

PROSODIC PHONOLOGY IN HUNGARIAN*

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1. Introduction

As recent work in phonology has shown, in order to account for phonological rules that involve more than one word, it is necessary to have a theory of the interface between phonology and syntax. Simply stating that a particular rule applies across words does not work since the rule may apply across some words but not others. It is thus necessary to specify the domains within which specific rules may and may not apply. That these domains do not necessarily coincide with syntactic constituents has been amply demonstrated in such works as Clements (1978), Napoli-Nespor (1979), Rotenberg (1978), Selkirk (1978, 1984), Nespor-Vogel (1982, 1986) and Kaisse (1985). Instead, what is needed is a somewhat more complex theory of the interaction between the syntactic and phonological components of a grammar. Several such theories have been proposed in the last few years, in particular those advanced by Selkirk (1984), Kaisse (1985) and Nespor-Vogel (1986).

In this paper, we will examine two phonological phenomena of Hungarian that operate above the word level, a stress rule and a palatalization rule. Hungarian is particularly interesting in relation to the problem of the syntax-phonology interface since the proposals about this interface advanced thus far have all dealt primarily with configurational languages, while Hungarian, according to most accounts, is a nonconfigurational language. We will consider the two phonological rules in relation to three current analyses of Hungarian syntax, those of Horvath (1981, 1986), É. Kiss (1981, 1987a) and Kenesei (1984, 1986)/Marác (1986), and demonstrate that none of the analyses provides appropriate constituents for delimiting the domains of application

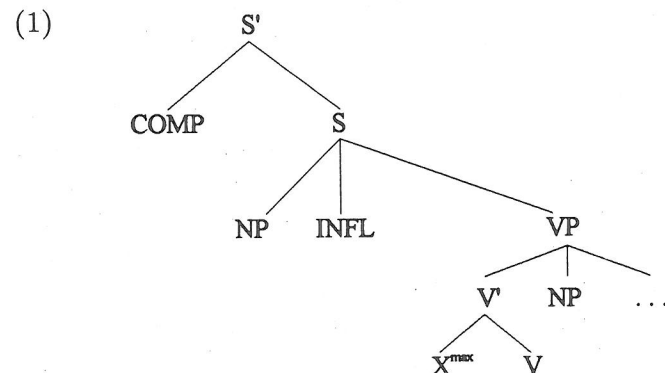
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of the rules, a result that is not particularly surprising. We will then examine the rules in light of the three proposals for more complex interactions between syntax and phonology and show, perhaps more surprisingly, that as they stand, none of these works either. What we will propose, instead, is an even more complex type of interaction, one that not only involves syntax and phonology, but also directly includes semantics, in particular, certain aspects of logical form. Our analysis will, furthermore, lend support to the treatment of Hungarian as a nonconfigurational language.

2. Hungarian and the configurationality issue

Before we begin to investigate the interaction between phonology and syntax in Hungarian, we will outline the relevant aspects of the three competing proposals for the analysis of Hungarian syntax that will be considered below.

In the recent literature on Hungarian syntax, we find proposals both to the effect that Hungarian is a configurational language and to the effect that it is nonconfigurational. On the side of configurationality, we find Horvath's (1981, 1986) treatment. Concentrating on a single aspect of word order, focus phenomena, Horvath posits the following tree structure for Hungarian sentences:



In this structure, all complements, including the preverbal ones, are optional; X^{\max} is a node that dominates a verbal prefix or some other preverbal complement, which may be 'locally postposed' freely. If another constituent is moved into the position vacated by a postposed verbal complement, it will receive focus interpretation. Thus, the neutral sentence in (2) can have the fo-

cused forms given in (3), where *le* is moved and its position is filled by another constituent.

(2) [s[NP Mari] [VP[v'[PP le] [v tette]] [NP az edényeket]]]
 Mary down put the dishes-acc.
 'Mary put the dishes down.'

(3) (a) [s[NP e_i] [VP[v'[v'[NP_i Mari] [v tette]] [PPle]] [NP az edényeket]]]
 'It was Mary that put the dishes down.'

(b) [s[NP Mari] [VP[v'[v'[NP_i az edényeket] [v tette]] [PP le]] [NP e_i]]]
 'It was the dishes that Mary put down.'

