, 67)

(81) $_{\text{IP}}$(Le$^{\text{L*}}$jla$^{\text{HL-}}$ me$^{\text{L*}}$gkérdezte$^{\text{HL-}}$ E$^{\text{L*}}$leonórától$^{\text{HL-}}$ hogy a maláj
Lejla PRT-asked Eleonora-from that the Malay
lá$^{\text{H*}}$ny$^{\text{L-}}$ el$^{\text{L*}}$menekült-e$^{\text{HL-}}$ E$^{\text{H*}}$míliához$^{\text{L\%}}$)$_{\text{IP}}$.
girl PRT-escaped-Q Emilia-to
'Lejla asked Eleonora whether the Malay girl escaped to Emilia.'

(82) $_{\text{IP}}$(m`ɛ ń-sòmból jí lɔ́ŋg**ˊɛ** ↓l**ˊɛ** mbómbó
I want to.know well that 1.grandmother
à-ǹ-lɔ̂)$_{\text{IP}}$
1.AGR-PST1-MH-arrive
'I really want to know that the grandmother came.'

Some languages however seem to differ from the English-type of languages in that complement clauses systematically form their own Intonation Phrases. This is the case of the Fukuoka dialect of Japanese, discussed by Selkirk (2009). In this language, *wh*-questions are characterized by a H tone plateau that extends from the *wh*-word to the right-edge of the clause (Hayata, 1985; Kubo, 1989; Selkirk, 2009). The words that belong to this so-called '*wh*-domain' (Selkirk, 2009, and reference therein) do not carry their typical H*+L pitch accent. This pattern is observed in both matrix (as in (83)) and embedded *wh*-questions (as in (84)).

(83) dare-ga kyoo biiru nonda?
who-NOM today beer drank

'Who drank beer today?'

(84) dare-ga kyoo biiru nonda ka sitto?
who-NOM today beer drank Comp know
'Do you know who drank beer today?

Additionally, the complementizer *ka*, in (83), carries a L tone and the matrix verb *sittoo* a H*+L pitch accent. Selkirk (2009) proposes that this prosody is consistent with the phrasing in (85) and (86), which is predicted by a ranking of the Match constraint in (66) that places the constraint MATCH-COMP^0-CLAUSE constraint higher than any constraint restricting the proliferation of Intonation Phrases in the structure, (e.g. NON-RECURSIVITY, Selkirk (1995a)).

(85) $_{\text{IP}}$(dare-ga kyoo biiru nonda)$_{\text{IP}}$

(86) $_{\text{IP}}$($_{\text{IP}}$(dare-ga kyoo biiru nonda)$_{\text{IP}}$ ka sitto)$_{\text{IP}}$

Other languages have been reported to display a systematic prosodic separation of in situ complement clauses. This is the case of Luganda (Bantu, Uganda) and Huave (isolate, Mexico), in which according to Pak (2008) in situ complement clauses form their own "tone domain". It is however not clear whether these tone domains correspond to Intonational Phrases or, rather, Phonological Phrases.

Kandybowicz (2017) argues that in Krachi and Bono, in (87) and (88) respectively, in situ complement clauses phrase separately from the main clause, which distinguishes them from Wasa and Asante Twi, two other Tano languages, in (89) and (90).

(87) $_{IP}$(Fe kwár´ɛ f´ɩ-gyɩ f´ɛ´ɛ)$_{IP}$ $_{IP}$(ɔky´ɩ wˇʊ ´ɛ-mɔ bwat´ɛ
2ND.SG collect 2ND.SG-eat COMP woman the PST-kill chicken
wˇʊ)$_{IP}$
the
'You think that the woman slaughtered the chicken.'

(88) $_{IP}$(Wó dwene s´ɛ)$_{IP}$ $_{IP}$(mméma kˇɛ be-kûm akoko kˇɛ)$_{IP}$
2ND.SG think COMP man.PL the 3RD.PL-kill.PST chicken the
'You think that the men slaughtered the chicken.'

(89) $_{IP}$(Wó dwéne s´ɛ mɛr´ɛma no be-kûm akóko no)$_{IP}$
2ND.SG think COMP man.PL the 3RD.PL-kill.PST chicken the
'You think that the men slaughtered the chicken.'

(90) $_{IP}$(Yaw kaa sˇɛ Kofí bɔ́ɔ̀ Áma)$_{IP}$
Yaw say.PST COMP Kofi hit.PST Ama
'Yaw said that Kofi hit Ama.'

Note that in Krachi and Bono, the complementizer phrases together with the matrix rather than with the embedded clause. A question that emerges is whether the difference in phrasing between Krachi and Bono on the one hand and Wasa, Asante Twi and more generally what we have called the 'English-type' languages is at the syntax-phonology interface level (whether the former simply maps more clauses into their own Intonation Phrases) or whether there are other differences, syntactic or pragmatic in nature, that would explain why these complement clauses form their own Intonation Phrase. Some of the ideas that should be explored in this regard concern the information structural import of the embedded clause. If it were topical in nature, then perhaps the additional boundaries are due to that, as enforced by ALIGN-TOPIC. Also, observe that the Japanese examples involve *wh*-questions. As we will see in the next section, focal elements seem to sometimes have the effect of ensuring the presence of extra boundaries in Japanese. It should

be explored whether the extra boundaries in the *wh*-questions are perhaps linked to their focal status.

