(70) a. [Mary-ga [kinoo [[[John-ga kekkonshita] to] itta]]]
Mary-Nom yesterday John-Nom got married C said
'Yesterday Mary said that John got married.'

b. Mary-ga kinoo, John-ga kekkonshita to itta.

In sum, phonetic form or written form must be faithful to the phonological structure with prosodic boundaries. Optional use of commas in Japanese helps the parser to choose the intended phrase structure of the sentence. English and some other European languages compensate for the lack of free commas with prosody or word order change.

5.6 Summary

I have argued that the theory of syntax-phonology mapping and prosodic phrasing can deal with the effects of constituent length on phonology and syntax.[8] The theory can also be an alternative to Hawkins's EIC analysis of word order.

Finally, if the analysis presented here is on the right track, then we can argue that constituent length is a matter of grammar, not a matter of performance as Hawkins (1994)

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[8] In this sense, the theory proposed here is opposite to Ghini (1993), who reduces the syntactic notion of branchingness into the phonological concept of weight. We share the view that branchingness and weight are related to each other, however.

argues. Of course we need discussion of more phenomena relating to constituent length. I will leave this for future research.

Chapter 6

Prosody in Discourse

In this chapter, I will argue that the bare mapping theory gives a new insight into prosody in discourse. In Section 6.1, I will discuss the phonological rules operating across sentences. In Section 6.2, I will argue that the bare mapping rule applies the hierarchical structure of discourse to give the long pause after the end of a paragraph or a larger unit of discourse.

6.1 Phonological Rules Operating across Sentences

Nespor and Vogel (1986: 235), citing Kahn (1980) and Harris (1969), show that some phonological rules may operate across sentences. First, consider the data from Mexican Spanish (cf. Harris 1969: 60). Voicing Assimilation may occur on *dos* in (a) but not in (b) where a pause (‖) occurs after the first sentences.

(1) a. Los dos. Dámelos. [los^{z} ðós^{z} dámelos]
'Both of them. Give them to me.'

b. Los dos. ‖ Dámelos. [los^{z} ðós dámelos]

Second, Flapping, the Linking-*r*, and the Intrusive-*r* may occur across the pairs of sentences, as shown in (a), (b), and (c), respectively.

(2) a. It's late. I'm leaving. --> ... la[ɾ] I'm ...

b. Where's Esther? I need her. --> ... Esthe[r] I ...

c. Call Anna. It's late. --> ... Anna[r] It's ...

Nespor and Vogel (1986: 221) assume that the topmost prosodic constituents, Utterance (U), is delimited by the beginning and end of the syntactic constituent X^n. They argue that these phenomena shown in (1) and (2) occur when Us are restructured into a single unit. For example, the process in (2a) can be represented as follows:

(3) $[_U$ It's late] $[_U$ I'm leaving] --> $[_U$ It's la[ɾ] I'm leaving]

However, these rules do not apply across all sentences. Nespor and Vogel propose the two phonological conditions on U restructuring as shown in (4).

(4) a. The two sentences must be relatively short.

b. There must not be a pause between the two sentences.

They also argue that the phonological unit U cannot be isomorphic with any syntactic constituent because X^n is by definition the largest constituent in syntax.

Nespor and Vogel's explanation is successful but not without problems. First, as they admit by themselves, (4a) is rather vague since they cannot give more precise indications about the length of the sentence involved. They just point out that phonological restructuring does not occur when the sentences are long. Second, they also just mention that rate of speech appears to play a role in a type of trade-off relation with length. This is nothing but an observation. Their analysis does not answer the question why this is the case.

The bare mapping theory gives us more precise characterization of the phenomena. First, let us consider the phrase structure above the sentence. Larson (1990: 594) discusses the following data on coreference:[1]

(5) a. * He came in and John was tired.

b. * He came in. John was tired.

On the basis of parallelism between (5a) and (5b), Larson assumes the following:

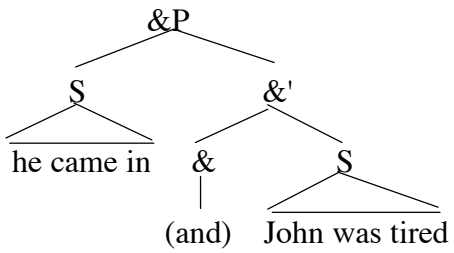
(6) a. Intrasentential anaphora between elements α, β depends on the relative hierarchical relations of α, β themselves; intrasentential anaphora between α, β depends on the relative hierarchical relations of the Ss containing α, β.

b. Coordination structures fall under X-bar theory and have conjunctions as their heads.

c. In their default form, discourses are extended coordinations.

Then (5a) and (5b) share the following phrase structure:

(7)



[1] See Tokizaki (1995, 1996) for the discussion of coordinate structure and coreference.

Larson explains the disjoint reference in (5a) and (5b) with the constraint to the effect that "an S containing an R-expression cannot be c-commanded by an S containing a coreferential phrase."

As Larson's analysis of coreference in discourse seems to be on the right track, let us assume that sentences are hierarchically structured into a tree as shown in (7). Then the structure of (2a), for example, is the following:

(8) $[_{\&P}\ [_{IP}\ [_{D}$ It's$]\ [_{A}$ late$]]\ [_{\&'}$ & $[_{IP}\ [_{D}$ I'm$]\ [_{V}$ leaving$]]]]$

Here, & is the covert version of *and*. As I assumed above, phonologically null elements are invisible to the mapping rule. Then mapping rule applies to the following structure (9a), instead of (8), to give the output (9b).

(9) a. $[_{\&P}\ [_{IP}\ [_{D}$ It's$]\ [_{A}$ late$]]\ [_{IP}\ [_{D}$ I'm$]\ [_{V}$ leaving$]]]$

b. /// It's // late //// I'm // leaving ///

Notice that there are four boundaries between the sentences in (9b). This number is nearly the smallest between two sentences. As the sentences become longer, the number may increase, as shown in (10).

(10) a. $[_{\&P}\ [_{IP}\ [_{D}$ It's$]\ [_{AP}\ [_{Adv}$ very$]\ [_{A}$ late$]]]\ [_{IP}\ [_{\&P}\ [_{N}$ Irene$]\ [_{\&'}\ [_{\&}$ and$]\ [_{D}$ I$]]]\ [_{I'}\ [_{I}$ are$]\ [_{V}$ leaving$]]]]$

b. /// It's /// very // late ////// Irene /// and // I ///// are leaving ////

In (10b), there are six boundaries between the sentences. The additional two boundaries are due to the AP and &P boundary in (10a). If the boundary deletion rule with *n*=4 applies to (9b) and (10b), we get (11a) and (11b), respectively.

(11) a. It's late I'm leaving (*n*=4)

b. It's very late // Irene and I / are leaving

Let us assume that Flapping is blocked if one or more boundaries intervene between [t] and the following vowel. Then we can explain straightforwardly why Flapping may occur between the short sentences in (11a) but not between the long sentences in (11b).

Moreover, we can also explain why speech rate appears to play a role in a type of trade-off relation with length. As the speaker utters sentences faster, the number *n* in the boundary deletion rule increases. Thus Flapping could occur even in (10) if all the boundaries between the sentences are deleted by the deletion rule with *n*=6. On the other hand, if the sentences in (2a) are uttered in slower rate, the boundary deletion rule with a smaller value for *n* cannot delete all the boundaries between the sentences, as shown in (12).

(12) It's late / I'm leaving (*n*=3)

In this case, Flapping is blocked by the remaining boundary. Thus we can explain optionality of intrasentential phonological process including the factors of speech rate and length of sentences straightforwardly.

Furthermore, the bare mapping theory can give us a profound insight into the syntax and semantics of conjunctions. Nespor and Vogel (1986: 241) argue that *or* and

but behave differently from *and*, *therefore*, and *because* in the possibility of intrasentential phonological process. As we have seen above, Flapping, the Linking-*r*, and the Intrusive-*r* may occur across the pairs of sentences. This is the case with the following examples where the two sentences are conjoined implicitly with *and*, *therefore*, and *because*, as shown in (13), (14), and (15), respectively.

(13) a. You invite Charlotte. I'll invite Joan. --> ... Charlo[ɾ] I'll ...

b. Isabelle's a lawye~~r~~. I'm a doctor. --> ... lawye[r] I'm ...

(14) a. It's late. I'm leaving. --> ... la[ɾ] I'm ...

b. I'm shorte~~r~~. I'll go in the back. --> ... shorte[r] I'll ...

(15) a. Take your coat. It's cold out. --> ... coa[ɾ] It's ...

b. Hide the vodka. Alvin's coming. --> ... vodka[r] Alvin's ...

Interestingly enough, sentences implicitly conjoined with *or* and *but* typically do not permit the application of these rules.

(16) a. Stop that. I'll leave otherwise. --> *... tha[ɾ] I'll ...

b. Finish your pasta. I'll eat it otherwise. --> *... pasta[r] I'll ...

(17) a. It's late. I'm not leaving though. --> *... la[ɾ] I'm ...

b. I didn't invite Peter. I should have though. --> *... Pete[r] I ...

Note that in each example of (16) and (17), Nespor and Vogel add the words *otherwise* and *though* to the second sentence. This is because the cases are extremely difficult to find where *or* and *but* relation is implied between sentences. Nespor and Vogel, citing

Cooper and Paccia-Cooper's (1980: 163) analysis of the example below, argue that negative semantic relation between two sentences influence speech timing.

(18) a. The tall yet frail student flunked chemistry.

b. The tall and frail student flunked chemistry.

Here, it is more likely that pausing will occur immediately before a negative conjunction (*yet*, *but*) than before a positive one (*and*). Posner (1973) also suggests that pausing with negation may reflect the speaker's need for an extra interval of processing time, necessary to access lexical information that is more distant from the lexical information just spoken. Nespor and Vogel conclude that adjacent Us may be joined into a single U when there exists a positive semantic relation between the Us.[2]

Nespor and Vogel's observation seems accurate and penetrating, but it does not give us a principled explanation of the difference between positive and negative conjunctions. I will show how the difference can be explained in the bare mapping theory below.

The phrase structure of (16a) and (17a) is (19a) and (19b), respectively. [3]

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[2] In fact, Nespor and Vogel's (1986: 244) final formulation of U restructuring includes various types of conditions as shown in (i).

(i) Adjacent Us may be joined into a single U when the basic pragmatic and phonological conditions are met and when there exists a syntactic relation (ellipsis, anaphora) and/or a positive semantic relation (*and*, *therefore*, *because*) between the Us in question.

[3] Traditionally, *otherwise* and *though* is classified as adverbial. However, we can say that *otherwise* is used as a conjunction in (i) where no other conjunction like *and* is used.

(i) Leave home by 7:00, otherwise you will miss the plane.

(19) a. $[_{CNJP}\ [_{VP}\ [_{V}$ Stop$]\ [_{D}$ that$]]\ [_{CNJ'}\ [_{IP}\ [_{D}$ I'll$]\ [_{V}$ leave$]]\ [_{CNJ}$ otherwise$]]$

b. $[_{CNJP}\ [_{IP}\ [_{D}$ It's$]\ [_{A}$ late$]]\ [_{CNJ'}\ [_{IP}\ [_{D}$ I'm$]\ [_{NegP}\ [_{Neg}$ not$]\ [_{v}$ leaving$]]]\ [_{CNJ}$ though$]]$

The mapping rule applies to (19a) and (19b) to give (20a) and (20b), respectively.

(20) a. /// Stop // that ///// I'll // leave /// otherwise //

b. /// It's // late ///// I'm /// not // leaving //// though //

Compare these with (9), repeated here as (21), where the relation implied is *therefore*.

