Chapter 12

Prosody and syntax of argument and adverbial clauses

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In this chapter, we discuss the relation between clausal embedding and phonological structure. Since Downing's (1970) seminal work on English intonational phrases (IP), it is commonly assumed that only *root* clauses are visible to the phonological component and necessarily introduce IP breaks. Nevertheless, embedded clauses can sometimes clearly form their own IP and give rise to prosodic realizations that closely mirror the syntactic embedding. The main question we address is whether there is a systematic correlation between the nature of the embedded clause (i.e., argument or adverbial clause) and/or its syntactic position (e.g., extraposed, high or low-attached, verb-adjacent) and its prosodic status.

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.[1] Syntactically speaking, Emonds (1970) offers the definition of root sentences given in (1) (Hooper & Thompson 1973: 465).

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[1]We use both the terms *sentence* and *clause* to reflect that in early works such as Emonds (1970) and Downing (1970) the term *root sentence* was used for any constituent that is directly dominated by the root node, which is labeled by the term *S* for *Sentence*. In more recent work, such constituents are more commonly called *root clauses*.

(1)   Root sentence (Emonds 1970: 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.

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* (Ross 1967: 338; Langacker 1969).[2]

(3)   Root sentence (Downing 1970: 31)
      A root sentence is any sentence that is not commanded [dominated] 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 & 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 & Vogel 1986: 187).

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[2]"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).

In this respect, they are typically considered to contrast with restrictive relative clauses (10), complement clauses (11) and at least some adverbial clauses (12), which are intonationally integrated to their context (Nespor & 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 relationship 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 & 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 (on prosodic weight see, for instance, Gee & Grosjean 1983, 1987). 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, 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 (e.g., Haraguchi 1977; Beckman & 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 intonational phrase (Ito & 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 intonational phrase (IP or ι) to syntactic clauses (Truckenbrodt 2005; Selkirk 2005, 2009, 2011; Hamlaoui & Szendrői 2015). From this perspective, the above discussed root and non-root clauses differ on whether they map onto an intonational 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 relationships between the prosodic units are concerned, it was originally assumed that they constitute exocentric categories (i.e., they are not organized around a head) arranged 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 & Vogel 1986). But already in the 1980s, certain phenomena were identified that called into question a strict formulation of the SLH (Ladd 1986; Inkelas 1989; Ito & Mester 1992). 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 (Selkirk 1996). This move, which is widely accepted by now (Truckenbrodt 1995, 1999, 2005; Féry & Truckenbrodt 2005; Wagner 2005, 2010; Ito & 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, StressFocus) 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, intonational 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 & Smith Jr. 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's (1980) 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 intonational 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 & 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 & Edwards (1990) and Beckman & Ayers-Elam (1997), the temporal juncture is greater at an intonational phrase edge than at the edge of phrases lower down in the prosodic hierarchy. Note, however, that, as made clear in Downing's (1970) 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 intonational 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 1995: 556). Concomitant to this, an upward pitch reset is indicative of the start or the left edge of an intonational 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, 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 Complement 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 intonational phrase boundaries. This is illustrated in the example in (13) (adapted from Selkirk 2005: 11) where, despite its significant length, the clausal complement does not form a separate intonational phrase.

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

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 a (minor) upward reset (noted with the ∧ 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) (adapted from Selkirk 2005: 11), where the conjoined clause is a root clause and introduces its own intonational phrase.

(14) $_{IP}$($_{PP}$(Bi$^{H^*}$lly thought his fa$^{!H^*}$ther was a me$^{!H^*}$rchant$^{L\text{-}H\%}$)$_{PP}$)$_{IP}$ ‖
$_{IP}$($_{PP}$(∧∧! and his fa$^{H^*}$ther was a secret a$^{!H^*}$gent$^{L\text{-}L\%}$)$_{PP}$)$_{IP}$.

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 intonational phrase and thus being downstepped with respect to it, as indicated by the ! symbol following the ∧ 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 intonational 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 quotations 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 intonational 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) $_{IP}$($_{PP}$(Ci$^{H^*}$ndy isn't pla$^{!H^*}$nting a ga$^{!H^*}$rden$^{L^-}$)$_{PP}$
$_{PP}$(becau$^{H^*}$se she lo$^{!H^*}$ves toma$^{!H^*}$toes$^{L\text{-}L\%}$)$_{PP}$)$_{IP}$.