Except for Japanese, the languages discussed so far happen to display a VO word order. Interestingly, some OV languages obligatorily extrapose complement clauses to a postverbal position. This is the case of German and Bangla. In his data from one Austrian German speaker, Truckenbrodt (2005) finds that the extraposed complement clauses do not form an Intonation Phrase of their own. In an experiment with more participants and different items, Truckenbrodt and Darcy (2010) however find evidence that German extraposed complement clauses consistently form their own intonation phrase. The authors offer an interesting discussion as to the phrasing preferences that emerge from the two experiments: whenever the main verb is stressed, the embedded complement clause preferably constitutes its own Intonation Phrase. This is illustrated in the examples (91) to (93), where simple underlying indicates phrasal stress and double underlying nuclear stress (Truckenbrodt and Darcy, 2010, 205).

(91) $_{\text{IP}}$(Der Werner hat auf dem Treffen gesagt, dass er der Lola das
DET Werner has at the meeting said that he DET Lola the
Weben zeigen will)$_{\text{IP}}$
weaving show wants
'Werner has said at the meeting that he wants to show Lola weaving.'

(92) $_{\text{IP}}$(Der Werner hat auf dem Treffen gesagt)$_{\text{IP}}$, $_{\text{IP}}$(dass er der Lola
DET Werner has at the meeting said that he DET Lola
das Weben zeigen will)$_{\text{IP}}$
the weaving show wants
'Werner has said at the meeting that he wants to show Lola weaving.'

(93) $_{\text{IP}}$(Der Werner hat dem Maler gesagt, dass er der Lola das Weben
DET Werner has the painter said that he DET Lola the weaving
zeigen will)$_{\text{IP}}$
show wants
'Werner has said to the painter that he wants to show Lola weaving.'

Whereas the main verb is unstressed when preceded by an object (93), it is optionally stressed when preceded by an adjunct, as in (91) and (92). According to Truckenbrodt and Darcy (2010, 206), this difference is the central one in the intonational phrasing of the extraposed complement clause, and not possible differing landing sites across sentences. Based on evidence provided by binding relations between a quantifier in the subject position of the main clause and a pronoun in the complement clause, they briefly argue that the extraposed clauses must occupy a low adjunct position, somewhere within the matrix CP. As the (low-adjoined) complement clause does not constitute a root clause, the possibility of matching it with its own Intonation Phrase goes against expectations and indeed suggests that other constraints may be at play that force a sentence like (92) to deviate from default syntax-phonology mapping.

Bangla is similar to German in displaying postverbal complement clauses in a language in which objects otherwise precede the verb. According to Hsu (2015), the position of complement clauses depends on their information-structural status. Postverbal ones are part of a broad focus, immediately preverbal ones are contrastively focused, and sentence-initial ones are topicalized clauses. According to Hsu, postverbal complement clauses form one Intonation Phrase with the main clause, as in (94).

(94) $_{IP}$(Jon bol-echi-lo je dadubhai kal rate oSudh
John say-PERF-PST that grandfather last night medicine
khey-eche.)$_{IP}$
eat-PERF
'John said that grandfather took medicine last night.'

The complex sentence in (94) contrasts with the ones in (95), in which the (non-discourse neutral) preverbal complement clause phrases separately. Unfortunately, the complete prosodic structure of the sentence is not provided.

(95) Jon $_{IP}$(dadubhai je kal rate oSudh khey-eche)$_{IP}$
John grandfather that last night medicine eat-PERF
bol-echi-lo.
say-PERF-PST
'John said that grandfather took medicine last night.'

Data from both languages suggest, again, that it might be too early to conclude that there is a systematic relation between the syntactic status of a particular type of embedded clause and its prosodic phrasing. More typological data is needed. When such data is collected, it seems important to bear in mind the syntactic structure, the attachment site and the information structural make-up of the complement clause.

Perhaps surprisingly, there are not that many studies that explore the prosody of direct quotes cross-linguistically. Hamlaoui and Szendrői (2017) discuss cases of direct quotes in Hungarian and show that, just like in English, direct quotes are independent Intonation Phrases.

3.3. **Adverbial clauses.** The intonational phrasing of adverbial clauses is also an area that generally remains to be further explored. Among the available descriptions, a number of languages do not seem to differ from what has been observed

in English and discussed in Section 2. Using the typical Eastern European (H-) L*H-L% intonational contour of *yes-no* questions, Hamlaoui and Szendrői (2017) observe that in Hungarian, complex sentences containing a *while*-clause form a single Intonation Phrase with the main clause when they are in situ, as in (96).