(21) a. $[_{\&P}\ [_{IP}\ [_{D}$ It's$]\ [_{A}$ late$]]\ [_{IP}\ [_{D}$ I'm$]\ [_{V}$ leaving$]]]$

b. /// It's // late //// I'm // leaving ///

The number of boundaries after the first sentence is five in (20a) and (20b) and four in (21b). The extra boundary in (20a) and (20b) is due to the CONJ' boundary in (19a) and (19b) which is made visible by the conjunction at the end of the second sentence. If we apply the boundary deletion rule with n=4 to (20a) and (20b), we get (22a) and (22b), respectively.

(22) a. Stop that / I'll leave otherwise (n=4)

b. It's late / I'm not leaving though (n=4)

Thus I will assume that *otherwise* and *though* are used here as conjunctions. See Tokizaki (2005a) for the discussion of the precise structure of (19a) and (19b)

Compare these with (11a) with an implied *and*, repeated here as (23).

(23) It's late I'm leaving (*n*=4)

Thus we correctly predicts Flapping applies in (23) and not in (22a) and (22b).[4]

To sum up, we have seen that the bare mapping theory successfully explains when phonological rules operate across sentences. The mapping rule interprets as prosodic boundaries not only syntactic boundaries within a sentence but also those before and after it. If the sentence becomes longer, then it may have more syntactic and prosodic boundaries before and after it. The faster the speaker utters sentences, the more prosodic boundaries are deleted. Thus we can take into account the factors of sentence length and speech rate. Optional application of phonological rules is also explained by changing the number of boundaries to be deleted.

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[4] We can explain the cases where there is no overt conjunction such as *otherwise* and *though* if we assume that a covert conjunction, which is 'visible' to the mapping rule, makes another syntactic and prosodic boundary. Then (18a) and (18b), for example, have the representation shown in (ia) and (ib), respectively. I omit the boundaries irrelevant to the discussion here.

(i) a. The $[_{CNJ2P}\ [_{CNJ1P}\ [_{CNJ1}\ e]\ [_{A}$ tall]] $[_{CNJ2'}\ [_{CNJ2}$ yet] $[_{A}$ frail]]] student flunked chemistry.

b. The $[_{CNJP}\ [_{A}$ tall] $[_{CNJ'}\ [_{CNJ}$ and] $[_{A}$ frail]]] student flunked chemistry.

There are four boundaries before *yet* in (ia) and three before *and* in (ib). Thus we can correctly predict a longer pause there in (ia) than (ib).

6.2 Hierarchical Structure in Discourse

I will argue briefly that our bare mapping theory correctly explains why a paragraph or a discourse ends with a long pause. Let us consider a simple example of a discourse consisting of four sentences:[5]

(24) John came. He sang. Mary came. She danced. The party went on and on ....

As I argued in 6.1, I assume that discourses are extended coordinations. Then the structure of the first and the second sentences in (24) is (25a) and that of the third and the fourth in (24) is (25b).

(25) a. $[_{\&P}\ [_{IP}\ [_{N}$ John$]\ [_{V}$ came$]]\ \lceil_{\&'}\ \&\ [_{IP}\ [_{D}$ He$]\ [_{V}$ sang$]]]]$

b. $[_{\&P}\ [_{IP}\ [_{N}$ Mary$]\ [_{V}$ came$]]\ \lceil_{\&'}\ \&\ [_{IP}\ [_{D}$ She$]\ [_{V}$ danced$]]]]$

Either of (25a) and (25b) makes a semantic unit which we may call a paragraph. I propose that (25a) and (25b) are also combined by merging (25b) with a covert conjunction *&* and by merging the resulted *&'* with (25a), as shown in (26).

(26) $[_{\&2P}\ [_{\&P}\ [_{IP}\ [_{N}$ John$]\ [_{V}$ came$]]\ \lceil_{\&'}\ \&\ [_{IP}\ [_{D}$ He$]\ [_{V}$ sang$]]]]\ \lceil_{\&2'}\ \&2\ [_{\&P}\ [_{IP}\ [_{N}$ Mary$]$
$[_{V}$ came$]]\ \lceil_{\&'}\ \&\ [_{IP}\ [_{D}$ She$]\ [_{V}$ danced$]]]]]]$

The tree diagram of (26) is shown as (27).

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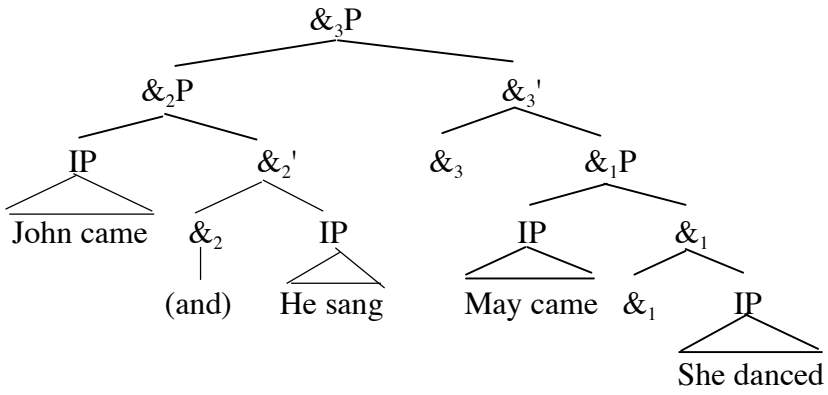
[5] See Tokizaki (1996b) for discourse structure and coreference.

(27)



The phrase structure in (26) or (27) is interpreted as a phonological representation as in (28).

(28) //// John // came //// He // sang /////// Mary // came //// She // danced //////

In (28), there are four boundaries between *came* and *He* and seven between *sang* and *Mary*. In other words, there are more boundaries after the end of a paragraph than the end of a sentence. One might argue that there are not so many boundaries after *danced* (six) as between *came* and *He* (seven). However, this mini discourse may well be followed by another mini discourse as in the following:

(29) John came. He sang. Mary came. She danced. The party went on and on ....

Then the second mini discourse has a number of syntactic brackets in front of it which are interpreted as prosodic boundaries as shown in (30).

(30) a. ... danced]]]]]] $\&_4$ [$_{IP}$ [$_{DP}$ [$_D$ The] [$_N$ party]] [$_{VP}$ [$_V$ went] [$_{\&P}$ [$_{ADV}$ on] [$_{\&'}$ [and] [$_{ADV}$ on]]]]]

b. ... danced ////// /// The // party //// went /// on /// and // on ///// ...

In the example (30), there are nine prosodic boundaries between *danced* and *The*. Thus, we can correctly predict more boundaries between larger discourse units such as paragraph and discourse. This is a welcomed result of the bare mapping theory.

6.3 Summary

In this chapter, I argued that the bare mapping theory naturally explains prosodic phonology above a sentence along with the assumption that discourses are extended coordinations. We have seen that phonological rules may operate between sentences if the two sentences are not separated by prosodic boundaries that block their application. I also showed that the bare mapping theory can explain duration of pauses between paragraphs and discourses. The fact that we can explain the prosody from small units to discourses gives support to the bare mapping theory.

Chapter 7

Topic, Focus, and Phrasing

In this chapter, I will argue that bare mapping theory shed a new light on topic/focus and movement. First, I will discuss how to deal with focus effect on phrasing in Section 7.1. Section 7.2 is the discussion of Topicalization in English. In 7.3, I will reconsider Serbo-Croatian Topicalization analyzed by Zec and Inkelas (1990). Section 7.4 deals with topic and Spirantization in Italian analyzed by Frascarelli (1997, 2000). In 7.5, I will consider postposing and preposing of focus in the sentence. Section 7.6 is the summary of this chapter.

7.1 Focus and Phrasing

The bare mapping theory makes it possible to deal with the effect of focus on prosodic phrasing. I will discuss two possible approaches: strong boundaries for focused constituents, and boundary deletion for presupposed strings.

If we try to explain the focus effects on phrasing by marking focused elements, one possible way is to add one (or more) pair of brackets to the focused constituent. Let us take Hausa *fa* again for example. We have seen in Chapter 2 that *fa* cannot be inserted before a non-branching constituent as shown in (1a) while it can be before a branching constituent (1b).

(1) a. *Ya $[_{VP}$ $[_{V}$ sayi] <u>fa</u> $[_{NP}$ teburin]]
he bought table-DEF
'He bought the table.'

b. Ya [$_{VP}$ [$_{V}$ sayi] fa [$_{NP}$ [$_{A}$ babban] [$_{N}$ tebur]]]

he bought big table

'He bought a big table.'

In (1a), the object NP *teburin* does not branch, and *fa* cannot be inserted. In (1b), the object NP *babban tebur* branches, and *fa* is allowed to occur in the position preceding it. As shown in (2a), however, *fa* can be inserted before an emphatic non-branching constituent. We can explain this fact by adding brackets to the focus constituent, as shown in (2b):

(2) a [$_{S}$ [$_{NP}$ Ya] [$_{VP}$ [$_{V}$ sayi] fa [$_{NP}$ *teburin*]]] (cf. (1a))

he bought tabel-def. (emph.)

'He bought the table.'

b. [$_{S}$ [$_{NP}$ Ya] [$_{VP}$ [$_{V}$ sayi] fa [$_{FOC}$ [$_{NP}$ *teburin*]]]] (cf. (1b))

c. // Ya /// sayi /// teburin ////

The bare mapping rule makes the representation shown in (2c) which has the same number of boundaries, that is 3, between *sayi* and *teburin* as the branching case (1b) has.

The addition of brackets, however, may raise a problem of making non-branching structure if it is a process in syntax. We could argue that it occurs in PF. Representation of focus is a matter of the whole architecture of grammar. I will leave this matter open.

A more interesting way to explain focus effects on phrasing is to delete the syntactic boundaries of presupposed strings. If we suppose that a sentence consists of presupposition and focus, *teburin* is focus and *ya sai* is presupposed in (2a). Let us assume that the rule of presupposition deletes all the syntactic boundaries of the

presupposed string. We also delete non-branching nodes because we are assuming bare phrase structure. Then we have (3a) and the phrasing (3b) as the output of the syntax-phonology mapping rule (3) in Chapter 2:

(3) a. ~~[~~$_S$~~[~~$_{NP}$ Ya~~]~~ ~~[~~$_{VP}$~~[~~$_V$ sayi~~]~~ fa [$_{NP}$ *teburin*]~~]~~

b. Ya sayi fa / *teburin* /

The deletion of brackets is supported by the following fact of extraction from NP. (4a) shows that extraction from NP is generally unacceptable, but it is allowed when the NP is a part of presupposed elements as in (4bB) (cf. Kuno (1987: 24), brackets and underlines added):

(4) a. *Who did you destroy [a picture of]?

b. A: Right after Chairman Mao died, they started taking [$_{NP}$ pictures of the Central Committee members] off the wall.

B: Who did they destroy more pictures of, Chairman Mao or Jiang Qing?

We can argue that NP boundaries are deleted in (4bB) because the NP *more pictures of* is a part of presupposition. The same effect is also observed in (5a) and (5b) where *only* can be associated with the focus in the complex NP and the adjunct (Rooth 1996: 283).

(5) a. Dr. Svenson only rejected the proposal that [John]$_F$ submitted.

b. Dr. Svenson only complain if [Bill]$_F$ doesn't finish his job.

The point is that the structure after deletion is the input to the syntax-phonology mapping proposed here.