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

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 not 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 intonational 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 enables distinguishing between a *restrictive* interpretation of adverbial clauses, in (20a) to (27a), and a *non-restrictive* one (in his terminology), in (20b) to (27b).

(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'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 Emondss' treatment of this type of clause as a root clause.

(30)   IP(If you had a llama)IP, IP(could you ride it)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)   IP(We can talk after we eat)IP.

(32)   IP(After we eat)IP IP(we can talk)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 at home.

Downing also contrasts sentences (38) and (39) which, according to him, provide evidence for the fact that a root clause inserts its own intonational 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 (40a) and (41a). It is optional in (40b) and (41b).

(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 into 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 intonational phrase of their own (i.e., introduce both their own left and right intonational phrase edges), or whether they are simply embedded in a prosodic domain that encompasses the entire sentence and contains an intonational 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's (1970) 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)
Phrase boundaries [termed Intonational Phrase (IP) boundaries in later literature] 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 (e.g., Selkirk 1984, and subsequent work), this means that a root clause is taken by Downing to insert both a left and a right intonational phrase boundary. Example (46) to (52) schematize the phrasing of the various types of complex sentences considered so far.

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

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

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

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

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

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

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

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 topicalized subject clause in (47) do form their own intonational phrase as they are directly attached to the root. In addition, in both cases there is an intonational phrase encompassing the entire complex sentence introduced by the topmost S-node in Downing's approach. This correctly reflects the intuition that two clauses that form two separate sentences are phrased differently compared to two clauses that are part of the same sentence.

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 & Vogel 1986). This is the case, for instance, of the approach proposed by Nespor & Vogel (1986), which assumes that intonational phrases are formed by the rule in (53).

(53) Intonational 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 & 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 intonational phrases and a specific syntactic category. They assume, as illustrated in (55), that any fragment surrounding an intonational phrase (here the parenthetical) can constitute an intonational phrase of its own (adapted from Nespor & 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 & Sorensen (1981) and Elanah Kutik & Boyce (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 are a bunch of phonetic markers, which seem to cluster more, the larger the intonational 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) $_?(_U($Lions $_{IP}($as you know$)_{IP}$ are dangerous$)_U$ $_U($and the book on the table $_{IP}($it seems to me$)_{IP}$ was a gift from my mother$)_U)_?$

One would then be forced to invent yet another category. Given that recursivity is intrinsically potentially infinite, this will not be practical.[3]

In Ladd's view, prosodic structure is thus 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) (Selkirk 1984: 26), it is nevertheless compatible with a weaker formulation, which simply prohibits lower-level categories from dominating higher-level ones.

(58)   A category of level i in the hierarchy immediately dominates a (sequence of) categories of level $i − 1$.

This weaker definition, in the form of violable Optimality-Theoretic constraints given in (59) (Selkirk 1996), and the ensuing availability of nested, recursive Intonational Phrases has since been widely adopted.[4]

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[3]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.

[4]Although proposals have been developed outside OT for the syntax-phonology mapping of other prosodic domains (e.g., phonological phrases), most of the recent work on the mapping of intonational phrases is set in this framework. For an alternative approach based on recent developments of the minimalist program and, in particular the notion of *termination of derivation* (Chomsky et al. 2019), the interested reader is referred to Dobashi (2018).

(59) Constraints on Prosodic Domination (where C^n = some prosodic category)

LAYEREDNESS: No C^i dominates a C^j, j > i,
e.g., "No σ dominates a Ft".

HEADEDNESS: Any C^i dominates a C^{i-1} (except if $C^i = \sigma$),
e.g., "A PWd must dominate a Ft".

EXHAUSTIVITY:
No C^i immediately dominates a constituent C^j, j < i-1,
e.g., "No PWd immediately dominates a σ".

NONRECURSIVITY:
No C^i dominates C^j, j = i,
e.g., "No Ft dominates a Ft".

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 intonational 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, 1996) – 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 Generalized Alignment in Optimality Theory (McCarthy & Prince 1993; Prince & Smolensky 2004), Truckenbrodt (2005: 287) and Selkirk (2005) respectively formulate the syntax-prosody alignment constraints given in (60) and (61).