(96) $_{\text{IP}}$ ([$_{\text{TopP}}$ Péter$_j$ $_{\text{IP}}$([$_{\text{vP}}$ el-viszi$_i$ [$_{\text{VP}}$ t_i t_i a gyerekeket a
Peter PRT-takes the children-acc the
múzeumba [$_{\text{DP}}$ (addig) [$_{\text{CP}}$ amíg Mari dolgozik?]]]]])$_{\text{IP}}$)$_{\text{IP}}$
museum-to D while Mary works
'Does Peter take the children to the museum, while Mary is working?

Whenever the *while*-clause is left-extraposed, as in (97), it is phrased outside the Intonation Phrase formed by the main clause. There is no evidence that it forms an Intonation Phrase too.

(97) $_{\text{IP}}$([$_{\text{TopP}}$ [$_{\text{CP}}$ Amíg Mari dolgozik], ([addig$_i$) [$_{\text{TopP}}$ Péter$_j$ [$_{\text{vP}}$ $_{\text{IP}}$(
while Mary works (D) Peter
el-viszi a gyerekeket a múzeumba t_i t_j?]]]])$_{\text{IP}}$)$_{\text{IP}}$
Prt-takes the children-acc the museum-to
'While Mary is working, does Peter take the children to the museum?'

A similar pattern is observed in Basaá: the temporal clause in (98) is prosodically integrated to the main clause when appearing in situ, but is not when left-extraposed, as in (99) (Hamlaoui and Szendrői, 2017).

(98) $_{\text{IP}}$(sóγól à-ŋ̀-k**ɛ́** **ˬí** ˬŋgɛ́ŋ Lingom à-ǹ-lɔ̂)$_{\text{IP}}$
1.grandfather 1.AGR-PST1-leave at hour Lingom 1.AGR-PST1-arrive
'The grandfather left when Lingom arrived.'

(99) $_{\text{IP}}$(í ˬŋgɛ́ŋ Lingom à-ŋ̀-k**ɛ̂** $_{\text{IP}}$(s**ó**γól
at hour Lingom 1.AGR-PST1-leave 1.grandfather
à-ǹ-lɔ̂)$_{\text{IP}}$)$_{\text{IP}}$
1.AGR-PST1-arrive

874 'When Lingom left, the grandfather arrived.'

875 Just like in Hungarian, there is no evidence so far that the left-extraposed adverbial
876 clause forms an Intonation Phrase of its own. In Hamlaoui and Szendrői (2017)'s
877 approach, this phrasing is accounted for through the fact that only main clauses
878 obligatorily insert their Intonation Phrase boundaries. The embedded clause, when
879 attached high enough (i.e. above the highest projection containing the root/main
880 verb), simply sits outside the Intonation Phrase constituted by the main clause.
881 For it to form an Intonation Phrase of its own, other constraints, for instance the
882 prosodic constraint StrongStart (Selkirk, 2011) in (100), need to prosodically
883 promote it. As long as the extra Intonation Phrase edges match the edges of
884 a syntactic clause, this more complex phrasing neither constitutes a violation of
885 syntax-phonology nor phonology-syntax mapping constraints.

886 (100) StrongStart (Selkirk, 2011, 122)
887 A prosodic constituent optimally begins with a leftmost daughter con-
888 stituent which is not lower in the prosodic hierarchy than the constituent
889 that immediately follows.

890 A more complex prosodic phrasing however emerges from Stockholm Swedish *if*-
891 clause in V1 position, investigated by Myrberg (2013). These adverbial clauses,
892 illustrated in example (101), occupy the initial position of V2 sentences, and have
893 been analyzed as sitting in Spec,CP (Platzack, 1998, 89-92).

894 (101) Om ˈsebrorna kom ˈnärmare så skulle ˈIda kunna ˈröra vid dem
if zebras-the came closer so would Ida be.able to.touch at them
895 'If the zebras came closer, Ida would be able to touch them.'

In contrast with coordinated clauses, used as a baseline for comparison in her experiment, Myrberg (2013, 14) observes that complex sentences of the type in (101) receive variable phrasing. The main and embedded clause can either form two Intonation Phrases embedded within a larger one as in (102), be phrased within a single Intonation Phrase as in (103), or show the phrasing in (104), in which only the *if*-clause forms its own Intonation Phrase and is embedded in a larger one corresponding to the entire sentence. Each of her three speakers shows a clear preference for one of these strategies, using it for at least 6 out of 9 utterances.