I will not argue which of these two approaches are better here. There is also a possibility that both addition and deletion of brackets are involved in phrasing of sentences with focus. The point is that bare mapping theory can make it easy to deal with cases of focus.

7.2 When do Topic and Focus Make a Prosodic Phrase?

Büring (1997: 58) suggests that [T]- and [F]-marked constituents are mapped on to prosodic phrases. However, topic and focus do not always make a separate prosodic phrase. In this section I argue that a syntax-phonology mapping adequately predicts the phrasing of topic and focus in the minimalist framework.

Topic constituents are often followed by a prosodic boundary, as in (6), but that is not always the case as shown in (7) (cf. Bing (1979:129, 228)).

(6) a. (Up the street) (trotted the dog)

b. (Tom Roeper) (is going to Germany)

(7) a. (Here comes the sun)

b. (Tom is going to Germany)

Bing (1979) tries to explain the difference in phrasing by her NP Prominence Principle. Topic contains a nonanaphoric NP in (6), but it does not in (7). However, the principle does not predict a boundary after an adjectival phrase which does not contain an NP, as in (8) which is cited from Rochemont (1978:31).

(8) a. (Poor but healthy) (is my best friend)

b. (Happy to be here) (are the refugees from Pakistan)

On the other hand, focused constituents are usually not separated by a prosodic boundary from the rest of the sentence whether postposed, as in (6a) and (7a), or preposed, as in (9a). However, long and heavy constituents make a prosodic phrase when postposed, as in (9b).

(9) a (California rolls I love to eat) [What do you love to eat?]

b. (Max put in his car) (all the boxes of home furnishings)

Then the question is: When do topic and focus make a prosodic phrase? We can answer the question with the bare mapping theory. The bare mapping rule interprets syntactic boundaries as prosodic boundaries. For example, the rule maps the syntactic boundaries of the sentence in (10a) onto the prosodic boundaries in (10b).

(10) a. [[Up [the street]] [trotted [the dog]]]

b. // Up / the street /// trotted / the dog ///

If we apply the boundary deletion rule with n=1 to (10b), we get (11) which correctly predicts the phrasing patterns in (6a).

(11) / Up the street // trotted the dog //

Similarly, for (12a) we get (12b) and (12c) as the output of the bare mapping rule and the boundary deletion rule with *n*=1.

(12) a. [Here [comes John]]

b. / Here / comes John //

c. Here comes John /

Thus we can explain why topic constituents make their own prosodic categories in (6), and (8) but not in (7). We can also predict that postposed focus does not make its own prosodic category in (6a), (7a), and (8). In these sentences, the focus constituent has at most one syntactic bracket at its left. I will discuss preposed/postposed focus in section 7.5 below.

We can also explain why subjects are likely to be the topic of sentences and to make their own prosodic phrases, separated from the predicates. Subjects are usually DP or NP with its internal structure which is right branching in most cases in English and other languages. As the subject gets longer, it makes more boundaries at the end of it, as shown in (13) (cf. 4.3.6).

(13) a. [[The girl] [plays succer]]

b. [[The [girl [from Bloomington]]] [plays succer]]

c. [[The [girl [from [Bloomington [in Indiana]]]]] [plays succer]]

These structures are mapped onto the following phonological representations:

(14) a. // The girl // plays succer //

b. // The / girl / from Bloomington //// plays succer //

c. // The / girl / from / Bloomington / in Indiana ////// plays succer //

There are two boundaries between the subject and the verb in (14a), four in (14b), and six in (14c).

On the other hand, an object does not make a prosodic phrase by itself, but is grouped together with the verb to make a prosodic phrase in most cases. In our theory, this is because long NPs with right branching structure have a small number of brackets in front of them, as shown in (15).

(15) a. [John [loves [the girl]]]

b. [John [loves [the [girl [from Bloomington]]]]]

c. [John [loves [the [girl [from [Bloomington [in Indiana]]]]]]]

The phonological representations mapped from (15a), (15b), and (15c) are (16a), (16b), and (16c), respectively.

(16) a. / John / loves / the girl ///

b. / John / loves / the girl / from / Bloomington /////

c. / John / loves / the girl / from / Bloomington / in Indiana ///////

Throughout (16a) to (16c), there is only one boundary between the verb and its object. Thus, the bare mapping theory correctly predicts that the length of object does not affect the phrasing between the verb and the object.

7.3 Topicalization in Serbo-Croatian

Zec and Inkelas (1990) argue that the Serbo-Croatian topicalization is prosodically constrained. The topic must be a branching phonological phrase, as shown in (17a). Topics consisting of only one phonological word are judged ungrammatical, as in (17b) (Inkelas and Zec 1995: 545).

(17) a. $[[\text{Taj}]_{\omega}\ [\ \text{čovek}]_{\omega}\ ]_{NP}$ voleo-je Mariju
that man loved-AUX Mary
'That man loved Mary.'

b. *$[[\text{Petar}]_{\omega}\ ]_{NP}$ voleo-je Mariju
Peter loved-AUX Mary
'Peter loved Mary.'

Zec and Inkelas conclude that the topicalized unit ought to be a branching prosodic constituent. However, why is topicalization prosodically constrained only in Serbo-Croatian? In fact, a number of languages, including English and Italian, permit the non-branching topic, as shown in (18a) and (18b).

(18) a. Cookies I love.

b. In America ci sono andato tanti anni fa.
in America there be-1SG go-PP many years ago
'I went to America many years ago.'

Zec and Inkelas do not show the explanation. As Frascarelli (2000: 82) instead notes, Serbo-Croatian locates clitics in "second" position. In (17b), *Petar* is the first constituent and *voleo* is the second. The sentence is unacceptable because the clitic *–je* is located in the third position. The clitic *–je* is located in the third position also in the sentence (17a). However, the topic *taj čovek* is separated from the rest of the sentence and makes its own prosodic phrase. Thus, the clitic is counted as the second constituent in the second prosodic phrase, as shown in (19a). The non-branching topic *Peter* is not long enough to make its own prosodic phrase. It is incorporated as the first constituent in a prosodic phrase with the rest of the sentence, as shown (19b).

(19) a. [Taj čovek] [voleo-je Mariju]

b. [Petar voleo-je Mariju]

In (19b), the clitic is still the third constituent in the prosodic phrase, and makes the sentence unacceptable. We can account for the prosodic difference between (19a) and (19b) as follows. The phrase structure of (17a) and (17b) is (20a) and (20b), respectively.

(20) a. $[_{IP}\ [_{DP}\ [_{D}$ Taj$]\ [_{N}$ čovek$]]\ [_{I'}\ [_{V}$ voleo-je$]\ [_{N}$ Mariju$]]]$

b. $[_{IP}\ [_{N}$ Petar$]\ [_{I'}\ [_{V}$ voleo-je$]\ [_{N}$ Mariju$]]]$

The mapping rule derives (21a) and (21b) from (20a) and (20b).

(21) a. /// Taj // čovek //// voleo-je // Mariju ///

b. // Petar /// voleo-je // Mariju ///

The boundary deletion rule with *n*=3 applies to (21a) and (21b) to give (22a) and (22b).

(22) a. Taj čovek / voleo-je Mariju (*n*=3)

b. Petar voleo-je Mariju (*n*=3)

Thus we correctly predict the difference in phrasing between (19a) and (19b).

Progovac (1996: 424) shows the following Serbo-Croatian sentences in which *nocu* is topicalized:

(23) a. Nocu, -- ovde = je mirnije.
at-night here is more-quiet
'At night, it is more quiet here.'

b. Nocu, ko = bi ovde dosao?
at-night who would here come
'At night, who would come here?'

c. Nocu, Marija ovde spava.
at-night Mary here sleeps

Progovac observes that in (23a), *nocu* is necessarily set off from the rest of the clause by a pause. (23b) and (23c) also show that a pause follows the topic constituent. Notice that *nocu* is as short as *Petar* in (17b). The fact that (23a) as well as (23b) and (23c) is acceptable throw a doubt on Zec and Inkelas's (1990) analysis.

We can explain the acceptability of (23a) in the bare mapping theory. Let us assume that the phrase structure of (23a) is (24).

(24) [Nocu] [[ovde] =je] [mirnije]]

Then the mapping rule applies to (24) and gives (25).

(25) / Nocu /// ovde / =je // mirnije //

If we apply the deletion rule with *n*=2, we have (26) as the output.

(26) Nocu / ovde =je mirnije (*n*=2)

Thus we can correctly explain the phrasing and the pause in (23a).

7.4 Topic in Italian

Frascarelli (1997: 240, 2000: 47) argues that a branching topic always forms a separate I-constituent. Thus I-domain rules never appear at its boundaries, as shown in (27a) and (27b) which have a left-handed topic and a right-handed topic, respectively (topic is romanized).

(27) a. [[Gli amici]$_{\phi}$ [di Sara]$_{\phi}$]$_{I}$ [[[dʒ]*ianni*]$_{\phi}$ [*è* *partito*]$_{\phi}$
the friends of Sara Gianni be-3SG leave-PP
[*senza neanche salutaruli*]$_{\phi}$]$_{I}$ *[dʒ] -> [ʒ]
without even to say good-bye –to.them
'Gianni left without saying good-bye-to Sara's friends.'

b. [[*Hanno deciso*]$_{\phi}$ [*di andare*]$_{\phi}$ [*in vacanza*]$_{\phi}$]$_{I}$ [[[tʃ]esare]$_{\phi}$ [e sua
have-3PL decided of to go in holiday Cesare and his
moglie]$_{\phi}$]$_{I}$ *[tʃ] -> [ʃ]
wife
'Cesare and his wife have decided to go on holiday.'

Here, the affricates [dʒ] and [tʃ] do not turn into the corresponding fricatives [ʒ] and [ʃ].

Frascarelli also argues that the behavior of non-branching topics changes depending on the style/speed of speech. In relatively slow speech, I-domain phenomena never appear at topic boundaries:

(28) a. [[Questo libro]$_{\phi}$]$_{I}$ [[[k]*onosco*]$_{\phi}$ [*l' autre*]$_{\phi}$ [*che l' la scritto*]$_{\phi}$]$_{I}$
this book know-1SG the author that it have-3SG written
'(As for) this book, (I) know the author who has written it.'

b. [[*Lo incontrerò*]$_{\phi}$ [*domani sera*]$_{\phi}$]$_{I}$ [[[dʒ]ianni]$_{\phi}$]$_{I}$
him meet-will-1SG tomorrow evening Gianni
'(I) will meet Gianni tomorrow in the evening.'

However, when the speech rate increases, non-branching topics generally restructure into adjacent Is:

(29) [[Questo libro]$_{\phi}$ [[h]*onosco*]$_{\phi}$ [*l'autre*]$_{\phi}$ [*che l'la scritto*]$_{\phi}$]$_{I}$

(30) [[*Lo incontrerò*]$_{\phi}$ [*domani sera*]$_{\phi}$ [[ʒ]ianni]$_{\phi}$]$_{I}$

Here, I-restructuring is shown by the presence of Gorgia Toscana/Intervocalic Spirantization.

We can explain the facts with the bare mapping theory. Let us consider the syntactic structure of the sentences. In (31b) and (32b) are shown the phonological representations which are derived by applying the mapping rule to the structures in (31a) and (32a), respectively. In the sentences with non-branching topics, there are four boundaries between the topic and the rest of the sentence.