(60) ALIGN-CP, RIGHT

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

(61) Interface Constraint for Intonational 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 intonational 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 (62), reminiscent of the Wrap-XP constraint of Truckenbrodt (1999). In the case of embedded clauses, if one disregards the possibility of nested intonational phrases, this constraint conflicts with ALIGN-CP,L/R and, if it outranks it, has the effect of blocking the introduction of clause-internal intonational phrase boundaries which would have the effect of splitting a root CP into several Intonational Phrases.

(62) WRAP-CP

Each CP is contained in a single intonational phrase.

If nested intonational phrases are considered, a ranking of NONRECURSIVITY above ALIGN-CP and WRAP-CP would have the effect of favoring the phrasing in (63), with only one large Intonational Phrase, over the one in (64), in which the embedded clause forms an intonational phrase of its own and splits the root CP into two Intonational Phrases.

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

(64) $_{IP}(_{CP}$ main clause $_{IP}(_{CP}$ complement clause$)_{IP})_{IP}$

As we have seen above, (63) 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 (64) 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 NONRECURSIVITY >> ALIGN-CP, WRAP-CP also correctly predicts the phrasing of English in situ subject and adverbial clauses, repeated below for convenience.

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

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

In the following configurations, however, there seems to be evidence for more complex intonational phrasing, as in the configurations repeated below for convenience. It is not immediately obvious that the ranking NONRECURSIVITY >> ALIGN-CP, WRAP-CP alone can provide an account.

(47)   IP(IP(topicalized subject clause)IP IP(main clause)IP)IP

(49)   IP(IP(main clause)IP IP(extraposed complement clause)IP)IP

(51)   IP(IP(main clause)IP IP(coordinate adversative clause)IP)IP

(52)   IP(adverbial/adverbial clause IP(main clause)IP)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 (65) (Frascarelli 2000; Feldhausen 2010).

(65)   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 >> NONRECURSIVITY would give rise to the desired phrasing. Without going into further details, we can conclude that an Optimality-Theoretic account making use of generalized alignment constraints, WRAP-CP, NONRECURSIVITY 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 quotations 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) [+ 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.[5]

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 does not 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 intonational 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 (61) 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 (root-level) right adjuncts necessarily follow the intonational 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 CommaPs. 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 intonational 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) does not seem to constitute a separate speech act, they are predicted, in Selkirk's approach, to simply phrase in the same intonational phrase as the preceding adverbial (clause). Note, however, that an approach based on NONRECURSIVITY, WRAP-CP, such as Truckenbrodt's, would equally need to be augmented to account for the phrasing difference between (47) and (52).

As far as direct quotations 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 quotations are CommaPs, Selkirk's proposal immediately accounts for their Intonational Phrase-status.

Overall, Selkirk's (2005) 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 pragmatic 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.

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[5]From this perspective, the intonational phrase is not formed based only on syntactic but also on discourse-pragmatic considerations. We will come back to this point subsequently.

A yet different approach was put forward 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 (66).

(66)   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 intonational 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's (1997) 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's (2005) idea of a CommaP, Selkirk (2009: fn.13) also maintains that the constituents that form an intonational 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 (67).

(67)   Match Clause:
       Spelling out the complements of complementizer heads as ι
       a. Match $Force^0$ Clause
          $_{ForceP}[\text{Spec } _{Force'}[\text{Force}^0 \ _{CP} [\ .... \ ] \ ] \ ]$
          $\Downarrow$SPELL-OUT on the ForceP phase
          $\iota \ (...............) \ \iota$
       b. Match $Comp^0$ Clause
          $_{CP}[\text{Spec } _{C'}[\text{Comp}^0 \ _{FncP} [\ .... \ ] \ ] \ ]$
          $\Downarrow$SPELL-OUT on any Comp-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.[6]

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 and NonRecursivity, here if Match-Comp^0-Clause ranks highly 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 intonational 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's (1997: 297) structure of the complementizer system, given in (68) 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.

(68)   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 (69) and (70)

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

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

In addition, in Match Theory, any clause that corresponds to a separate speech act, regardless of its position or size, also corresponds to an intonational phrase prosodically. This would give rise to the phrasing in (71) and (72). Direct quotations, for instance, fall under this category, as they come with their own illocutionary force (i.e., one can quote a question inside a declarative).

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

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[6]A reviewer notes that a different way of looking at Selkirk's proposal is to assume that clause always corresponds to CP, in which case (66) is equivalent to (67b) and Selkirk's proposal boils down to assuming (67a) alongside it.