(102) $_{\text{IP}}(_{\text{IP}}(\textit{if}\text{-clause})_{\text{IP}}\ _{\text{IP}}(\text{main clause})_{\text{IP}})_{\text{IP}}$. (7/27 cases)

(103) $_{\text{IP}}(\textit{if}\text{-clause} + \text{main clause})_{\text{IP}}$ (7/27 cases)

(104) $_{\text{IP}}(_{\text{IP}}(\textit{if}\text{-clause})_{\text{IP}}\ \text{main clause})_{\text{IP}}$ (13/27 cases)

A high ranking of Selkirk's MATCH-COMP^0 and, alternatively, Truckenbrodt's ALIGN-CP would favor the phrasing in (104). This phrasing is unexpected, as a default phrasing, under Hamlaoui and Szendrői (2017)'s approach. Rather, (103) is the one expected under the strict application of their default syntax-phonology mapping constraints, as the *if*-clause is not a root clause under their definition and should thus not, as a default, map onto an Intonation Phrase of its own. The phrasing in (102) seems problematic for all accounts in Section 2.2, as the second Intonation Phrase does not correspond to the main clause but is only a part of it. This phrasing calls for the purely prosodic constraint EQUALSISTERS in (105), proposed by Myrberg, which together with MATCH constraints, allows her to derive all and only the grammatical prosodic structures in (102) to (104).

(105) EqualSisters (Myrberg, 2013, 75)
Sister nodes in prosodic structure are instantiations of the same prosodic category.

To model the intonational variation observed in Swedish, Myrberg casts her analysis in a version of Optimality Theory that allows variable ranking of constraints in (106) to (108), which respectively derive the phrasings in (102) to (104).

(106) EqualSisters >> Match-CP(S-P) >> Match-CP(P-S)

(107) EqualSisters >> Match-CP(P-S) >> Match-CP(S-P)

(108) Match-CP(S-P) >> Match-CP(P-S) >> EqualSisters

Crucially, any of the three rankings in (106) to (108) correctly predicts the invariable phrasing observed in Swedish sentences containing two coordinated clauses and given in (109).

(109) $_{\text{IP}}(\ _{\text{IP}}(\text{clause})_{\text{IP}}\ _{\text{IP}}(\text{clause})_{\text{IP}})_{\text{IP}}$

As pointed out by Myrberg, clausal embedding of the type discussed here is generally expected to present more intonational variation than e.g. complex sentences involving coordinated clauses, as it gives rise to a conflict between the need for a prosodic structure that reflects syntactic embedding on the on hand (i.e. recursive prosodic structure) and prosodic well-formedness constraints that favor a more balanced (i.e. flat) structure on the other.

4. Effects of information structure on the phrasing of argument and adverbial clauses

In this final section, we consider the effect of the discourse context, and more particularly information structure, on the prosodic phrasing of complex sentences. It has been argued that information structural categories such as focus and topic have the ability to insert extra prosodic boundaries and are sometimes responsible for the lack of isomorphy between syntax and phonology. Let us see whether and how this applies in complex sentences and take a glimpse at the various accounts that have been proposed to capture the interaction between the components of grammar involved.

4.1. **Focusing.**

As we have seen in Section 3, Hungarian complement clauses do not generally align with their own Intonation Phrase edges, but are prosodically integrated with the main clause. They however do whenever the embedded complement clause contains a focused constituent, as in (110).

(110) Péter AZT mondta/utálta/bánta meg, hogy MARIT választottuk
Peter D-ACC said/hated/regretted PRT that Mary-ACC selected
be a bizottságba.
PRT the committee-to
'What Peter said/ hated/ regretted was that we selected MARY to the committee.'

It has been argued that foci generally need to satisfy the constraint in (111) (a.o. Reinhart, 1995; Szendrői, 2001). In Hungarian simple sentences, they do so by moving to the immediately preverbal position, where they align with the left edge of the Intonation Phrase and realize its head (i.e. sentence stress).

(111) Focus rule or Stress-Focus Correspondence Principle
'The focus of a clause is a(ny) constituent containing the main stress of the Intonational Phrase, as determined by the stress-rule.'

As discussed in Hamlaoui and Szendrői (2017), long focus movement to the edge of the matrix clause is possible with some verbs. There however seems to be a preference for embedded foci to remain in their clause. This, according to the authors, motivates the selection of a prosodic structure that, under the pressure of satisfying (111), contains extra Intonation Phrase edges. In contrast with approaches like Kanerva (1990) or Frascarelli (2000), information structure is not taken to directly influence prosodic structure. As the extra edges do align with the highest projection to which the embedded verb moves (here FocP), they simply do not violate the phonology-syntax constraints in (72-b), while ensuring that (111) is satisfied.

An effect of focusing on prosodic structure is also found in Schubö (submitted), who examines German complex sentences of the type discussed in Truckenbrodt (2005) and Truckenbrodt and Darcy (2010). As we have seen in Section 3 in connection to German, the prosodic status of the items preceding the embedded clause might have an effect on its (lack of) prosodic integration to the main clause. Relatedly, Schubö investigates the effect of focus and givenness on the phrasing of German complex sentences containing a complement clause, comparable to the ones in Truckenbrodt and Darcy (2010). He concentrates on three information-structural configurations: broad focus on the entire sentence in (112), narrow focus on the object of the main clause in (113) and narrow focus on the subject of the (extraposed) complement clause in (114). The condition in (113) differs from the other two in that the verb is in postfocal position and should thus be destressed.

What is predicted by both Schubö and Truckenbrodt and Darcy (2010) is that in this condition, the embedded clause should be prosodically integrated with the main clause.