(31) a. $[_{IP}\ [_{DP}\ [_{D}$ Questo$]\ [_{N}$ libro$]]\ [_{IP}\ [_{V}$ {k/h}onosco$]\ [_{DP}\ [_{DP}$ l'autre$]\ [_{CP}\ [_{C}$ che$]$
$[_{VP}\ [_{D}$ l'la$]\ [_{V}$ scritto$]]]]]]$

b. /// Questo // libro //// {k/h}onosco /// l'autre /// che /// l'la // scritto //////

(32) a. $[_{IP}\ [_{VP}$ Lo incontrerò$]\ [_{AdvP}\ [_{N}$ domani$]\ [_{Adv}$ sera$]]]\ [_{N}$ {dʒ/ʒ}ianni$]$]

b. // Lo incontrerò /// domani // sera //// {ʒ}ianni //

In the sentences with branching topics, there are more than five boundaries between topic and the rest of the sentence.

(33) a. $[_{IP}\ [_{DP}\ [_{D}$ Gli$]$ $[_{N'}\ [_{N}$ amici$]\ [_{PP}\ [_{P}$ di$]\ [_{N}$ Sara$]]]]$ $[_{IP}\ [_{N}$ {dʒ}ianni$]$
$[_{I'}\ [_{I}$ è $[_{VP}$ partito$]\ [_{PP}\ [_{P}$ senza$]$ $[_{VP}\ [_{Adv}$ neanche$]\ [_{V}$ salutaruli$]]]]]]]$

b. /// Gli /// amici /// di // Sara ////// {dʒ}ianni //// è partito /// senza /// neanche // salutaruli ///////

(34) a. $[_{IP}\ [_{IP}\ [_{I}$ Hanno$]\ [_{VP}\ [_{V}$ deciso$]\ [_{IP}\ [_{I}$ di$]\ [_{VP}\ [_{V}$ andare$]\ [_{PP}\ [_{P}$ in$]\ [_{N}$ vacanza$]]]]]$
$[_{CONJP}\ [_{N}$ [tʃ]esare$]\ [_{CONJ'}\ [_{CONJ}$ e$]\ [_{DP}\ [_{D}$ sua$]\ [_{N}$ moglie$]]]]]$

b. /// Hanno /// deciso /// di /// andare /// in // vacanza /////// [tʃ]esare /// e /// sua // moglie /////

Thus, if we accelerate the utterance, for example to *n*=4, all the boundaries are deleted between non-branching topic and the rest of the sentence. Some boundaries are still left between branching topic and the rest of the sentence.

(35) a. Questo libro {k/h}onosco l'autre che l'la scritto // (*n*=4)

b. Lo incontrerò domani sera {ʒ}ianni (*n*=4)

(36) a. Gli amici di Sara // {dʒ}ianni è partito senza neanche salutaruli (*n*=4)

b. Hanno deciso di andare in vacanza /// [tʃ]esare e sua moglie / (*n*=4)

We can argue that the boundaries left block Spirantization in (36). Thus we can explain the fact that non-branching topic can form a separate I-constitunet if the speech rate increases.

7.5 Preposed/Postposed Focus

Turning to focused constituents, we can straightforwardly explain the cases where they are postposed. As we have seen in section 7.2, in sentences such as (6a), the focused constituent *the dog* is separated from the preceding verb *trotted* by only one syntactic and prosodic boundary, as shown in (10a) and (10b). The prosodic boundary can easily be deleted by the boundary deletion rule with *n*=1 as in (11). (10a), (10b), and (11) are repeated here as (37a), (37b), and (37c), respectively.

(37) a. [[Up [the street]] [trotted [the dog]]]

b. // Up / the street /// trotted / the dog ///

c. / Up the street // trotted the dog // (*n*=1)

On the other hand, in "Heavy NP Shift" sentences such as (9b), the focused DP is preceded by four boundaries, as in (38a) and (38b).

(38) a. [Max [[put [in [his car]]] [all [the [boxes [of [home furnishings]]]]]]]

b. / Max // put / in / his car //// all / the / boxes / of / home furnishings ///////

The phrasing rule does not delete all of these boundaries as long as *n* is less than four.

In sum, topic makes a prosodic phrase when it is long and has some syntactic boundaries at its right end in right-branching languages, as in (6) and (8). But when it is short, especially when it consists of only one word, it does not make a separate prosodic phrase because it does not have many boundaries at its right end, as in (7). Postposed focus usually does not make a prosodic phrase of its own, as in (6a), (7a) and (8), but it does only when the constituent preceding it is long and has some syntactic boundaries at its right end, as in (9b).

The question remains, why preposed focus does not make a prosodic phrase even when it consists of more than one word, as in (9a) (cf. Downing 1970:48).

(39) (California rolls I love to eat) [What do you think of California rolls?]

A promising way to explain focus effects on phrasing is to delete the syntactic boundaries of presupposed strings. Given that a sentence consists of presupposition and focus, *California rolls* is focus and *I love to eat* is presupposed in (39). Then the structure of (39) is (40a), which is mapped onto (40b). The output of the boundary deletion rule with *n*=1 is (40c).

(40) a. ǂ[California rolls] ǂI ǂlove ǂto eatǂǂǂ

b. / California rolls / I love to eat

c. California rolls I love to eat

Thus we correctly predict that preposed focus does not make its own prosodic category.

7.6 Summary

In this chapter, I have shown that bare mapping theory can explain the facts concerning topic and focus. Focus effect on phrasing is explained in terms of boundary addition or unstructuring of the presupposed parts of a sentence. Preposed constituents by Topicalization tend to make independent prosodic phrase because of the boundaries at their ends. I discussed topic in English, Serbo-Croatian, and Italian. I also considered phrasing and postposing/preposing of focus.

Chapter 8

Semantics and Phrasing

In this chapter, I will consider the relation between semantics and phrasing. In 8.1, I will give an overview of Zubizarreta's (1998) analysis on sentences with intransitive verbs. In 8.2, I will point out some conceptual and empirical problems with her theory. In 8.3, I will propose an alternative analysis and suggest an extension of Zubizarreta's work.

8.1 An Overview of Zubizarreta (1998)

One of the main proposals Zubizarreta makes is that the NSR, originally proposed by Chomsky and Halle (1968), should be modularized and formulated in syntactic terms such as selectional ordering and asymmetric c-command. Selectional ordering, based on the lexicosyntactic structures proposed in Hale and Keyser (1993), is established by the ordered sequence of selected heads. Zubizarreta assumes the syntactic structures in (1a-d) for transitives, unergatives, unaccusatives, and ditransitive directional predicates, respectively (pp. 53-55).

(1) a. $[D_1\ [V_1\ [V_2\ D_2]]]$

b. $[D_1\ [V_1\ [[V_2\ D_2]\ t_2]]]$

c. [V D]

d. $[D_1\ [V_1\ [D_2\ [V_2\ [P_3\ D_3]]]]]$

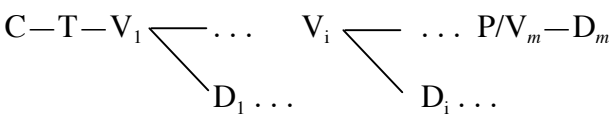
(1 a, b) contain two verbal heads, each of which selects an argument, and D_2 is the lowest constituent in a selectional chain. In (1c) D, which is selected by V, is the lowest constituent in the selectional chain. In (1d) V_2 selects the prepositional predicate P_3. P_3 in

turn selects a nominal argument D_3, which constitutes the lowest constituent in a selectional chain. The definition of the selectional ordering is shown in (2) (p. 52).

(2) (C, T, V1, ..., Vi, P/Vm, Dm), with possibly m=1
(C, T, ..., Vi, Di), for i=1, 2, ..., m-1 (for the cases where m > 1)
where Di, i=1, 2, ..., m-1 is the nominal argument of Vi (for the cases where m > 1) and Dm is the nominal argument of the lowest (possibly only) verb or prepositional predicate (P/Vm) in the selectional ordering.

The sequence V1, ..., Vi, P/Vm, Dm is the ordered analysis of the lexical verbs or prepositions. Dm is the nominal argument of the last (possible only) element P/Vm in the selectional ordering, and Di, i=1, 2, ..., m-1 is the nominal argument of Vi when Vi exists. The partial ordering in (2) can be represented as the tree in (3) (p. 53).

(3)



The notion of asymmetric c-command is defined as in (4).

(4) α asymmetrically c-commands β =def α c-commands β and β does not c-command α.

Zubizarreta posits the following definition of c-command:

(5) α c-commands β =def α and β are visible to the syntactic computation (i.e., are either heads or maximal projections (excluding segments)) and (a) α and β are sisters or (b) there exists a χ such that α and χ are sisters and χ dominates β.

Zubizarreta also introduces the convention stated in (6).

(6) If α c-commands β, then α c-commands χ, χ a projection of β that does not contain α.

Whereas (5) defines a direct relation of c-command between two nodes, (6) defines an indirect relation of c-command between two nodes. Consider the structure in (7).

(7) $[_{XP}$ ZP $[_{X'}$ X YP]]

ZP c-commands X and hence indirectly the projection X' of X. ZP is not c-commanded by X' because X' is not visible for the computation. Thus ZP asymmetrically c-commands X'. In the adjunction structure (8), YP asymmetrically c-commands XP_1.

(8) [XP_2 YP XP_1]

YP c-commands the head of XP_1, but XP_1 itself is a segment and invisible for the computation. Then YP c-commands XP_1 indirectly by (6) and asymmetrically c-commands XP_1.

With these definitions, Zubizarreta proposes to revise the NSR as in (9) (p. 19,

124):

(9) *Revised NSR*

a. S-NSR: Given two sister nodes C_i and C_j, if C_i and C_j are selectionally ordered, the one lower in the selectional ordering is more prominent, or

b. C-NSR: Given two sister nodes C_i and C_j, the one lower in the asymmetric c-command ordering is more prominent.

The following examples in (10a) and (10b) illustrate the S-NSR (selection-driven NSR) and the C-NSR (constituent-driven NSR), respectively:

(10) a. A bóy has danced.

b. John ate the pie in the kítchen.

In (10a), the verb *dance* selects its argument *a boy*. Then *a boy*, the lowest argument in the selectional ordering, receives Nuclear Stress (NS) by the S-NSR. In (10b) *kitchen*, the lowest constituent in the asymmetric c-command ordering, receives NS by the C-NSR. Zubizarreta suggests that the S-NSR and the C-NSR are unordered in English, unlike in German where the S-NSR has primacy over the C-NSR (p. 71). For example, (10a) may also be pronounced with NS on the verb in an out-of-the-blue context:

(11) A boy has dánced.

Here the DP *a boy*, which is lower than the verb *danced* in the selectional ordering, does not receive NS by S-NSR. The C-NSR instead assigns NS to the verb, the lowest

constituent in the asymmetric c-command ordering.

Note also that the revised NSR applies to metrical sisters, and not to syntactic sisters. Zubizarreta first introduces the relevant notion of metrical nondistinctness in (12).

(12) Constituents X and Y are *metrically nondistinct* $=_{def}$ A and B dominate the same set of metrically visible heads.

The notion of metrical sisterhood is formalized as in (13).

(13) Constituents X and Y are metrical sisters =def there exist two constituents Z and W such that (a) Z and W are sisters and (b) Z (resp. W) is metrically nondistinct from X (resp. Y).

Zubizarreta adopts the following convention for the application of the NSR (p. 43):

(14) *Convention for the application of the NSR*

Given two analyses of the syntactic tree ..., Ci, ... Cj, ... and ..., Ki, ... Kj, ... such that ..., Ci, ... Cj, ... and ..., Ki, ... Kj, ... are metrically nondistinct at (Ci, Ki) and at (Cj, Kj) and (Ci, Cj) meets some condition P of the structural description of the NSR in the standard sense, then (Ki, Kj) is taken to meet P as well.