(72) $_{IP}(_{IP}$(main clause)$_{IP}$ $_{IP}$(embedded clause)$_{IP})_{IP}$

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 & 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 (73)). This projection can vary both within and across languages, depending on the particular type of sentence considered.

(73)   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 intonational

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 intonational 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 intonational phrase, the entire sentence forms an intonational phrase, but the embedded clause itself is not an intonational phrase (cf. (69) and (70) 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 Intonational Phrase boundaries (73a), the phonology-to-syntax mapping constraints see both root and non-root (i.e., free-standing or embedded) clauses and simply ensure that Intonational Phrase boundaries, if present, correspond to syntactic clause boundaries (73b). This has the effect that embedded clauses are not required to map onto their own intonational phrase to satisfy the prosody-to-syntax mapping constraints, only root clauses are. But if other constraints (e.g., prosodic or discursive) favor them doing so, this does not violate any of the mapping constraints in (73).

In addition, just as in Truckenbrodt's and Selkirk's earlier proposals, Hamlaoui & 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 (71) and (72) above. As far as direct quotations are concerned, Hamlaoui & Szendrői's proposal needs to be augmented to account for these too (see Section 3). In addition to the mapping principles listed in (73) 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 quotations form their own Intonational Phrases.

To sum up, Hamlaoui & 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 intonational 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 intonational phrase boundary 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, NONRECURSIVITY and 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 into 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) can account for the phrasing in (74), in which the right edge of the intonational phrase corresponding to the sentential subject (and its corresponding left edge) is optional (so long as ALIGN-CP, RIGHT outranks NONRECURSIVITY). Selkirk (2009, 2011) predicts two different structures, corresponding respectively to (75) and (76), depending on how her two constraints rank.[7] 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 & Szendrői (2017) predict the obligatory presence of a single intonational phrase, as in (77). However, their proposed syntax-to-prosody mapping allows for an additional rightward intonational phrase boundary at the edge of the subject clause, as in (74), if required by some other constraint.

(74) $_{IP}(_{IP}$(subject clause$)_{IP}$ rest of main clause$)_{IP}$

(75) $_{IP}$(subject clause $_{IP}$(rest of main clause$)_{IP})_{IP}$ (MATCH-FORCE)

(76) $_{IP}(_{IP}$(subject clause$)_{IP}$ $_{IP}$(rest of main clause$)_{IP})_{IP}$ (MATCH-C)

(77) $_{IP}$(subject clause + rest of main clause$)_{IP}$

Using declination and (Intonational Phrase-final) upstep as the main correlates of intonational phrasing, Truckenbrodt reports that in this dialect of German, sentential subjects form their own intonational phrase. Example (78), adapted from Truckenbrodt, illustrates this type of sentence. Note that, in contrast to what is observed in example (14), the upward reset (noted with the ∧ symbol) here takes place before rather than after the relevant boundary.

(78) $[_{CP} [_{CP}$ 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 by Kandybowicz (2017) who focuses on four Tano languages, spoken in Ghana: Krachi, Bono, Wasa and

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[7]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 (67). One could perhaps assume it is a right-leaning clitic.

Asante Twi. Using final L% as well as pause duration to diagnose the right edge of intonational phrases, Kandybowicz (2017: 126) argues that subject clauses also form their own intonational phrase in Krachi. An example is given in (79).

(79) $_{IP}$(Kɛ Kofí ɛ́-kya-wǔ)$_{IP}$ $_{IP}$(mě ódum ɛ́-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 (80) illustrates a complex sentence containing a clausal subject in this language.

(80) $_{IP}$(Sɛ́ Kofí kûm akoko kɛ̃)$_{IP}$ $_{IP}$(yɛ̌ 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 English in prosodically integrating them with the main clause. This is the case for Turkish *ki*-headed finite complement clauses (Kan 2009), illustrated in (81) (Kan 2009: 67), Hungarian (Hamlaoui & Szendrői 2017), in (82), and Basaá (Hamlaoui & Szendrői 2017), in (83).

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

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

(83) $_{\text{IP}}$(mè ń-sòmból jí   lɔ́ŋgɛ́ ꜜlɛ́   mbómbó   à -ǹ-lɔ̂)$_{\text{IP}}$
     I   want   to.know well   that 1.grandmother 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 intonational 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 (84)) and embedded *wh*-questions (as in (85)).