In Horvath's model, focus status is optionally assigned in the preverbal position at S-structure, and the constituent involved is moved into the peripheral COMP position at Logical Form (LF), the result being that it will c-command its trace at the relevant level.¹

Counter to Horvath's proposal, if we consider any of the grammatical properties that have been proposed for distinguishing between configurational languages (CLs) and nonconfigurational languages (NCLs), it turns out that Hungarian displays all of the characteristics associated with NCLs. Thus, for example, Hungarian, like Walpiri, Navaho, etc. has the following set of superficial properties discussed by Hale (1981, 1983, 1985): free word order, syntactically discontinuous expressions, extensive use of null anaphora (or pro-drop), lack of pleonastic elements, a rich case system and complex verb-words.

It has also been proposed that CLs differ from NCLs in relation to a parametrized form of the Projection Principle (cf. (4)), formulated by Hale as in (5).

(4) Projection Principle

Representations at each syntactic level (i.e., LF, D- and S-structure) are projected from the lexicon, in that they observe the subcategorization properties of lexical items. (Chomsky 1981, 29)

¹ Focus interpretation at LF is carried out by a rule of the following form:

(i) Given a representation of the form:

α [s ... x ...]

[FOCUS]

where x is in the position of the FOCUS-marked constituent, and α stands for an arbitrary category, rewrite it as: $\alpha =$ the x such that [s ... x ...].

For a discussion of Horvath's movement rules and a proposal in the framework of GPSG, see Farkas (1986).

(5) Configurationality Parameter

- (a) In configurational languages, the projection principle holds of the pair (LS, PS).
 (b) In nonconfigurational languages, the projection principle holds of LS alone. (Hale 1983, 26)

Note that in (5) LS stands for lexical structure ("essentially an amalgam of the 'virtual structure' of Vergnaud-Zubizarreta (1982) and the 'logico-semantic structure' of Marantz (1981)", Hale 1983, 11); PS stands for phrase structure.

In a different approach, Jelinek (1984) claims that at least in some NCLs elements in the inflectional morphology (verbal affixes or AUX clitics) are in fact clausal arguments and are coindexed with freely occurring nominals for coreference. To account for this, Jelinek (1986) proposes a different typological parameter:

(6) Argument Type Parameter (ATP)

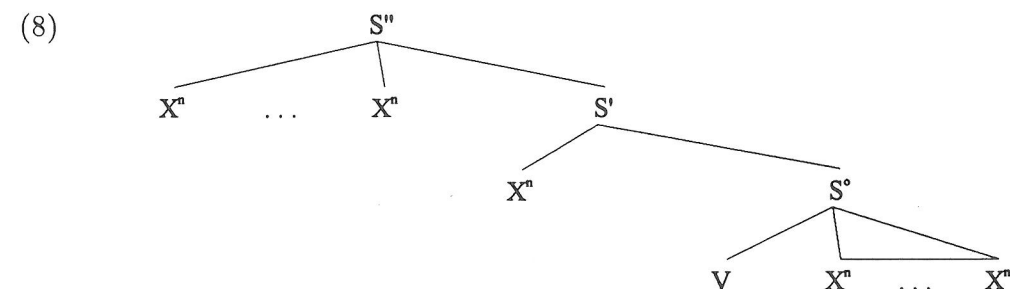
- (a) In Pronominal Argument languages, only pronominal (and anaphoric) clitics and affixes are arguments.
 (b) In Lexical Argument languages, lexical items serve as arguments.

The ATP, while providing for free constituent order, can rescue the projection principle in its original form.

The best known nonconfigurational proposal for Hungarian syntax is that advanced by É. Kiss (1981, 1987a) who offers the following set of rules, where 'X^{n*}' stands for any number of maximal major categories:

- (7) (a) Sⁿ → X^{n*} S'
 (b) S' → Xⁿ S^o
 (c) S^o → V X^{n*}

The resulting trees, which have the form in (8), are subject to the operation of rules of the move-α type, which in effect move constituents from S^o into positions in S' (focus) and Sⁿ (topic).



By virtue of an obligatory rule, the Xⁿ immediately dominated by S' (i.e. focus) will receive primary stress.

The sentences in (2) and (3) will thus, according to É. Kiss, be derived from (9a) by the optional application of the rules of Focusing and Topicalization, yielding (9b, c, d).