(112) [Ja/Nein Cornelius will dem Lehrer melden, dass Manuel eine
yes/no Cornelius wants the teacher report that Manuel a
Brille gestohlen hat]$_{F}$.
glasses stolen has
'Yes/No, Cornelius wants to report to the teacher that Manuel stole a pair of glasses.'

(113) Ja/Nein [Cornelius will]$_{G}$ [dem Lehrer]$_{F}$ [melden, dass Manuel eine
yes/no Cornelius wants the teacher report that Manuel a
Brille gestohlen hat]$_{G}$.
glasses stolen has
'Yes/No, Cornelius wants to report to the teacher that Manuel stole a pair of glasses.'

(114) Ja/Nein [Cornelius will dem Lehrer melden, dass Manuel]$_{G}$ [eine
yes/no Cornelius wants the teacher report that Manuel a
Brille]$_{F}$ [gestohlen hat]$_{G}$.
glasses stolen has
'Yes/No, Cornelius wants to report to the teacher that Manuel stole a pair of glasses.'

Despite a certain amount of variability, his data show a clear preference for the realization of an internal Intonation Phrase boundary in the broad focus condition, confirming Truckenbrodt and Darcy (2010)'s findings. In both narrow focus conditions, in contrast, there was a preference for the absence of internal Intonation Phrase boundary, which was more pronounced for the condition in (113). This latter result however tends to indicate that verb stress does not reliably predict the phrasing of the complement clause. What the two narrow focus conditions have in

common, according to Schubö, is that one of the two clauses contains only given material and there should thus be a dispreference for phrasing it separately. The phrasing in which both clauses are prosodically integrated is selected under the ranking of the information structural constraints StressFocus (similar to (111)) and DestressGiven (which militates against stressing discourse-given items), as well as the prosodic constraint Rightmost (which requires to keep nuclear stress rightmost) above syntax-phonology and phonology-syntax mapping constraints. Whenever nuclear stress shifts to the focus in (113), keeping stress rightmost as well as destressing post-focal material is better achieved by not mapping the complement clause into its own Intonation Phrase. In (114), in contrast, destressing pre-focal material is responsible for dephrasing and thus prosodic integration. Information structural requirement relating to the expression of focus thus seems to have an (indirect) effect on the phrasing of complex sentences.

4.2. **Topicalization.** In his study of complex sentences containing a complement clause in Catalan, Feldhausen (2011) observes that a prosodic break often separates the embedded subject from the rest of the complement clause. Just like in Myrberg's study of Swedish, experimental data show that there is considerable variation in the phrasing of the complex sentences investigated. In 40% of the time, an Intonation Phrase break separates the matrix and the embedded clause (including the category of Intermediate Phrase, used by Feldhausen, the complement clause phrases separately in 80% of the time). An Intonation Phrase break is also sometimes found to separate the embedded subject from the embedded verb and object, grouping the embedded subject and the preceding complementizer with the matrix clause. Feldhausen (2008, 175) and Feldhausen (2010, 93) report that embedded left-dislocated phrases fail to phrase with the embedded

clause, and also tend to phrase with the matrix clause while being followed by an Intonation Phrase break (over 65% of the time at normal speech rate). To account for this phrasing, schematized in (115), Feldhausen proposes the Align-Top, R constraint given in (64), which is responsible for inserting the right edge of an Intonation Phrase after the topic and separating it from the rest of the embedded clause.

(115) (... main V C Topic) YP

More prosodic structure than predicted by default syntax-phonology mapping constraints is thus found when an embedded clause contains a topic. This is also observed in Bàsàá and discussed by Hamlaoui and Szendrői (2017). An embedded topic also fails to phrase together with the embedded clause in the example (116).

(116) [$_{TP}$ [$_{TP}$ ($_{\iota}$ ($_{\iota}$ hálà à-jè lɔ́ŋg´ɛ)] [$_{CP}$ ˩l´ɛ [$_{TopP}$ síŋg**â** [$_{TP}$ ($_{\iota}$ s**ó**γól$_j$ à-ǹ-ʤ´ɛ$_i$ [$_{vP}$ t_j t_i jɔ̂))]]]]]

hálà à-j lɔ́ŋg`ɛ l´ɛ síŋgà sóγól
so 1.AGR-be.PRES well that 9.cat 1.grandfather

à-n-ʤ´ɛ jɔ̀
1.AGR-PST1-eat 9.PRO

'This is good that the cat the grandfather ate it.'

(= This is good that the cat was eaten by the grandfather)

What is seen in (116) thought the failure of Falling Tone Simplification, a phenomenon by which a sequence of HL-H tones becomes H-˩H when no left Intonation Phrase edge intervenes, is that the topical phrase sits outside of the Intonation Phrase constituted by the rest of the embedded clause. As argued by Hamlaoui and Szendrői, there is however no evidence that the topic itself forms an Intonational Phrase. Rather, and as visible in (116) and just like in Catalan, it phrases

with the material that precedes it. The position of the left Intonation Phrase break aligning with the embedded TP rather than CP is, according to Hamlaoui and Szendrői, consistent with their idea that the syntactic projection relevant to the syntax-phonology and phonology-syntax mapping of the Intonation Phrase is the one to which the verb moves (here the embedded verb) and not generally CP, as proposed for instance by Truckenbrodt. In their approach, the constraint in (117) simply requires for a topic to align with the edge of an Intonation Phrase but not for it to form one.