This convention ensures that relative prominence between two constituents is established by the NSR if and only if they are both metrically visible (p. 43).

8.2 Problems with Zubizarreta (1998)

Let us look at Zubizarreta's (1998) analysis of sentences with intransitive verbs. First, as we have seen above, Zubizarreta argues that there are two possible positions of Nuclear Stress (NS) in sentences with unergative verbs:

(15) a. A bóy has danced.

b. A boy has dánced.

To account for this, Zubizarreta proposes the following auxiliary to convention (14) (p. 59):

(16) *Auxiliary to convention [(14)] for application of the NSR (optional)*

If some projections of the verbal components V_i and V_j of the lexical verb are metrically nondistinct, then V_i and V_j are analyzed as metrically nondistinct for the purpose of applying the interpretive convention in [(14)].

Consider the case where (16) applies to the sentence in (15). Because V_1 (=[$_{V_1}$ $\underline{v_1}$ [$_{V_2}$ has danced]]) and V_2 (=[$_{V_2}$ has danced]) are metrically nondistinct, their heads [$_{V_1}$ $\underline{v_1}$] and [$_{V_2}$ danced] are interpreted as metrically nondistinct. By transitivity, V_1 (=[$_{V_1}$ $\underline{v_1}$ [$_{V_2}$ has danced]]) is metrically nondistinct from [$_{V_1}$ $\underline{v_1}$] as well. Therefore, the sisters D_1 (=$\underline{\text{a boy}}$) and V_1 (=[$_{V_1}$ $\underline{v_1}$ [$_{V_2}$ has danced]]) are derivatively interpreted as selectionally ordered. The S-NSR applies and assigns NS to the subject as in (15a). If (16) does not apply, the S-NSR cannot apply because D_1 and V_1 are not selectionally ordered. The C-NSR instead assigns NS to the verb as in (15b). Zubizarreta argues that (16) is independently supported

by the structures involving defocalized constituents in German (p. 60). However, this auxiliary is still *ad hoc*.

Second, as we noted in section 8.1, Zubizarreta concludes that the S-NSR and the C-NSR are unordered in English. This means that either rule can apply to any sentence. She also argues that in sentences with unaccusative verbs, NS can fall only on the subject, as shown in (17).[1]

(17) a. The sún came out.

b. *? The sun came óut.

However, we have no way to prevent the C-NSR from applying to this sentence and assigning NS to the predicate as in (17b).

Zubizarreta's analysis has more empirical problems. First, her observation about unaccusative/unergative verbs does not agree with other linguists' judgments. As is shown in (15) and (17) above, Zubizarreta observes that in sentences with unaccusative verbs NS falls obligatorily on the subject, and that in sentences with unergative verbs NS can fall either on the verb or on the subject (I repeat (17) and (15) as (18) and (19) for ease of reference):

(18) a. The sún came out. (unaccusative)

b. *? The sun came óut.

[1] Zubizarreta notes that "only one of the five speakers consulted accepted both options with unaccusative verbs (NS on the subject or on the verb)" (p. 176).

(19) a. A bóy has danced. (unergative)

b. A boy has dánced.

Selkirk's (1984, 1995) observation is contrary to Zubizarreta's. Selkirk argues that unaccusative verbs do not have to be prominent while unergative verbs have to be prominent (Selkirk 1995:559):[2]

(20) a. The SUN's shining. (unaccusative)

b. The SUN is SHINing.

(21) a. * JOHN was dancing. (unergative)

b. JOHN was DANCing.

Note that Selkirk uses the term *pitch accent* instead of NS, and identifies two prominent words in (20b) and (21b). The second pitch accented word is perceived as more

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[2] Example (21) is taken from Heycock (1994:159), who cites Selkirk's observation. Allerton and Cruttenden (1979) show the unaccusative/unergative pairs as the following:

(i) a. JOHN died.

b. John proTESTed.

(ii) a. ... My COUsin's coming.

b. ... My cousin's CELebrating.

These examples are also referred to by Gussenhoven (1983). Then it may well be argued that NS is likely to fall on the subject in sentences with unaccusative verbs while it is likely to fall on unergative verbs in sentences containing them. See section 8.3.

prominent than the first because the nucleus of intonation falls on the last pitch accented word (cf. Schmerling (1976)). Thus I assume here that Zubizarreta's NS pattern in (18b) and (19b) basically corresponds to Selkirk's (20b) and (21b) respectively.

Then it is necessary for us to explain these contradictory observations. Zubizarreta mentions the examples with the verb *die* (p. 69), and attributes the ambiguity in the place of NS to the discourse context, citing Schmerling (1976). She does not show other examples from Selkirk (1984, 1995) such as (18), however. We should seek for the analysis which can explain all the cases. I will propose such an alternative analysis in section 8.3.

Zubizarreta also shows the contrast between existential subjects and generic subjects (p. 66):[3]

(22) a. weil Féuerwehrmänner verfügbar *sind*
because the-firemen available are
b. weil Feuerwehrmänner altruístisch *sind*
because the-firemen altruistic are

Whereas NS falls on the existentially interpreted subject in (22a), it falls on the predicate in (22b). In other words, stage-level predicates such as 'are available' do not have NS while individual-level predicates such as 'are altruistic' have NS (Gussenhoven 1983, Selkirk 1995). Zubizarreta argues that the contrast derives from the assumption that (22a) is analyzed as a raising structure and (22b) as a control structure (Diesing 1992, Selkirk

[3] In (22), *sind* is written in italics because Zubizarreta assumes that function words are metrically invisible for the NSR (p. 47).

1995). The subject in (22a) is an argument of the adjective and the subject in (22b) is not. Then the S-NSR applies in (22a), but not in (22b). However, if we assume a raising structure for (22a), we need to apply the auxiliary (16) to make the S-NSR applicable. Zubizarreta assumes that the auxiliary (16) is optional. This means that we expect ambiguity in the position of NS in sentences with existential subjects, just like with unergative verbs (cf. (19)). In other words, we expect the following pattern, which Zubizarreta does not include:

(23) weil Feuerwehrmänner verfügbar *sind*
because the-firemen available are

However, this stress pattern is not acceptable unless *Feuerwehrmänner* has been previously introduced into the discourse. Zubizarreta also suggests an alternative analysis to the effect that generic subjects are bona fide sentence topics and cannot carry the NS within a phrase. This functional approach seems to be on the right track, but it is not an easy task to specify what kind of subject is a sentence topic. Moreover, there are examples where generic subjects may have NS (Bolinger (1985:105)):

(24) a. How strange! Dólphins are mammals. Did you know that?
b. I've just learned that asbéstos is dangerous. Have we got any of the stuff about the house?

Then we have to allow sentence topics to carry NS in some cases.

Moreover, according to Selkirk's observation, there is an interesting parallelism between unaccusative/unergative verbs and stage-level/individual-level predicates ((20) and (21) repeated here as (25) and (26)):

(25) a. The SUN's shining. (unaccusative)

b. The SUN is SHINing.

(26) a. * JOHN was dancing. (unergative)

b. JOHN was DANCing.

(27) a. FIREmen are available. (stage-level predicate)

b. FIREmen are aVAILable.

(28) a. * FIREmen are altruistic. (individual-level predicate)

b. FIREmen are altruIStic.

If this observation is right, Zubizarreta fails to capture an important generalization because she cannot give any unified analysis of these contrasts. I will present an analysis that unifies these cases in section 8.3.

Finally, Zubizarreta notes that (29a) and (29b) as answers to (30) do not have the same communicative value:

(29) a. The báby's crying.

b. The baby's cŕying.

(30) What's happening?

She claims that in (29a) the speaker intends to convey to the listener that the lexical content of the subject is informationally relevant (p. 173). However, it is hard to

understand what she means by 'informationally relevant.' Whether the lexical content of the subject is informationally relevant or not depends on the context, which is in fact the same for (29a) and (29b), namely (30). Thus Zubizaretta's analysis cannot predict whether NS falls on the subject or on the predicate in such cases as (29). In the next section I will argue that (29a) and (29b) reflect two kinds of judgment by the speaker.

8.3 An Alternative Account

8.3.1 Thetic/Categorical Judgment

In this section I will propose an alternative account to explain the data concerning unergative and unaccusative verbs.[4] Let us look at more data and reconsider all the data from a different perspective. Unergative verbs do not have NS in some cases, such as the following (Faber (1987:349)):

(31) a. Your MOTHer telephoned.

b. Sssh! The CHILDren're listening!

Some contexts can also make unergative verbs accentless as in the following examples (Gussenhoven 1992:103):

(32) a. (Why have they stopped the traffic?) JOHN is jogging today.

b. (Why is SHE here?) Her HUSband beats her.

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[4] Okazaki (1998) argues that sentence accent assignment is determined by the specificity of NP and the action/nonaction distinction of predicates. The proposal seems compatible with the analysis to be presented here, but we need to carefully examine the difference in predictability about data between the two proposals.

Notice that unergative verbs do not need pitch accent when they are the predicates in small clauses. The following examples contain complements of perception verbs, which are typical small clauses (I underline the (small) clauses in question):

(33) a. I heard a BIRD sing. (Gussenhoven (1992:95))

b. I heard a CLOCK tick. (Selkirk (1995:559))

Similarly, small clauses appear after it's (just) as in the following sentences (Faber (1987:356)):

(34) a. It's just a BAby crying.

b. ?It's just the SECretary typing.

These examples are problematic for Selkirk's (1995) analysis. She claims that unergative verbs are prominent.

Note in passing that Selkirk's distinction between stage-level predicates and individual-level predicates is problematic. Individual-level predicates do not need pitch accents in some cases. Gussenhoven's (1983:396) example is interesting in that it is uttered in an out-of-the-blue context:

(35) (Adam, upon first seeing Eve:) Your EYES are blue! I LOVE blue!

Blue is an individual-level predicate, but it is not pitch accented in (35). Also in the answer to a question asking for a reason, individual-level predicates do not need pitch accent:

(36) (Why didn't you come here by car?) The ROAD is bad! (Jäger (1997:234))

This is the same if the reason clause is embedded in a main clause:

(37) a. I love CaliFORnia because its CLImate is so nice. (attested)

b. I can't READ much of THINGS like that anyway cos my EYES are too bad. (London-Lund Corpus)

The predicates in the underlined clauses of (36) and (37) are individual-level predicates, but they do not have pitch accent. Selkirk's explanation based on the stage-level/individual distinction cannot deal with these examples.

To explain all the data shown above, let us introduce here the notion *thetic/categorical judgment*. The terms thetic/categorical judgment were invented by the 19th century philosopher, Franz Blentano and his successor Anton Marty. In contemporary linguistics this notion was first revived by Kuroda (1972). Kuroda (1992:21) defines the distinction in the following way:

(38) a. *Thetic* judgments: … simply express recognition of the existence of an entity or a situation. … a simple form of a judgment, a unitary cognitive act. … a simple judgment.

b. *Categorical* judgments: … conform to the Subject-Predicate form … two distinct cognitive acts, one the recognition of the Subject, …, and another the act of acknowledging or disavowing a Predicate of a Subject. … a double judgment.

The original examples of Blentano and Marty, cited by Kuroda (1972:154), are the following:

(39) a. Es regnet.
it rains

b. Es gibt gelbe Blumen.
it gives yellow flowers
'There are yellow flowers.'

(40) a. Der Körper ist auf der Erde.
the body is on the earth

b. Ich urteile.
I judge

According to Blentano and Marty, the sentences in (39) are thetic because their grammatical subjects are the pleonastic *es*, and not lexical subjects. The sentences in (40) are claimed to be categorical because they have subject-predicate form.