- (9) (a) [Sⁿ e[S' e[S^o tette le Mari az edényeket]]]
 put down Mary the dishes-acc.
 (b) [Sⁿ Mari_i[S' le_j[S^o tette e_j e_i az edényeket]]]
 'Mary put down the dishes.'
 (c) [Sⁿ e[S' Mari_i[S^o tette le e_i az edényeket]]]
 'It was Mary that put down the dishes.'
 (d) [Sⁿ Mari_i[S' az edényeket_j[S^o tette le e_i e_j]]]
 'It was the dishes that Mary put down.'

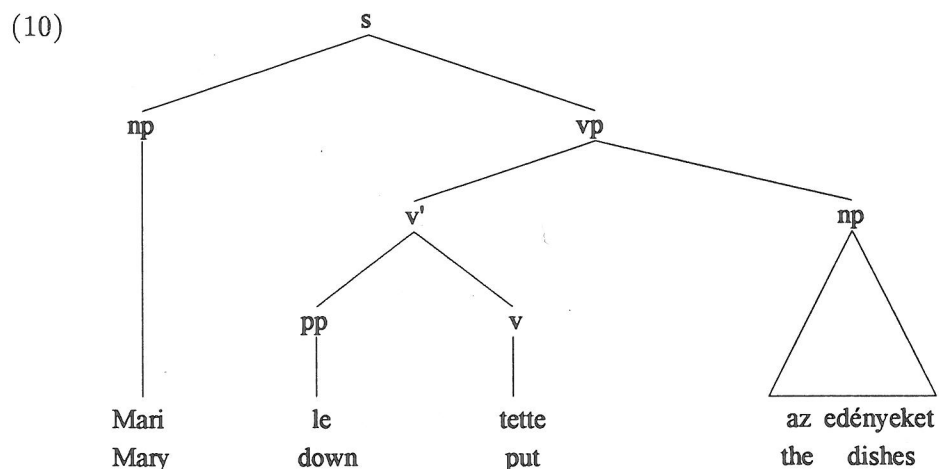
By implication, focus interpretation is carried out at LF, since any constituent under the preverbal S' position is assigned focus status.

The third analysis we will consider, based on work mainly by Marác and Kenesei, arose out of the need to account for both subject-object asymmetries, such as are found in reflexive binding, and the arguments for a VP-less S-structure, e.g. those stemming from pronominal non-coreference, the lack of rules involving VP and of ECP effects in subject position (cf. É. Kiss 1987b; Kenesei 1984, 1986; Marác 1986).

The Kenesei/Marác proposal can be accommodated in various analyses proposed for non-configurational languages. For example, Hale argues that "argument positions in LS are fully identified [...] and suffice to discharge the theta roles associated with the verb as required by the projection principle" (Hale 1985, 5). It may then be the case that the NPs at the PS level are not arguments, i.e., the PS of NCLs contains only non-A positions which are related to LS A-positions by some device. If, in a NCL, a module of grammar makes reference to argument positions it will have to look at LS, and if it refers to non-A positions, it will have PS as its domain. The data from Hungarian also support Mohanan's (1983, 113) conclusion (wherever applicable) that "reflexive binding, disjoint reference, control, case-assignment and NP-movement belong to Lexical structure, while pronominal non-coreference, wh-movement and quantifier scope belong to Configurational structure [Hale's phrase structure]."²

² The condition on applicability concerns, for example, NP-movement, a nonexistent operation in Hungarian.

The examples used above to illustrate Horvath's and É. Kiss's proposals would have the LS and PS representations in (10) and (11a-c), respectively, according to the Kenesei/Marác analysis.



- (11) (a) [S[NP Mari] [V'[PP le] [v tette]] [NP az edényeket]]
'Mary put the dishes down.'
- (b) [S[NP Mari] [V'[v tette]] [PP le] [NP az edényeket]]
'It was Mary that put the dishes down.'
- (c) [S[NP Mari] [NP az edényeket] [V'[v tette]] [PP le]]
'It was the dishes that Mary put down.'