(117) Align-Topic (Hamlaoui and Szendrői, 2017, 23)
Align the left or right edge of a topic with the left or right edge of an Intonational Phrase.

The embedded Intonation Phrase edge required to satisfy (117) is not however free to appear just anywhere. It has to satisfy the prosody-to-syntax constraints in (72-b), which it does by aligning with the left edge of TP (as this is the highest projection to which the verb moves in this structure). This approach, according to the authors, better accounts for the cross-linguistically limited distribution of topics, which tend to appear at clausal edges (i.e. where Intonation Phrase edges appear to satisfy syntax-phonology and phonology-syntax mapping constraints) rather than clause medially.

5. Conclusion

In this paper we explored the prosodic realisation of complex sentences involving argument and adverbial clauses. We started by reviewing a body of evidence about English complex sentences, including complement clauses, subject clauses, adverbial clauses and direct quotations,– the work of Downing (1970). The first

important finding was that embedded clauses do not always form independent Intonation Phrases, despite their syntactic clausal status. The second important observation from this body of evidence was that the attachment site of the embedded clause affects its prosodic phrasing, with high-extraposed clauses typically being separated from the main clause by Intonation Phrase boundaries.

Next, we reviewed a series of proposals from the literature enumerating their main tenets and exploring the predictions they make with respect to Downing's findings. In particular, we looked at Selkirk's earlier work using syntax-prosody alignment constraints for all clauses and its extension involving the idea of CommaP (Potts, 2005), which ensures that clauses that form separate Speech Acts form their own Intonational Phrases. We also discussed Truckenbrodt's WRAP-CP proposal, to account for the fact that in situ embedded clauses typically do not form their own Intonation Phrases. Next we turned to two proposals that advocate a more direct, more detailed correspondence between syntactic and prosodic structure. Selkirk's (2005, 2009, 2011) Match Theory involves a more fine-grained mapping between different kinds of Complementizers (i.e. Force^0, Comp^0); Hamlaoui and Szendrői (2015, 2017) argued for the relevance of the surface position of the main or root verb in the structure, and a difference between syntax-to-prosody and prosody-to-syntax mapping constraints.

In section 3, we expanded the empirical basis of our discussion to other languages, with an aim to formulate typologically valid generalizations regarding the different types of embedded clauses (i.e. subject clauses, complement clauses, adverbial clauses and direct quotations). This proved difficult, due to the lack of systematic data on all of these domains in the literature. In the final section, we explored the effect of information structure on prosodic phrasing involving complex clauses. As has been observed also for simplex sentences, arguably, prosodic

phrasing is sometimes affected by information-structural considerations. Focal and topical elements can trigger additional prosodic boundaries (see ALIGN-TOPIC and ALIGN-FOCUS). From the reviewed evidence it seems that information-structural considerations also play a role in determining the prosodic structure of complex sentences.

In sum, we would like to draw the conclusion that the current existing theories fare well when faced with data involving complex sentences with argument and adverbial clauses. It also seems to be the case that systematic data collection in this area from a typologically wide array of languages would be immensely helpful to advance our understanding of the prosody of complex sentences, and consequently our quest for the best theoretical framework.

REFERENCES

Beckman, M. and Ayers-Elam, G. (1997). Guidelines for ToBI Labelling, version 3. Technical report.

Beckman, M. and Edwards, J. (1990). Lengthenings and shortenings and the nature of prosodic constituency. In Kingston, J. and Beckman, M., editors, *Papers in Laboratory Phonology I: Between the Grammar and the Physics of Speech*, pages 153–178. Cambridge University Press, Cambridge.

Beckman, M. and Pierrehumbert, J. (1986). Intonational structure in English and Japanese. *Phonology*, 3:255–309.

Charnavel, I. (2017). Non-at-issueness of *since*-clauses. In *Proceedings of SALT 27*, pages 43–58.

Chomsky, N. (2001). Derivation by phase. In Kenstowicz, M., editor, *Ken Hale : A life in language*, pages 1–52. M IT Press, Cambridge, MA.

Cooper, W. and Sorensen, J. (1981). *Fundamental Frequency in Sentence Production*. Springer, Heidelberg.

Downing, B. T. (1970). *Syntactic structure and phonological phrasing in English*. PhD thesis, University of Texas at Austin.

Elfner, E. (2012). *Syntax-prosody interactions in Irish*. PhD thesis, University of Massachusetts, Amherst.

Emonds, J. (1969). *Root and Structure-Preserving Transformations*. PhD thesis, MIT.

Feldhausen, I. (2008). *The prosody-syntax interface in Catalan*. PhD thesis, Universität Potsdam.