(84)   dare-ga   kyoo   biiru nonda?
     who-NOM today beer   drank
     'Who drank beer today?'

(85)   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 (84), carries a L tone and the matrix verb *sitto* a H*+L pitch accent. Selkirk (2009) proposes that this prosody is consistent with the phrasing in (86) and (87), which is predicted by a ranking of the Match constraint in (67) that places the MATCH-COMP⁰-CLAUSE constraint higher than any constraint restricting the proliferation of intonational phrases in the structure, (e.g., NON-RECURSIVITY, Selkirk 1996).

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

(87) $_{\text{IP}}$($_{\text{IP}}$(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 (88) and (89) respectively, in situ complement clauses phrase separately from the main clause, which distinguishes them from Wasa and Asante Twi, two other Tano languages, in (90) and (91).

(88)　IP(Fe　　　kwáré fí-gyı　　fέέ)IP IP(ɔkyí　　wŭ έ-mɔ　bwaté　wŭ)IP
　　　　2ND.SG collect 2ND.SG-eat COMP　　woman the PST-kill chicken the
　　　　'You think that the woman slaughtered the chicken.'

(89)　IP(Wó　　　dwene sέ)IP IP(mméma kɛ̃　be-kûm　　　akoko　kɛ̃)IP
　　　　2ND.SG think　COMP　　man.PL　the 3RD.PL-kill.PST chicken the
　　　　'You think that the men slaughtered the chicken.'

(90)　IP(Wó　　　dwéne sέ　　mɛrέma 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.'

(91)　IP(Yaw kaa　　sĕ　　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 (where the former simply maps more clauses into their own intonational phrases) or whether there are other differences, syntactic or pragmatic in nature, that would explain why these complement clauses form their own intonational 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 for German and Bangla. In his data from one Austrian German speaker, Truckenbrodt (2005) finds that the extraposed complement clauses do not form an intonational phrase of their own. In an experiment with more participants and different items, Truckenbrodt & Darcy (2010), however, find evidence that German extraposed complement clauses consistently form their own intonational 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 intonational phrase. This is illustrated in the examples (92) to (94), where italics indicate phrasal stress and small capitals nuclear stress (Truckenbrodt & Darcy 2010: 205).

(92) 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)IP
      weaving show   wants
      'Werner has said at the meeting that he wants to show Lola weaving.'

(93) IP(Der *Werner* hat auf dem *Treffen* GESAGT)IP, IP(dass er der *Lola* das
      DET Werner has at   the   meeting said   that he DET Lola the
      WEBEN   zeigen will)IP
      weaving show   wants
      'Werner has said at the meeting that he wants to show Lola weaving.'

(94) 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)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 (94), it is optionally stressed when preceded by an adjunct, as in (92) and (93). According to Truckenbrodt & 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 intonational phrase goes against expectations and indeed suggests that other constraints may be at play that force a sentence like (93) 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 intonational phrase with the main clause, as in (95).

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

      'John said that grandfather took medicine last night.'

The complex sentence in (95) contrasts with the ones in (96), in which the (non-discourse neutral) preverbal complement clause phrases separately. Unfortunately, the complete prosodic structure of the sentence is not provided.

(96) Jon $_{\text{IP}}$(dadubhai je kal rate oSudh khey-eche)$_{\text{IP}}$ bol-echi-lo.
      John grandfather that last night medicine eat-PERF 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 quotations cross-linguistically. Hamlaoui & Szendrői (2017) discuss cases of direct quotations in Hungarian and show that, just like in English, direct quotations are independent intonational 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 & Szendrői (2017) observe that in Hungarian, complex sentences containing a *while*-clause form a single intonational phrase with the main clause when they are in situ, as in (97).

(97) $_{\text{IP}}$ ([$_{\text{TopP}}$ Péter$_j$ $_{\text{IP}}$([$_{\text{vP}}$ el-viszi$_i$ [$_{\text{VP}}$ t_i t_j a gyerekeket a múzeumba
      Peter   PRT-takes   the children.ACC the museum.to
      [$_{\text{DP}}$ (addig) [$_{\text{CP}}$ amíg Mari dolgozik?]]]]])$_{\text{IP}}$)$_{\text{IP}}$
      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 (98), it is phrased outside the intonational phrase formed by the main clause. There is no evidence that it forms an intonational phrase too.