One way to assign focus in the Kenesei/Marác system would be to assume that in the derivation of S-structure some rule like Culicover-Rochemont's (1983) Strong Assignment optionally marks the constituent in front of the verb for primary stress, which will be interpreted for focus function at LF. Alternatively, as we will suggest below, LF can be allowed to interpret the structures for operator status and scope and feed this information into the Phonetic Form (PF) component for stress assignment and other phonological rules.

3. The data: stress and *l*-palatalization

Now that we have examined the basic syntactic structure of Hungarian sentences, we will proceed in this section to provide the phonological facts that are relevant for the specific proposal we will advance regarding the syntax-phonol-

ogy interface in Hungarian, and perhaps in nonconfigurational languages in general. We will first examine the phenomenon of stress, and in particular a rule of Stress Reduction (SR), sometimes referred to as a stress eradication rule. This is the only phonological rule of Hungarian operating above the word that has received significant attention in the Hungarian linguistic literature. The second rule we will examine is *l*-palatalization (LP), a rule that is typically mentioned in traditional discussions of Hungarian in relation to its application within words. Sometimes it is mentioned that the rule may apply across words as well (cf. among others, Vago 1980), but this phenomenon has not previously been examined systematically. Our discussion of these rules is based on their application in standard Budapest Hungarian as spoken by educated speakers. They are both observed in colloquial speech produced at a tempo that is neither particularly slow nor particularly fast, it should be noted, however, that SR applies independently of style and rate of speech.

3.1. Stress

As is well known, Hungarian has word and phrase initial stress. This can be seen in the following minimal pair from Hetzron (1980), where 'M' and 'L' indicate mid and low degrees of stress, respectively.

- (12) (a) ^MChomsky ^Mprofesszor
'Chomsky is a professor.'
- (b) ^MChomsky ^Lprofesszor
'Professor Chomsky'

As far as stress in sentences is concerned, some linguists (e.g. Varga 1983) claim that, at the phonetic level, there are three degrees: primary ('), secondary (ˊ), and non-stress (unmarked). Others (e.g. Kálmán 1985) believe that there are only two: presence (') and absence of stress (unmarked), and moreover, the perception of primary stress does not necessarily mean that the syllable in question has received more stress. It may gain its relative prominence as a result of the loss of stress on the following phonological word, defined as the entire string following the stress up to, but not including, the point at which there is another strong stress, or the end of the sentence.

Thus, a neutral sentence will have identical stress patterns in Varga's and Kálmán's analyses.

- (13) 'Tegnap 'Pál 'játszott a 'kertben.
yesterday Paul played the garden-in
'Yesterday Paul played in the garden.'

In nonneutral sentences, however, the two approaches differ. For Varga, a focused phrase must have primary stress and postverbal ones secondary stress (14a), while for Kálmán the latter are unstressed (14b).

- (14) (a) 'Tegnap 'Pál játszott a ,kertben.
 (b) 'Tegnap 'Pál játszott a kertben.
 'It was Paul that played in the garden yesterday.'

It should be noted that according to both Varga and Kálmán (cf. also Kálmán-Kornai 1988) the finite verb has to be destressed following a focused constituent.³ As far as postverbal constituents are concerned, however, it is Varga's proposal we will adopt here, that is, that words following the verb retain some degree of phonetic prominence. This position is supported by a minimal pair (cf. Varga 1983) which shows that if postverbal stresses were all decreased to the zero level, the sentences in (15a) and (15b) could not be distinguished, though in fact they have distinct pronunciations.

- (15) (a) Csak 'most jöttek a ,rabok.
 only now came the prisoners
 'The prisoners have just come.'
 (b) Csak 'most jöttek ,arabok.
 Arabs
 'Arabs have just come.'

Since these examples show that the stress on postverbal constituents is not totally eliminated (or eradicated) as it is on the verb in sentences with a focused element, we will use the term Stress Reduction (SR) here to refer to the general phenomenon by which stress is reduced following a focused constituent. The fact that the phonetic realization of this process is somewhat different on the verb itself and on the postverbal constituents is not relevant here.