Feldhausen, I. (2010). *Sentential form and prosodic structure of Catalan*. John Benjamins, Amsterdam.

Feldhausen, I. (2011). The prosodic phrasing of sentential objects. *Lingua*, 121:1934–1964.

Féry, C. and Truckenbrodt, H. (2005). Sisterhood and tonal scaling. *Studia Linguistica*, 59:223–243.

Frascarelli, M. (2000). *The syntax-phonology interface in focus and topic constructions in Italian*. Kluwer Academic Publishers, Dordrecht.

Gee, J. and Grosjean, F. (1983). Performance structures: A psycholinguistic and linguistic appraisal. *Cognitive Psychology*, 15(4):411–458.

Gee, J. and Grosjean, F. (1987). Prosodic structure and spoken word recognition. *Cognition*, 25:135–155.

Gleason, H. A. (1961). *An introduction to descriptive linguistics. Revised edition*. Holt, Rinehart and Winston, New York.

Hamlaoui, F. and Szendrői, K. (2015). A flexible approach to the syntax-phonology mapping of intonational phrases. *Phonology*, 32(1):79–110.

Hamlaoui, F. and Szendrői, K. (2017). The syntax-phonology mapping of intonational phrases in complex sentences: A flexible approach. *Glossa*, 2(1)(55):1–31.

Haraguchi, S. (1977). *The tone pattern of Japanese: An Autosegmental Theory of Tonology*. Kaitakusha, Tokyo.

Hayata, T. (1985). *Hakata hougen no akusento/keitairon [The accent and morphology of the Hakata dialect*. Kyushu University Press, Fukuoka.

Hooper, J. B. and Thompson, S. A. (1973). On the Applicability of Root Transformations. *Linguistic Inquiry*, 4(4):465–497.

Hsu, B. (2015). Variation in Bangla complementizer order at the syntax-prosody interface. In Buy, T. and Öyildiz, D., editors, *NELS 45: Proceedings of the 45th Meeting of the North East Linguistic Society*, volume 2, pages 35–44, Amherst, MA. GSLA.

Ito, J. and Mester, A. (2007). Prosodic adjunction in Japanese compounds. In *Formal Approaches to Japanese Linguistics*, volume 4, pages 97–111. M IT Department of Linguistics and Philosophy, Cambridge, MA.

Ito, J. and Mester, A. (2009). The extended prosodic word. In Grijzenhout, J. and Kabak, B., editors, *Phonological Domains: Universals and Deviations*, pages 135–194. Mouton De Gruyter.

Ito, J. and Mester, A. (2012). Recursive prosodic phrasing in Japanese. In Borowsky, T., Kawahara, S., Shinya, T., and Sugahara, M., editors, *Prosody Matters: Essays in Honor of Elisabeth Selkirk*, pages 280–303. Equinox.

Kan, S. (2009). Prosodic domains and the syntax-prosody mapping in Turkish. Master's thesis, Boğaziçi University, Istanbul.

Kandybowicz, J. (2017). On prosodic variation and the distribution of wh-in-situ. *Linguistic Variation*, 17(1):111–148.

1179 Kanerva, J. (1990). *The phonology-syntax connection*, chapter Focusing on phono-
1180 logical phrases in Chichewa. The University of Chicago Press.
1181 Kubo, T. (1989). Hukuoka-si hougen no, dare/nani tou no gimonsi o hukume
1182 bun [The pitch patterns of sentences containing wh-words in the Fukuoka-city].
1183 *Kokugogaku*, 156:71–82.
1184 Kubozono, H. (1988). *The Organization of Japanese Prosody*. PhD thesis, Uni-
1185 versity of Edinburgh.
1186 Kutik, E., Cooper, W., and Boyce, S. E. (1983). Declination of fundamental
1187 frequency in speakers' production of parenthetical and main clauses. *Journal of*
1188 *the Acoustical Society of America*, 73:1731–1738.
1189 Ladd, R. (1986). Intonational phrasing: the case of recursive prosodic structure.
1190 *Phonology Yearbook*, 3:311–340.
1191 Ladd, R. D. (1988). Declination 'reset' and the hierarchical organization of utter-
1192 ances. *The Journal of the Acoustical Society of America*, 84:530–544.
1193 Langacker, R. W. (1969). On Pronominalization and the Chain of Command.
1194 In Reibel, D. and Schane, S., editors, *Modern Studies in English: Readings*
1195 *in Transformational Grammar*, pages 160–186. Prentice-Hall, Englewood Cliffs,
1196 N.J.
1197 Lieberman, P. (1967). *Intonation, perception and language*. M IT Press, Cam-
1198 bridge, MA.
1199 Lohndal, T. (2014). Sentential subjecs in English and Norwegian. *Syntaxe et*
1200 *sémantique*, 15:81–113.
1201 McCarthy, J. and Prince, A. (1993). Generalized alignment. Technical report,
1202 Rutgers Center for Cognitive Science, Rutgers University, New Brunswick.
1203 Myrberg, S. (2013). EQUALSISTERS and prosodic branching. *Phonology*, 30(1):73–
1204 124.