(98)   IP([TopP [CP Amíg Mari dolgozik], ([addig_i) [TopP Péter_j [vP IP(
              while Mary works   (D)   Peter
       el-viszi   a   gyerekeket a   múzeumba t_i t_j?]]]])IP)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 (99) is prosodically integrated into the main clause when appearing in situ, but is not when left-extraposed, as in (100) (Hamlaoui & Szendrői 2017).

(99)   IP(sóɣól   à-ṅ-kɛ́   ⁺í ⁺ŋgɛ́ŋ Lingom à-ǹ-lɔ̂)IP
            1.grandfather 1.AGR-PST1-leave at hour Lingom 1.AGR-PST1-arrive
       'The grandfather left when Lingom arrived.'

(100) IP(í ⁺ŋgɛ́ŋ Lingom à-ṅ-kɛ̂   IP(sóɣól   à-ǹ-lɔ̂)IP)IP
            at hour Lingom 1.AGR-PST1-leave   1.grandfather 1.AGR-PST1-arrive
       'When Lingom left, the grandfather arrived.'

Just like in Hungarian, there is no evidence so far that the left-extraposed adverbial clause forms an intonational phrase of its own. In Hamlaoui & Szendrői's (2017) approach, this phrasing is accounted for through the fact that only main clauses obligatorily insert their intonational phrase boundaries. The embedded clause, when attached high enough (i.e., above the highest projection containing the root/main verb), simply sits outside the intonational phrase constituted by the main clause. For it to form an intonational phrase of its own, other constraints, for instance the prosodic constraint STRONGSTART (Selkirk 2011) in (101), need to prosodically promote it. As long as the extra-intonational phrase edges match the edges of a syntactic clause, this more complex phrasing constitutes a violation of neither syntax-phonology nor phonology-syntax mapping constraints.

(101) STRONGSTART (Selkirk 2011: 122)
       A prosodic constituent optimally begins with a leftmost daughter
       constituent which is not lower in the prosodic hierarchy than the
       constituent that immediately follows.

A more complex prosodic phrasing, however, emerges from Stockholm Swedish *if*-clause in V1 position, investigated by Myrberg (2013). These adverbial clauses, illustrated in example (102), occupy the initial position of V2 sentences, and have been analyzed as sitting in Spec CP (Platzack 1998: 89–92).

(102) 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
      '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 (102) receive variable phrasing. The main and embedded clause can either form two intonational phrases embedded within a larger one as in (103), be phrased within a single intonational phrase as in (104), or show the phrasing in (105), in which only the *if*-clause forms its own intonational 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.

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

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

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

A high ranking of Selkirk's Match-Comp^0 or, alternatively, Truckenbrodt's Align-CP would favor the phrasing in (105). This phrasing is unexpected, as a default phrasing, under Hamlaoui & Szendrői (2017)'s approach. Rather, (104) 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 intonational phrase of its own. The phrasing in (103) seems problematic for all accounts in Section 2.2, as the second intonational 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 (106), proposed by Myrberg, which together with Match constraints allows her to derive all and only the grammatical prosodic structures in (103) to (105).

(106) 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 (107) to (109), which respectively derive the phrasings in (103) to (105).

(107)   EQUALSISTERS >> MATCH-CP(S-P) >> MATCH-CP(P-S)

(108)   EQUALSISTERS >> MATCH-CP(P-S) >> MATCH-CP(S-P)

(109)   MATCH-CP(S-P) >> MATCH-CP(P-S) >> EQUALSISTERS

Crucially, any of the three rankings in (107) to (109) correctly predicts the invariable phrasing observed in Swedish sentences containing two coordinated clauses and given in (110).

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

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 one 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 intonational phrase edges, but are prosodically integrated with the main clause. However, they do whenever the embedded complement clause contains a focused constituent, as in (111).

(111) Péter AZT mondta/utálta/bánta meg, hogy MARIT választottuk be
     Peter D.ACC said/hated/regretted PRT that Mary.ACC selected PRT
     a bizottságba.
     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 (112) (e.g., 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 intonational phrase and realize its head (i.e., sentence stress).

(112) 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 & Szendrői (2017), long focus movement to the edge of the matrix clause is possible with some verbs. However, there 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 (112), contains extra intonational 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 (73b), while ensuring that (112) is satisfied.