3.2. *l*-palatalization

A number of the dental consonants of Hungarian become palatal in the environment of a palatal segment. We will be concerned here, however, only with

³ Kálmán-Kornai's formulation of the destressing rule is as follows, where 'S' stands for syllable, 'S₀' for (more than) null syllable, '(...)₁' for one or more of the item(s) in parentheses, '*' for accent, 'f' for a focused constituent and '#' for sentence boundary:

$$(i) [f S_0 \overset{*}{S} S_0] ([S_0 \overset{*}{S} S_0])_1 \longrightarrow [f S_0 \overset{*}{S} S_0 (S_0 S S_0)_1] / \text{---} \{ \# \}$$

the palatalization of *l*, which follows a pattern slightly different from the others. When *l*-palatalization (LP) applies, essentially what happens is that an /l/ followed by /j/ becomes [j], resulting in the sequence [jj], as shown:

- (16) *l*-palatalization
 $l \longrightarrow j / \text{---} j$

Considering the question of where LP applies in a broader sense, that is, to morphemes and words, let us begin by examining those structures in which the rule may and may not apply.⁴ As the examples in (17) show, the rule applies within a word between a base and suffix.

- (17) *tol* - *ja* *to*[jj]*a* 'he pushes it'
cél - *juk* *cé*[jj]*uk* 'their aim'
fél - *jen* *fé*[jj]*en* 'let him fear'

LP also applies across the two members of a compound, as illustrated in (18).

- (18) *fél* - *jegy* *fé*[jj]*egy* 'half price'
fal - *járó* *fa*[jj]*áró* 'wall walker (one who walks through walls)'
szél - *jegyzet* *szé*[jj]*egyzet* 'margin note'
el - *jönni* *e*[jj]*önni* 'to come away'
fel - *jönni* *fe*[jj]*önni* 'to come up'

If we look now at sequences of words, we find that LP may apply in different positions within a phrasal constituent. The length of the constituents appears not to be crucial, as the examples below show. The *ls* that may undergo palatalization are in italics.

- (19) (a) [*az angol játék*]_{NP}
 the English toy
 (b) [*ez a nagyon szép angol játék*]_{NP}
 this very beautiful English toy
 (c) [*az a nagyon jól játszott meccs*]_{NP}
 that very well played match

⁴ It should be noted that the application of LP is not obligatory. To some extent whether or not LP applies between words seems to depend on the style of speech, more extensive application being associated with less formal registers, though by no means can LP be considered what has sometimes been called a "sloppy speech rule". Rate of speech seems to have little or no effect on the extent of LP application. A systematic study of the various factors would be needed, however, to determine more precisely how they affect LP.

- (d) [jól jár]_V
well walks 'he fares well' (lit. 'he walks well')
- (e) [Pál javára]_{PP}
Paul for-the benefit-of 'for Paul's benefit'
- (f) [túl jeges]_{AP}
too icy

LP can also apply across phrasal constituents in many instances, as illustrated by the following examples, where phrasal constituents are labelled only as XP or V (or V'); further distinctions are not necessary here.⁵

- (20) (a) [csak]_{XP} [Pál]_{XP} [jár]_V
only Paul walks
'Only Paul walks.'
- (b) [Pál]_{XP} [bottal]_{XP} [jár]_V [be]_{XP} [az iskolába]_{XP}
Paul stick-with walks in the school-into
'Paul walks with a stick into the school.'
- (c) [a legkisebb angol]_{XP} [jött]_V [be]_{XP} [a szobába]_{XP}
the smallest Englishman came in the room-into
'The smallest Englishman came into the room.'
- (d) [minden nyúl]_{XP} [Jánost]_{XP} [szereti]_V [a legjobban]_{XP}
every rabbit John-acc. loves the best
'Every rabbit loves John the best.'
- (e) [nem]_{PRT} [olvasol]_V [jó széljegyzetet]_{XP}
not read good margin note-acc.
'You don't read good margin notes.'
- (f) [tegnap]_{XP} [beszélgetett]_V [Pál]_{XP} [Jánossal]_{XP}
yesterday spoke Paul John-with
'Yesterday Paul spoke with John.'
- (g) [Mari]_{XP} [a kastélyban]_{XP} [beszélgetett]_V [olaszul]_{XP}
Mary the castle-in spoke Italian
[Jánossal]_{XP}
John-with
'In the castle Mary spoke Italian with John.'

⁵ Although some of the sentences in (20)–(22) are ambiguous without stress indications, we will postpone the discussion of stress until the next section.