Kuroda (1972) argues that the thetic/categorical distinction is expressed by the two particles, *-ga* and *–wa* in Japanese. The following examples are taken from Kuroda (1992:21):

(41) a. Neko-*ga* asokode nemutte iru (thetic)
cat-Prt there sleeping be
'A cat is sleeping there'

b. Neko-*wa* asokode nemutte iru (categorical)
cat-Prt there sleeping be
'The cat is sleeping there'

Kuroda argues that *–ga* marks the subject of thetic clauses and that *–wa* marks the subject of categorical clauses.

Now let us turn to the prosody of thetic/categorical clauses. Sasse (1987:520) argues that accentuation of the subject and the predicate reflects the thetic/categorical distinction in English:

(42) a. The BUTter melted (thetic)

b. The BUTter MELTed (categorical)

The sentence (42a) has pitch accent only on its subject. According to Sasse, this shows that the clause consists of a conceptual unit and is thetic. (42b) is categorical in that it has pitch accent both on the subject and the verb. We may argue that a categorical clause consists of two conceptual units.[5]

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[5] See Chafe (1974:115) for the notion of conceptual units. See also Lambrecht (1994) and Lambrecht and Michaelis (1998) for the prosodic expression of the thetic/categorical judgment. However, they do not discuss the relation between thetic/categorical judgment and unaccusative/unergative verbs or stage/individual predicates.

Note that in (42b) the hearer perceives the subject to have secondary stress. Bing (1979:140) argues that this is because the subject has a non-final contour with a continuation rise. The predicate is heard as more prominent than the subject in (42b) because it is uttered with sentence-final falling intonation.[6] I propose the following hypotheses:

(43) a. A thetic clause contains one conceptual unit and a categorical clause two conceptual units.

b. In a conceptual unit, the most informative word has prominence.

c. In a sentence, the last prominent word which is not defocalized is heard as most prominent.

The thetic/categorical judgment basically corresponds to the use of *-ga*/*-wa* in Japanese.

(i) a. Bataa-gatoketa.
butter-Prt melted
'The BUTter melted.'

b. Bataa-wa toketa.
butter-Prt melted
'The BUTter MELTed.'

Thus we can use Japanese translations as a test of thetic/categorical judgment. Although I will not show Japanese translations of the example sentences until (55), *-ga*/*-wa* distinction is clear in all of them. See also footnote 8.

[6] Bing (1979:140-142, 171) shows that both the intensity and height of the F0 contour of the subjects are as great as those of the predicate.

In (43b), I simply assume here that nouns are more informative than predicates except when (i) they are defocalized and/or anaphoric, or (ii) predicates have emphatic stress (see Schmerling 1976:82 and Bing 1979:126 for discussion).

According to (43), in (42a), which is thetic and consists of one conceptual unit, *butter* is the most informative word and has prominence. (42b), which is a categorical clause, contains two conceptual units, and *butter* and *melted* are prominent in each unit. *Melted* is heard as more prominent than *butter*.[7]

Now let us try to solve the problems we have seen in section 3. First, unaccusative verbs and stage-level predicates do not need pitch accent or prominence:

(44) a. The SUN's shining.

b. FIREmen are available.

This is because clauses with these verbs and predicates are thetic in the unmarked case. Unaccusative verbs, such as *shine*, introduce a new entity into the discourse and make the clause thetic. Stage-level predicates, such as *be available*, express the existence of a situation and make the clause thetic. However, it is also possible for the speaker to utter these sentences as a categorical judgment because they have lexical subjects:

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[7] An anonymous reviewer has pointed out that the predicates in (36) and (37a, b) are predictable or inferable from the preceding discourse, and that 'Because of the ROAD,' 'because of its CLImate,' and 'because of my EYES' could replace them. However, the predicates are not perfectly predictable or inferable. In (36), for example, the predicate could be *icy* or *wet* instead of *bad*. The point is that nouns are more informative than predicates, as mentioned above.

(45) a. The SUN is SHINing.

b. FIREmen are aVAILable.

In (45), the speaker first introduces the subject as the topic of the sentence and then comments on it with the predicate. This is the marked option (see also footnote 2 above).

On the other hand, unergative verbs and individual-level predicates typically need pitch accent or prominence, because they describe their subject and make the clauses categorical. For example, *be dancing* or *be altruistic* below are descriptions of the subject, and are the second judgment.

(46) a. * JOHN was dancing.

b. * FIREmen are altruistic.

(47) a. JOHN was DANCing.

b. FIREmen are altrIStic.

We can claim that clauses with unergative verbs and individual-level predicates are basically categorical.

Then we can give a natural answer to the problematic examples we have seen so far. Unergative verbs and individual-level predicates lack pitch accent or prominence only if the speaker utters the whole clause as a single judgment, not as a double judgment, as shown in (48) and (49).

(48) a. Your MOTHer telephoned.

b. Sssh! The CHILDren're listening! (Faber (1987:349))

(49) (Adam, upon first seeing Eve:) Your EYES are blue! (I LOVE blue!)

In other words, these sentences express recognition of the existence of a situation (cf. (38a)). This is clearer in the examples in (50) and (51):

(50) a. (Why have they stopped the traffic?) JOHN is jogging today.

b. (Why is SHE here?) Her HUSband beats her.

(51) (Why didn't you come here by car?) The ROAD is bad! (Jäger (1997:234))

These clauses are answers to questions asking for a reason. The speaker could answer the questions in the following way:

(52) a. They have DONE it because JOHN is jogging today.

b. She is HERE because her HUSband beats her.

(53) I DIDN'T because the ROAD is bad!

In (52a, b) and (53), the main clause is the topic and the subordinate clause is a comment on it. Then in (50a, b) and (51), the answer sentence itself is a single judgment and is thetic. Thus it has pitch accent or prominence only on the subject.

Then the examples in (54) are straightforward:

(54) a. I love CaliFORnia because <u>its CLImate is so nice</u>. (attested)

b. I can't READ much of THINGS like that anyway cos <u>my EYES are too bad</u>.

(London-Lund Corpus)

These sentences have two clauses and express double judgment as a whole: the main clause serves as the topic of the sentence and the subordinate clause as the comment on it. The underlined clause itself is thetic in that it expresses a simple judgment.

Our claim that the clauses in question are thetic is supported by the Japanese data in (55)-(57), which are translations of (35)-(37). The topic marker –wa cannot appear in the clauses, which shows that they cannot be categorical:

(55) Adam (…): Me-ga/*wa aoi! Boku-wa ao-ga suki!
eyes-Prt/Prt blue I-Prt blue-Prt love

(56) A: Naze kuruma-de kokoni konakatta-no?
why car-Instr here came not-Q
B: Michi-ga/*wa warui(-kara(-da))!
road-Prt/Prt bad-because-it's

(57) a. California-ga suki, kikoo-ga/*wa totemo ii-kara
California-Prt love climate-Prt/Prt so nice-because
b. Son-na-no-wa yom-e-nai, me-ga/*wa warui-kara.
That-like-things-Prt read-can-Neg eyes-Prt/Prt bad-because

As we saw in the last section, another case which seems to be exceptional is small clauses. We can argue that small clauses are thetic because they typically occur as the complement of perception verbs. The speaker perceives and recognizes the existence of a situation. Thus examples (33) and (34) are straightforward. They contain small clauses which have pitch accent or prominence only on the subject:

(58) a. I heard a BIRD sing. (Gussenhoven (1992:95))

b. I heard a CLOCK tick. (Selkirk (1995:559))

(59) a. It's just a BAby crying

b. ? It's just the SECretary typing. (Faber (1987:356))

The Japanese translation gives us evidence that these are thetic because *-wa* cannot appear in the small clauses:

(60) a. Tori-ga/*wa utau-no-o kiita.
bird-Prt/Prt sing-Nml-Acc heard
'I heard a bird sing.'

b. Akanboo-ga/*wa naiteru-n-da.
baby-Prt crying-Nml-it's
'It's a baby crying.'

Ikawa (1998) also claims that complements of perception verbs are thetic.[8]

In this section we have argued that we can describe the data shown in section 8.2 in terms of the thetic/categorical judgment distinction. We have also seen that our explanation can deal with the examples that were problematic for Zubizarreta (1997) and

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[8] *-ga* may also appear in categorical clauses such as the following:

(i) Kingyo-ga neko-ni osowareteiru
goldfish-Prt cat-by is being attacked
'A goldfish is being attacked by a cat.'

I refer to this type of clause as semi-thetic in Tokizaki (1999a).

Selkirk (1995). Thus this is a more general way to explain the prosody in sentences with unaccusative/unergative verbs and stage/individual-level predicates, with no obvious empirical problems.[9]

8.3.2 Prominence and Phrasing

In this section, I would like to show in brief how our analyses of prominence and phrasing can be put together to predict the prosody of various sentences. Let us consider the example (54a) above (repeated here as (61)).

(61) [I [love CaliFORnia]] [because [[its CLImate] [is [so nice]]]]

The rule (61) applies to (61) to give (62):

(62) / I / love CaliFORnia /// because // its CLImate // is / so nice /////

If we apply the boundary deletion rule with n=2, we get the following phrasing:

(63) a. I love CaliFORnia / because its CLImate is so nice ///

b. (I love CaliFORnia) (because its CLImate is so nice)

---

[9] I should give an independent way of identifying the thetic/categorical distinction that does not rely on accentuation. I have not found any way of doing it in English. However, as I have shown in (55)-(57) and (60), the subject markers *-ga*/*-wa* in the Japanese translation give us indirect evidence that the corresponding English clauses are thetic or categorical. See also footnote 4.

The whole sentence (63b) is categorical in the sense that the first intonational phrase is the topic and the second is a comment on it. As we argued above, the second intonational phrase in (63b) is a thetic clause and consists of a unit. The hypothesis (43b) predicts that *climate* gets prominence because it is the most informative word in the unit. Because the clause is thetic, the predicate *is so nice* does not have prominence, in spite of the fact that it is an individual-level predicate.[10]

8.4 Summary

In this chapter, I reviewed Zubizarreta (1998) and pointed out some problems concerning the modularized NSR, PF Restructuring, the Relative Weight Constraint, and unergative/unaccusative verbs. I also proposed an alternative analysis for sentences with intransitive verbs in terms of thetic/categorical judgment in the minimalist framework.

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[10] In the first intonational phrase of (63b), *California* gets prominence because it is more informative than *I* and *love*. Note that *love* instead of *California* may have an accent when it is emphasized and more informative than the nouns (see the discussion immediately below (43)):

(i) (I LOVE California) (because its CLImate is so nice)

Chapter 9

Derivation and Parsing

In this chapter, I will investigate the relation between bare mapping theory and the production/perception of sentences. A paradox in the interface between syntax and PF is how computation merges words or constituents from right to left, while a parser parses a sentence from left to right (cf. Chomsky 1995, Phillips 2003). The aim of this chapter is to show that the paradox is not a real contradiction if words are Spelled Out before they are Merged. I will argue that lexical items and silent demibeats (cf. Selkirk 1984) are introduced to the working space from left to right, and that an extra silent demibeat triggers Merge, which proceeds from right to left. This model gives us a new view of the syntax- phonology interface and the architecture of grammar.

9.1 A Paradox: Parse Right and Merge Left

In the minimalist program, it is assumed that lexical items selected from the lexicon are introduced in the working space and are merged with each other step by step. Consider the following sentence for example:

(1) Alice loves small hamsters.

The lexical items needed to derive (1) are {Alice, Infl, loves, hamsters}. The derivation proceeds as shown in (2).