An effect of focus on prosodic structure is also found by Schuboe (2020) who examines German complex sentences of the type discussed by Truckenbrodt (2005) and Truckenbrodt & 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 into the main clause. Relatedly, Schuboe investigates the effect of focus and givenness on the phrasing of German complex sentences containing a complement clause, comparable to the ones documented by Truckenbrodt & Darcy (2010). He concentrates on three information-structural configurations: broad focus on the entire sentence in (113), narrow focus on the object of the main clause in (114) and narrow focus on the subject of the (extraposed) complement clause in (115). The condition in (114) differs from the other two in that the verb is in postfocal position and

should thus be destressed. What is predicted by both Schuboe (2020) and Truckenbrodt & Darcy (2010) is that in this condition, the embedded clause should be prosodically integrated with the main clause.

(113)   [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.'

(114)   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.'

(115)   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 intonational phrase boundary in the broad focus condition, confirming Truckenbrodt & Darcy's (2010) findings. In both narrow focus conditions, in contrast, there was a preference for the absence of any internal intonational phrase boundary, which was more pronounced for the condition in (114). 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 Schuboe, 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 (112)) and DESTRESSGIVEN (which militates against stressing discourse-given items), as well as the prosodic constraint RIGHTMOST (which requires keeping nuclear stress rightmost) above syntax-phonology and

phonology-syntax mapping constraints. Whenever nuclear stress shifts to the focus in (114), keeping stress rightmost as well as destressing post-focal material is better achieved by not mapping the complement clause into its own intonational phrase. In (115), in contrast, destressing pre-focal material is responsible for dephrasing and thus prosodic integration. An 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. Forty percent of the time, an intonational phrase break separates the matrix and the embedded clause (including the category of Intermediate Phrase, used by Feldhausen, the complement clause phrases separately 80% of the time). An intonational phrase bre ak 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, 2010: 93) reports 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 intonational phrase break (over 65% of the time at a normal speech rate). To account for this phrasing, schematized in (116), Feldhausen proposes the ALIGN-TOP, R constraint given in (65), which is responsible for inserting the right edge of an intonational phrase after the topic and separating it from the rest of the embedded clause.

(116)   (... 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 & Szendrői (2017). An embedded topic, here *síŋgâ*, also fails to phrase together with the embedded clause in the example (117).

(117)   [$_{TP}$ [$_{TP}$ ($_ι$ ($_ι$ hálà à-jè lóŋgέ)] [$_{CP}$ $^↓$lέ [$_{TopP}$ *síŋgâ* [$_{TP}$ ($_ι$ s**ó**γól$_j$ à-ǹ-ʤέ$_i$ [$_{vP}$$t_j$ t_i jô))]]]]]]

hálà à-jè	lɔ́ŋgɛ̀ lɛ́	síŋgà sóɣól	à-n-ʤɛ́	jɔ̀
so	1.AGR-be.PRES	well that 9.cat	1.grandfather	1.AGR-PST1-eat 9.PRO

'This is good that the cat was eaten by the grandfather'.
(= This is good that the cat the grandfather ate it.)

What is seen in (117) through the failure of Falling Tone Simplification, a phenomenon by which a sequence of HL-H tones becomes H-$^{\downarrow}$H when no left intonational phrase edge intervenes, is that the topical phrase sits outside of the intonational phrase constituted by the rest of the embedded clause. As argued by Hamlaoui & Szendrői, there is, however, no evidence that the topic itself forms an Intonational Phrase. Rather, and as visible in (117) and just like in Catalan, it phrases with the material that precedes it. The position of the left intonational phrase break aligning with the embedded TP rather than CP is, according to Hamlaoui & Szendrői, consistent with their idea that the syntactic projection relevant to the syntax-phonology and phonology-syntax mapping of the intonational 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 (118) simply requires a topic to align with the edge of an intonational phrase but not for it to form one.

(118)   ALIGN-TOPIC (Hamlaoui & Szendrői 2017: 23)
        Align the left or right edge of a topic with the left or right edge of an
        Intonational Phrase.

The embedded intonational phrase edge required to satisfy (118) is not, however, free to appear just anywhere. It has to satisfy the prosody-to-syntax constraints in (73b), 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 intonational 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 realization 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 intonational 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 intonational 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 intonational 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., $Force^0$ and $Comp^0$); Hamlaoui & 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.

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