It should be noted that LP may also apply across words where a (putative) trace intervenes, as in (21).⁶

- (21) [e] [csak]_{XP} [Pál]_{XP} [fél]_V [e]_i [Jánostól]_{XP}
only Paul fears John-from
'Only Paul is afraid of John.'

Although LP may apply in many positions within a sentence, it is not the case that it may apply across all sequences of two words, given the correct segmental context. Examples of positions in which LP is typically blocked are given in (22), where the relevant *ls* are in boldface.

- (22) (a) [Pál]_{XP} [Jánost]_{XP} [látta]_V
Paul John-acc. saw
'Paul saw John.'
- (b) [Pál]_{XP} [jól]_{XP} [gondolta]_V [a dolgot]_{XP}
Paul well thought the matter-acc.
'Paul was right about it.'
- (c) [a nyúl]_{XP} [Jánost]_{XP} [szereti]_V
the rabbit John-acc. loves
'The rabbit loves John.'
- (d) [Pál]_{XP} [jól tudod]_S [beteg]_{XP}
Paul well you-know sick
'Paul, as you know, is sick.'
- (e) [ha iszol]_S [János]_{XP} [haragudni fog]_V
if you drink John be angry will
'If you drink, John will be angry.'
- (f) [minden nyúl]_{XP} [Jánost]_{XP} [sem]_{PRT} [szereti]_V
every rabbit John-acc. not-even loves
'Not even John is loved by every rabbit.'
- (g) [Mari]_{XP} [visszaél]_V [János]_{XP} [türelmével]_{XP}
Mary abuses John's patience-with
'Mary takes advantage of John's patience.'
- (h) [Mari]_{XP} [beszélgetett]_V [olaszul]_{XP} [Jánossal]_{XP}
Mary spoke Italian-in John-with
'Mary spoke in Italian with John.'

⁶ This is one possible constituent analysis according to É. Kiss.

- (i) [Pál]_{XP} [fél]_V [Jánostól]_{XP}
 Paul fears John-from
 'Paul is afraid of John.'

The data considered in this section reveal a complex pattern of LP application and lack of application. While it is clear that LP may always apply within words, including compounds, and within phrasal constituents, it is much less clear where its application across phrasal constituents is permitted and where it is prohibited. Particularly surprising are pairs of sentences such as (20g) and (22h), or (21) and (22i). While the two sentences in each pair are quite similar, LP may apply in the first but not the second one. If we look closely at the sentences, however, we see that there is an important difference between the first and second one in each pair. The first one contains a focused element (i.e. *a kastélyban* and *Pál*), while the second one is a neutral sentence in both cases and thus does not contain a focused element. Since focus was also seen to be relevant for the stress reduction phenomena, a reasonable question to raise at this point is whether there is any overlap between the contexts of SR and LP.⁷

⁷ Since native speakers' intuitions about LP are often unclear, 22 native speakers of standard Budapest Hungarian were tape recorded in November and December, 1987, to provide more reliable data. The subjects a) read 29 sentences with sequences of /l + j/ and b) performed a sentence completion task involving the same sentences. Of these, 4 items were omitted from our analysis because they were interpreted and stressed in more than one (acceptable) way by our subjects. Of the 12 secondary school students and 10 teachers recorded, 5 subjects were eliminated from consideration: 3 because their speech was excessively deliberate and unnatural, and 2 because, throughout the sample, they applied another rule, *l*-deletion, which made it impossible to determine whether it was this rule or LP that was being applied. This left 17 subjects and 24 test sentences in two conditions, a total of 816 items: 7 where no LP is predicted, 7 where it is predicted within words, and 10 where it is predicted across words. In a few instances, the responses were unintelligible, so the final total is 809. The results are given below (see footnote 27 for a discussion of pauses).

Table 1

	LP predicted						No LP predicted	
	within words		across words		total		N	%
	N	%	N	%	N	%		
LP	160	67%	182	54%	342	59%	28	12%
No LP	78	33%	140	41%	218	38%	167	72%
Pause	0	0%	16	5%	16	3%	38	16%
Total	238		338		576		233	

3.3. Relation between stress and LP

In order to best see the relation between stress and LP, let us review the examples of LP application vs. nonapplication just seen in light of the observations made about stress above in 3.1. The cases of LP within a single word are straightforward. There is one stress per word, on the first syllable, so we find that LP applies to a string in which there is only one stress, and this falls on a syllable to the left of the one containing the relevant /j/. The same is true for compounds, in which the first member is the one that bears the stress; the stress of the second member is lost. The items seen above in (17) and (18) are repeated in (23), where stress indications have been added.