(2) a. [small hamsters]

b. [loves [small hamsters]]

c. [Infl [loves [small hamsters]]]

d. [Alice [Infl [loves [small hamsters]]]]

First, the two words *small* and *hamsters* are introduced to the working space and are merged (2a). Next, another lexical item *loves* is introduced on the left of the constituent [*small hamsters*] and is merged with it (2b). The same process applies to *Infl* and *Alice* as shown in (2c) and (2d). Merge proceeds from the right end of a sentence to the left. Let us call this kind of derivation Merge Left.

From a phonological or psycholinguistic point of view, utterance or processing must proceed from left to right. The speaker utters or writes the example sentence (1) through the following steps:

(3) a. Alice

b. Alice loves

c. Alice loves small

d. Alice loves small hamsters.

The hearers also perceive the sentence through the same steps. Let us call the order of production and perception Parse Right.

The order of (2a-d) and the order (3a-d) show that there is a paradox in syntax and phonology. Merge proceeds leftward while Parse proceeds rightward. Any plausible theories of interface must explain the paradox in some way.[1]

Note that the paradox cannot be explained by phase theories of syntax-phonology interface. If we assume that the sister of a strong phase head (v and C), namely VP and IP (or TP), is Spelled Out to PF (Chomsky 2001), the sentence (1) is derived as shown in (4).

(4) a. [small hamsters]

b. [loves [small hamsters]]

c. [*v* [$_{VP}$ *loves [small hamsters]*] -- Spell Out 1 [$_{VP}$ *loves hamsters]* -> PF

d. [Infl [*v* [$_{VP}$ *...]*]]

e. [$_{IP}$ Alice [Infl [*v* [$_{VP}$ *...]*]] -- Spell Out 2 [$_{IP}$ Alice [Infl [*v* [$_{VP}$ *...]*]] -> PF

First the VP is Spelled Out at the stage (4c), and then the IP is Spelled Out at the stage (4e). If this order is the one in which a speaker utters words, we wrongly predict the following word order:

(5) a. [$_{VP}$ *loves small hamsters]*

b. [$_{VP}$ *loves small hamsters]* [$_{IP}$ Alice [Infl [*v* [$_{VP}$ *...]*]]

---

[1] The paradox became apparent when Merge replaces Rewriting rules in syntax. For example, rewriting rules expand VP *loves small hamsters* into V *loves* and NP *small hamsters*. The NP is in turn expanded into *small* and *hamsters*. It was possible to argue that the order of derivation and lexical insertion is left-to-right. In this sense, the paradox of direction between derivation and parsing is a new problem in the theory of grammar.

To get the right word order in (1), we must assume that the first output of Spell Out, VP, is stored somewhere in the PF component, and that the second output, IP, is placed at its left.

(6) a. *[$_{VP}$ loves small hamsters]*

b. [$_{IP}$ Alice [Infl [*v* *[$_{VP}$ ...]*]] *[$_{VP}$ loves small hamsters]*

However, it is not clear how we can guarantee the procedure in the PF component. Moreover, the speaker and the hearers parse words in a phase unit from left to right. In the VP in (6b) they parse *loves* first, then *small*, and *hamsters* last. Parsing proceeds from left to right in a phase unit while Merge applies from right to left in the same unit as shown in (4a-b).[2]

Note that the same problems occur with other theories of phase such as Uriagereka (1999) and strong derivational theory such as Epstein et al. (1998). They assume different domains of phase unit, but they assume that Merge applies from right to left to build up a sentence.

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[2] The problem of word order is more serious if we assume that discourse above a sentence is also made up by Merge with covert conjunctions (cf. Larson 1990).

(i) [[John woke up] ... [*&* [[He washed his face] [*&* [He went out]]]]]

Merge starts with the last two words and then proceeds to the left edge of the discourse. Parse starts with the first word in the discourse.

9.2 Branch Right and Its problems

The right-left paradox does not occur in the incremental model of derivation proposed by Phillips (1996, 2003), who assumes Branch Right instead of Merge Left. For example, a VP with NPs as its specifier and complement is constructed in the order shown in (7) (cf. Richards 1999).

(7) a. [Mary saw]

b. [Mary [saw John]]

It is argued that the right node V dominating *saw* in (7a) branches into V' [*saw John*] as shown in (7b). The parser proceeds from left to right, and the structure is built from left to right at the same time.

This theory avoids the right-left paradox that occurs in the standard minimalist syntax with Merge Left. However, the status of Branch Right in the grammar is not clear. Phillips does not specify how Branch Right applies to a single lexical item and makes it branch into two nodes. In other words, we do not know what mechanism changes the verb *saw* into the VP *saw* in (7a) into the VP *saw John* in (7b).

Moreover, Branch Right has an empirical problem. As Shiobara (2005) points out, it cannot build left branching structure such as the subject in *[[The girl] [saw John]].* Branch Right wrongly builds *[The [girl [saw John]]].* It is not clear how we can guarantee that Branch Right sometimes applies not to the rightmost word but to the constituent dominating it.

Though the idea of Branch Right is appealing if we want to resolve the contradiction of direction between parsing and derivation, it has both conceptual and

empirical problems. We must try to find other ways to show that the paradox is not a real contradiction.

9.3 Spell-Out before Merge

One way to keep both Parse Right and Merge Left without contradiction is to assume that Spell Out sends lexical items with structural information before Merge combines two syntactic objects. I will explore this possibility in detail below.

Consider the example sentence (1) again. Suppose also that (s)he utters or writes the structure (2d) from left to right with brackets as shown in the order (8a-e).

(8) a. [Alice

b. [Alice [Infl

c. [Alice [Infl [loves

d. [Alice [Infl [loves [small

e. [Alice [Infl [loves [small hamsters

I assume that no Merge has applied until (8e). The first Merge applies when a closing bracket is added to (8e) to make a constituent, the NP *small hamsters* as shown in (9a). Merge next applies when the second closing bracket is added to make the VP *loves small hamsters* as shown in (9b). (9c) shows the third Merge and (9d) the fourth.

(9) a. [Alice [Infl [loves [small hamsters]

b. [Alice [Infl [loves [small hamsters]]

c. [Alice [Infl [loves [small hamsters]]]

d. [Alice [Infl [loves [small hamsters]]]]

In the derivation shown in (8) and (9), Parse applies from left to right, and Merge applies from right to left. Thus, there is no contradiction between Parse Right and Merge Left in this derivational model. Each lexical item is Spelled Out before being Merged with another syntactic object. There is no phase unit such as VP or IP in the sense of Chomsky (2001). Each lexical item is Spelled Out when introduced into the derivation.

9.4 Spell-Out of Brackets as Silent Beats

Here, however, a number of questions arise. Are starting brackets and closing brackets syntactic objects? Does the speaker Spell Out brackets? If so, how?

I assume that brackets are real objects in syntactic representation. We need brackets to show that two syntactic objects are merged into one. Suppose that the speaker Spells Out a bracket as a pause of a certain length. Following Selkirk (1984), I assume that the pause duration between two words is represented there as a number of silent demibeats.

Silent demibeats are assumed to be contained in the metrical grid of an utterance. Selkirk argues that the representation of the rhythmic structure of the sentence *Abernathy gesticulated* is as follows, where the underscored grids are silent demibeats:

```
(10)                    x
        x               x
        x    x          x  x
        x x  x   x xx x  x x x x   xxx
        Abernathy     gesticulated
```

Selkirk argues that silent demibeats are added at the end (right extreme) of the metrical grid aligned with a word or certain constituents.[3] Here I will assume that a syntactic bracket is Spelled Out as a silent demibeat. We can formulate the following syntax-phonology mapping rule (cf. Tokizaki 1999):

(11) $\left\{ \begin{array}{c} [\\ \\ ] \end{array} \right\}$ --> x

The speaker "Spells Out" a syntactic bracket, either left or right (cf. Ferreira 1993, Watson and Gibson 2004), as a silent demibeat. The rule (11) encodes the sentence structure (12a) into (12b).

(12) a. [Alice [loves [small hamsters]]]

---

[3] As I have shown in section 1.3.3, Selkirk (1984) argues that the sentence in (ia) contains a number of silent demibeats (x) as shown in (ib).

(i) a. $[_S\ [_{NP}\ [_N$ Mary]] $[_{VP}\ [_V$ finished] $[_{NP}$ her $[_A$ Russian] $[_N$ novel]]]]

b. Mary xxx finished xx her Russian x novel xxxxx

a, b, d a, b a a, b, c, d

The silent demibeats in (ib) are assigned by Silent Demibeat Addition (ii).

(ii) Add a silent demibeat at the end (right extreme) of the metrical grid aligned with

a. a word,

b. a word that is the head of a nonadjunct constituent,

c. a phrase,

d. a daughter phrase of S.

In (i), according to Selkirk, *Mary* is a word, and a word that is the head of a nonadjunct constituent, and a daughter phrase of S. Thus, three silent demibeats are added to the right of *Mary* by (iia), (iib), and (iic).

Here I will generalize Silent Demibeat Addition. Putting aside (iib) and (iid), a word gets a silent demibeat after it by (iia). If the word is the final one in a phrase, it gets another silent demibeat by (iic).

b. x Alice x loves x small hamsters xxx

Note that derivation proceeds with multiple Spell-Out. Every time a syntactic object is introduced into derivation, its phonetic features are sent to PF. If it is a syntactic bracket, a silent demibeat is sent to PF. For example, consider the derivation of the sentence (1) again.[4]

(13)	syntax	- Spell Out ->	PF
a.	*[Alice*		*x Alice*
c.	[Alice *[loves*		x Alice *x loves*
d.	[Alice [loves *[small*		x Alice x loves *x small*
e.	[Alice [loves [small *hamsters*		x Alice x loves x small *hamsters*
f.	[Alice [loves [small hamsters*]]]*		x Alice x loves x small hamsters *xxx*

Instead of listing categories receiving a silent demibeat at its right edge as in (iia-d), I assume the syntax-phonology correspondence rule as shown in (11).

[4] I will omit phonologically empty categories such as Infl. I assume that phonologically null elements and the constituents made by merging them with other syntactic objects have no effect on phonology. See Nespor and Scorretti (1984), Tokizaki (1999).

[6] For the notion of linearization, see also Uriagereka (1998).

In other words, the speaker encodes syntactic constituent structure into pauses while speaking a sentence. This is how linearization of syntactic hierarchical structure proceeds.[6]

9.5 Parsing of Pause and Tree Building

In this section, I will argue that hearers as well as a speaker use silent demibeats to parse phrase structure. I have argued that a speaker "Spells Out" a syntactic bracket (either left or right) as a silent demibeat. Here I assume that the hearer interprets a silent demibeat as a syntactic bracket. The interpretation of a silent demibeat might be formulated as follows:

(14) $\underline{x} \text{ --> } \left\{ \begin{array}{c} [\\ ] \end{array} \right\}$

This rule is the reverse of the rule in (11). However, this time we face the problem of which bracket is the one the speaker intended: right or left. The hearer has no information about the direction of a bracket.

Let us assume a working hypothesis that a silent demibeat is interpreted as a left bracket, [, in right branching languages such as English. Suppose that the rule is the following in those languages.

(15) $\underline{x} \text{ --> } [$

For example, the parsing of the sentence (12b) proceeds as follows:[7]

(16)	PF	Parsing
a.	*x Alice*	*[Alice*
b.	x Alice *x loves*	[Alice *[loves*
c.	x Alice x loves *x small*	[Alice [loves *[small*
d.	x Alice x loves x small *x hamsters*	[Alice [loves [small *[hamsters*

The question is what happens next. The rule in (15) wrongly predicts that the silent demibeat after *hamsters* is interpreted as left brackets:

(17) x Alice x loves x small x hamsters x... [Alice [loves [small [hamsters [...