Nespor, M. and Vogel, I. (1982). Prosodic domains of external sandhi rules. pages 225–256.

Nespor, M. and Vogel, I. (1986). *Prosodic Phonology*. Foris, Dordrecht.

Pak, M. (2008). *The postsyntactic derivation and its phonological reflexes*. PhD thesis, University of Pennsylvania.

Pierrehumbert, J. (1980). *The phonology and phonetics of English intonation*. PhD thesis, Massachusetts Institute of Technology, Cambridge, MA.

Platzack, C. (1998). *Svenskans inre grammatik: det minimlistiska produktion till modern generativ grammatik*. Student-litteratur, Lund.

Potts, C. (2002). The syntax and semantics of *as*-parentheticals. *Natural Language and Linguistic Theory*, 20:623–689.

Potts, C. (2003). *The Logic of Conventional Implicatures*. PhD thesis, University of California at Santa Cruz.

Potts, C. (2005). *The Logic of Conventional Implicatures*. Oxford University Press, Oxford.

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

Prince, A. and Smolensky, P. (2004). *Optimality Theory: Constraints Interaction in Generative Grammar*. Blackwell, Oxford.

Reinhart, T. (1995). Interface strategies. In *OTS Working Papers in Theoretical Linguistics*, pages 55–109. O TS, Utrecht University, Utrecht.

Rizzi, L. (1997). The fine structure of the left periphery. In Haegeman, L., editor, *Elements of Grammar*, pages 281–337. Kluwer, Dordrecht.

Ross, J. R. (1967). *Constraints on variables in syntax*. PhD thesis, MIT.

Rutherford, W. (1970). Some observations concerning subordinate clauses in English. *Language*, 46:97–115.

Sæbø, K. J. (1991). Causal and purposive clauses. In *Semantik – Semantics. Ein internationales Handbuch zeitgenössischer Forschung – An International Handbook of Contemporary Research (HSK 6)*, pages 623–631. De Gruyter, Berlin.

Schuboe, F. (Submitted). Intonation phrase formation in sentences with clausal embedding.

Selkirk, E. (1978). On prosodic structure and its relation to syntactic structure. In Fretheim, T., editor, *Nordic Prosody*, volume 2, pages 111–140. TAPIR, Trondheim.

Selkirk, E. (1984). *Phonology and Syntax*. MIT press, Cambridge, MA.

Selkirk, E. (1986). On derived domains in sentence phonology. *Phonoloy Yearbook*, 3:371–405.

Selkirk, E. (1995a). The prosodic structure of function words. In *Papers in Optimality Theory*, pages 439–470. University of Massachusetts, Amherst.

Selkirk, E. (1995b). Sentence prosody : Intonation, stress and phrasing. In Goldsmith, J. A., editor, *The Handbook of phonological theory*. Blackwell, London.

Selkirk, E. (2005). Comments on Intonation Phrasing in English. In Frota, S., Vigario, M., and Freitas, M. J., editors, *Prosodies*. Monton de Gruyter, Berlin.

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

Selkirk, E. (2011). The syntax-phonology interface. In Goldsmith, J., Riggle, J., and Yu, A., editors, *The Handbook of Phonological Theory*, pages 485–532. Blackwell Publishing, Oxford.

Szendrői, K. (2001). *Focus and the syntax-phonology interface*. PhD thesis, University College of London.

Taglicht, J. (1998). Constraints on intonational phrasingg in English. *Journal of Linguistics*, 34:181–211.

Trager, G. L. and Smith, H. L. J. (1957). An outline of English structure. In *Studies in Linguistics: Occasional Papers Number 3*. American Council of Learned Societies, Washington.

Truckenbrodt, H. (1999). On the relation between syntactic phrases and phonological phrases. *Linguistic Inquiry*, 30(2):219–282.

Truckenbrodt, H. (2002). Upstep and embedded register levels. *Phonology*, 19:77–120.

Truckenbrodt, H. (2005). A short report on intonation phrase boundaries in german. *Linguistische Berichte*, 203:273–296.

Truckenbrodt, H. (2015). Intonation phrases and speech acts. In Kluck, M., Ott, D., and de Vries, M., editors, *Parenthesis and ellipsis. Crosslinguistic and theoretical perspectives*, pages 301–349. Walter de Gruyter, Berlin.

Truckenbrodt, H. and Darcy, I. (2010). Object clauses, movement, and phrasal stress. In Erteschik-Shir, N. and Rochman, L., editors, *The sound patterns of syntax*, pages 189–216. Oxford University Press, Oxford.

van den Berg, R., Gussenhove, C., and Rietveld, T. (1992). Downstep in Dutch: Implications for a model. In Docherty, G. and Ladd, R. D., editors, *Papers in Laboratory Phonology II: Gesture, segment and prosody*, pages 335–358. Cambridge University Press, Cambridge.

Wagner, M. (2005). *Prosody and recursion*. PhD thesis, MIT.

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