- (23) (a) 'tolja (b) 'féljegy 'eljönni
 'céljuk 'faljáró 'feljönni
 'féljen 'széljegyzet

Let us now compare the stress patterns of those cases in which LP applies across constituents with those in which it does not.⁸ We will return to the cases of LP within constituents below. The sentences where LP applies (cf. (20) and (21)) and does not apply (cf. (22)) are repeated with stress indications in (24) and (25). Word stress is indicated by a double (") or single (') stress mark, the latter indicating a reduced word stress; unstressed items bear no special markings.⁹ The word that initiates Stress Reduction is in italics.

- (24) (a) Csak "Pál jár.
 (b) "Pál "bottal jár 'be az 'iskolába.
 (c) A "legkisebb 'angol jött 'be a 'szobába.
 (d) "Minden nyúl 'Jánost szereti a legjobbban.
 (e) "Nem olvasol 'jó 'széljegyzetet.

⁸ The results of the experiment on LP given in footnote 7 show 12% of cases where LP was found in contexts in which no LP is predicted. Aside from some small percentage of these cases which could be normally expected statistically, there appear to be two other sources for these responses: a) possible restructuring of the intonational phrase, creating additional environments for LP (cf. (59) in 5.2) and b) the application of another rule, *l*-deletion, which would produce a result similar to that of LP. Although these are also interesting phenomena, to examine them further would be beyond the scope of the present paper. We will thus consider the relevant contexts from the point of view of the lack of LP application.

⁹ Recall that the verb following a focused element is destressed by SR, while any subsequent constituents retain a level of word stress lower than that of the item that is the source of the application of SR. For a discussion of how focus is determined, see 5.1.

- (f) "Tegnap beszélgetett 'Pál 'Jánossal.
 (g) "Mari a "kastélyban beszélgetett 'olaszul 'Jánossal.
 (h) Csak "Pál fél 'Jánostól.
- (25) (a) "Pál "Jánost látta.
 (b) "Pál "jól gondolta a 'dolgot.
 (c) A "nyúl "Jánost szereti.
 (d) "Pál, "jól tudod, "beteg.
 (e) Ha "iszol, "János "haragudni fog.
 (f) "Minden nyúl "Jánost sem szereti.
 (g) "Mari "visszaél "János "türelmével.
 (h) "Mari "beszélgetett "olaszul "Jánossal.
 (i) "Pál "fél "Jánostól.

While the generalization found in relation to stress and LP within words does not hold for LP across constituents, where the syllable with the /j/ may bear stress, there is nevertheless another generalization that holds for both cases. That is, LP may apply any time there is a syllable to the left of the one containing the /j/ that has a stronger stress than the one with the /j/. This same generalization also holds for the cases seen above of LP applying within a phrasal constituent, where stress is always on the leftmost element that may bear stress in phrases in Hungarian (cf. 3.1). There is thus clearly a link between stress and LP, though it is not possible to state the environment of LP in straightforward terms directly in relation to stress since local stress relations are not adequate for predicting whether or not the rule may apply. If we consider the relative stress of two adjacent syllables (*a* and *b*), within or across words, there are three logical possibilities: $a > b$, $a = b$, $a < b$. As Table 1 shows, the only relation which allows us to distinguish between the application of LP and its absence is $a > b$. The other two stress patterns permit LP to apply in some cases, but not in others.

Table 2
Stress relations

	+LP	-LP
a) $a > b$	e.g. (24a, e)	—
b) $a = b$	e.g. (24c, f)	(25a, b)
c) $a < b$	e.g. (24d, h)	(25e, f)

As far as the application of SR and LP is concerned, there is one more observation that should be made. The only place in which we find LP operating across words is within a single constituent and across constituents in sentences in which SR also applies, but only to the right of the first syllable of the word which initiates Stress Reduction. Thus, at least in part, the domains of SR and LP overlap. In the remaining sections, we will address the problem of accounting for these domains.