We need another parsing rule to change silent demibeats into right brackets. Let us assume the following rule for right brackets:

(18) xx -->]x

We also need to modify (15) to the following, where α is a lexical item:

(19) x α --> [α

---

[7] In (16), I put a silent demibeat between *small* and *hamsters*, because the two words are separated by a pause. This raises an interesting point for non-branching nodes. See the discussion on (21) below.

Then parsing proceeds not as in (17) but as in (20).[8]

(20)	PF	Parsing
a.	x Alice x loves x small x hamsters x	[Alice [loves [small [hamsters
b.	x Alice x loves x small x hamsters *xx*	[Alice [loves [small [hamsters*]*
c.	x Alice x loves x small x hamsters x*xx*	[Alice [loves [small [hamsters]*]*
d.	x Alice x loves x small x hamsters x*xxx*	[Alice [loves [small [hamsters]]*]*
e.	x Alice x loves x small x hamsters x*xxxx*	[Alice [loves [small [hamsters]]]*]*

Thus, we can explain how hearers build a syntactic tree from pause durations between words.

Notice that in (20), only the rightmost lexical item *hamsters* by itself is contained in a pair of brackets. In a tree diagram, the lexical item would be dominated by a non-branching node.

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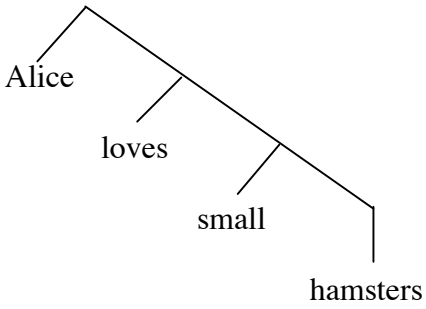
[8] In fact, we need one more silent demibeat in (20e) than we have seen in (13f) in order to Merge *Alice* and the VP. I assume that the final silent demibeat is supplied by the next sentence in a discourse, as shown in (i).

(i)	syntax	PF	Parsing
a.	... hamsters]]]] *[*	... hamsters x*xxxx*	... hamsters]]]*]*
b.	... hamsters]]]] [*She*	... hamsters x*xxxx* *She*	... hamsters]]]] *[She*

(21)



Interestingly, this tree is the same as Kayne's (1994) tree based on the Linear Correspondence Axiom.[9] This similarity may be rooted in a deep principle of language, but I will not pursue it here. This point provides support to the syntactic structure presented above.

9.6 Marked Direction of Branching

Now let us turn to cases of left branching in right branching languages. For example, consider the following sentence:

(22) [[Alice Walker] [loves hamsters]]

Here the subject NP branches into two words. The Spell-Out rule (11) applies to (22) to give a PF with silent demibeats. However, the parsing rule wrongly changes the first silent demibeat to a right bracket:

---

[9] For example, Kayne (1994:10) shows the following structure, where N is dominated by a non-branching NP:

(i) $[_K$ J $[_{VP}$ $[_V$ see] $[_{NP}$ $[_N$ John]]]]

(23)	syntax	PF	Parsing
	[[	xx	]x

However, the parsing in (23) is a vacuous closing of a constituent because there is no lexical item to be enclosed by the right bracket and no left bracket to be paired with. Let us assume here that such a vacuous parsing of a silent demibeat is banned in principle. The hearer must interpret the first silent demibeat as a left bracket as shown in (24).

(24)	syntax	PF	Parsing
	[[	xx	[x

This unnatural interpretation seems to make left branching marked in right branching languages. The rest of Spell-Out and Parsing is straightforward.

(25)	a.	... Walker*] [*	... Walker *xx*	... Walker*]* x
	b.	... Walker] *[loves*	... Walker x*x loves*	... Walker] *[loves*

Thus, we conclude that branching in marked direction can be parsed by marked interpretation of silent demibeats as shown in (24), not by unmarked interpretation (18).

9.7 Left Branching Languages

So far we have seen how Parse Right and Merge Left apply to structure in right branching languages such as English. Now let us consider how they apply to structure in so-called left branching languages such as Japanese. For example, the subject NP in (26) is left branching.

(26) [[[Umeda-no ane-no] omiyage-ga] [marude amai]]
Umeda-Poss sister-Poss souvenir very sweet
'The souvenir of my sister living in Umeda is very sweet.'

I assume that Spell-Out of brackets (11) is universal while the parsing rule in right branching languages is not (18) and (19) but (27) and (28), where α and β are lexical items.

(27) α x β --> α] β

(28) xx(x...) -->] [([...)

First Spell Out (11) applies to (26) and gives (29) as its PF.

(29) xxx Umeda-no ane-no x omiyage-ga xx marude amai xx

The hearer interprets the phonological representation in (29) as (30).

(30)][[Umeda-no ane-no] omiyage-ga] [marude amai][

Here the first bracket and the final bracket are vacuous and they must be interpreted as a left boundary and a right boundary, respectively.

(31) [[[Umeda-no ane-no] omiyage-ga] [marude amai]]

Thus, we can also explain left branching languages in terms of Spell-Out before Merge.

9.8 Compounds in Right Branching Languages

The discussion of left branching languages opens an interesting path to compounds in right branching languages. Some compounds in those languages are left branching (cf. Cinque 1993). For example, *waste disposal plan* has the following structure:

(32) [[waste disposal] plan]

If we apply the same Spell Out rule (11) to (32), the output is the following:

(33) xx waste disposal x plan x

Suppose a hearer applies the same Parse rule (15) to (33), we will get the wrong result (34).

(34) [[waste disposal [plan]

However, if we apply (27) and (28) to (33), we get a better result:

(35)][waste disposal] plan]

The first right bracket must be replaced by a left bracket because it is vacuous. Then we can correctly restore the structure (32).

It is interesting that left branching structure can be seen in left branching languages and some compounds in right branching languages. It might be that disjuncture between words is shorter in left branching structure than in right branching structure. We could

argue that in left branching structure, brackets are weaker and silent demibeats are in fact quaterbeat. However, I will not explore the possibility here.

9.9 Phonological Evidence for the Analysis

Finally, let us look at some evidence for the analysis presented above. Let us consider the prosody of structurally ambiguous sentences. Cooper and Paccia-Cooper (1980) report that speakers put a longer pause between *cop* and *with* in (36a) than in (36b).

(36) a. [Jeffrey [hit [the [cop]] [with [a stick]]]] (Jeffrey had the stick) [127.7 msec]

b. [Jeffrey [hit [the [cop [with [a stick]]]]]] (The cop had the stick) [97.1 msec]

The underscored brackets are changed into silent demibeats by the rules (18) and (19) as shown in (37).

(37) a. x Jeffrey x hit x the x cop xxx with x a stick xxxx

b. x Jeffrey x hit x the x cop x with x a stick xxxxxx

The number of italicized silent demibeats in (37a) is three and that in (37b) is one. This explains why pause duration at that point is longer in (36a) than in (36b).

Hearers also tend to interpret a prosodic break as a major constituent break. For example, according to Pynte and Prieur (1996), if the second prosodic break is put between NP and PP in (38), the interpretation (39b) is preferred to (39a).

(38) The spies [$_{VP}$ informed # [$_{NP}$ the guards] (#) [$_{PP}$ of NP]]

(39) a. The spies [informed [the [guards [of [the palace]]]]]

b. The spies [informed [the [guards]] [of [the conspiracy]]]]

We can explain the preference if we assume that the second prosodic break between NP and PP is perceived by a hearer as two more silent demibeats as shown in (40b).

(40)

	PF	Parsing	
a.	... guards x of ...	... guards [of ...	(= (39a))
b.	... guards xxx of ...	... guards]] [of ...	(= (39b))

Parsing interprets the silent demibeat as (40b), which is the same structure as in (39b).

These data of production and perception are naturally explained with the analysis presented here. This fact gives support for the Spell-Out before Merge hypothesis.

9.10 Consequences

This analysis has a number of favorable consequences. First, as we have seen in chapter 5, if we assume "Avoid Pause" constraint, it explains why right-branching languages are "end-weighted" (Hawkins 1994, Wasow 2002).

Second, as we have seen above, the phrase structure proposed here has an interesting similarity to Kayne's (1994): the rightmost word is bracketed by itself (=non-branching), contra Chomsky (1995). Thus, this analysis provides support for Kayne's LCA.

Third, this mapping between syntax and PF does not use any syntactic labels, which should be eliminated from syntax in any attempt to extend the minimalist framework (cf. Chomsky 1995, Collins 2002, Tokizaki 2005).

9.11 Summary

I have argued that we can resolve the contradiction of directions between rightward parsing and leftward tree structuring if we assume a Spell Out before Merge hypothesis. A speaker Spells Out a lexical item and a bracket to PF stepwise as sound and a silent demibeat. Merge is triggered by inserting a right bracket, which encloses a constituent together with its corresponding left bracket. Hearers interpret the silent demibeats in PF representation as syntactic brackets which enable them to build a syntactic tree. Thus, there is no paradox between Parse Right and Merge Left. This analysis of interface is a small but steady step toward the goal of the minimalist program.

Chapter 10

Conclusion

So far, we have seen that syntactic phrase structure provides basic phonological representation in the domains of phrase, clause, and discourse. In Chapter 1, I sketched the minimalist framework and reviewed some of the previous studies on syntax-phonology mapping, focusing on the syntactic branching and disjuncture. In Chapter 2, I proposed a bare theory of syntax-phonology interface in the minimalist framework, which consists of the bare syntax-phonology mapping and the prosodic boundary deletion. The mapping rule interprets syntactic brackets as prosodic boundaries, some of which are deleted by the deletion rule to make various types of prosodic phrases. In Chapter 3, I argued that the bare mapping theory can deal with the phrasing difference among languages in terms of the syntactic head parameter, and that we can do away with prosodic edge parameters. In Chapter 4, I showed that the bare mapping theory correctly predicts the optional prosodic phrasing by changing the number of prosodic boundaries to be deleted according to the speech rate. In Chapter 5, I argued that the bare theory straightforwardly explains the fact that constituent length affects prosodic phrasing. I showed that prosodic well-formedness requires long constituents to be placed at the end of the sentence. In Chapter 6, I argued that the bare mapping rule also applies to hierarchical discourse structure built up by merging sentences with phonologically empty conjunctions. In Chapter 7, I argued that topic is phonologically marked by prosodic boundaries because it is placed at some specifier or adjunct position. While presupposed parts of the sentence lose their hierarchical structure, focus retains its structure and gives prosodic boundaries. In Chapter 8, critically reviewing Zubizarreta (1998), I argued that the problematic prosodic facts about intransitive verbs can be explained if we take thetic/categorical distinction into account. In Chapter 10, I proposed a new theory of derivation and Spell Out with the bare

mapping theory. I argued that syntactic brackets are Spelled Out with lexical items one by one and that a closing bracket triggers Merge.

Throughout this thesis, I have tried to show that languages are made of words and morphemes build up into a hierarchical structure, which is faithfully reflected in certain aspects of prosodic realization, such as disjuncture, pause, and (in)applicability of phonological rules. I have not argued much about language processing, but it seems to be clear that both speakers and hearers make the most use of prosodic information in encoding and decoding the hierarchical structure of utterance. Surely, this thesis leaves much to be discussed, but I hope it is a steady step to investigating the nature of languages.

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