4. Syntax and the domain of SR and LP

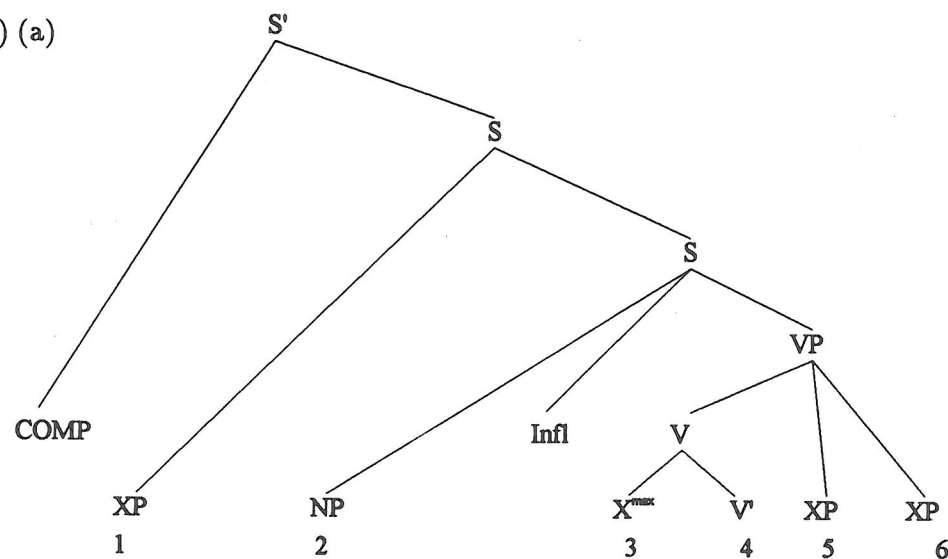
Since SR and LP apply across words, but not just any sequence of words, any account of their domains will have to involve syntax in order to specify precisely under what conditions the rules may and may not apply. We will first examine the possibility of accounting for SR and LP in terms of syntactic constituents, and then proceed to a consideration of more complex types of relations between syntax and the two rules in question.

4.1. Syntactic constituents

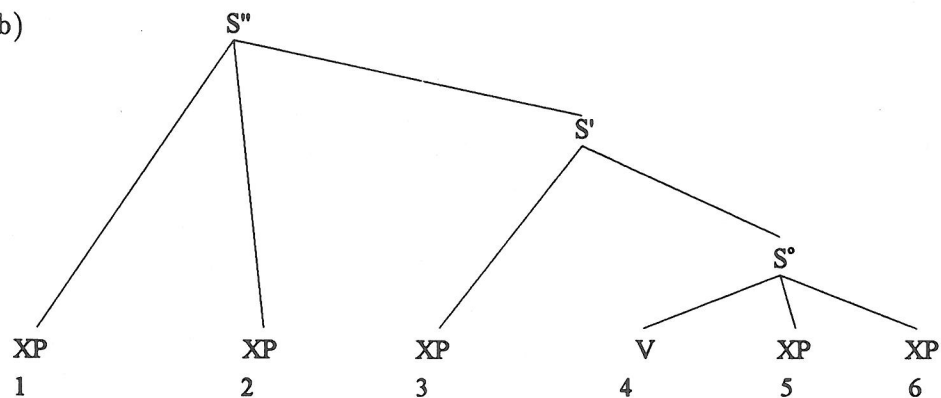
The simplest type of interaction between phonology and syntax is one in which the constituents of syntactic structure are coextensive with the strings within which phonological rules apply. Although, as was mentioned above, it has been demonstrated elsewhere that such a simple relation is not tenable, we will nevertheless go through the demonstration that it cannot account for the Hungarian data since it is still currently assumed that SR can be predicted solely on the basis of syntactic tree structures (cf. among others Horvath 1981, 1986; É. Kiss 1981, 1987a). Let us consider the three structures in (26a-c), corresponding to a sentence consisting of one verb preceded by three and followed by two constituents, as it would be represented in the syntax of Horvath, É. Kiss and Kenesei/Marácz (cf. 2 above).¹⁰

¹⁰ Note that in (26a), Horvath's type of analysis, the constituent in position 1 is attached to S by Chomsky Adjunction. This is a topic constituent, and since Horvath mentions preposing only in passing and in relation to nonadjuncts, it is not clear how other topics should be incorporated into the tree.

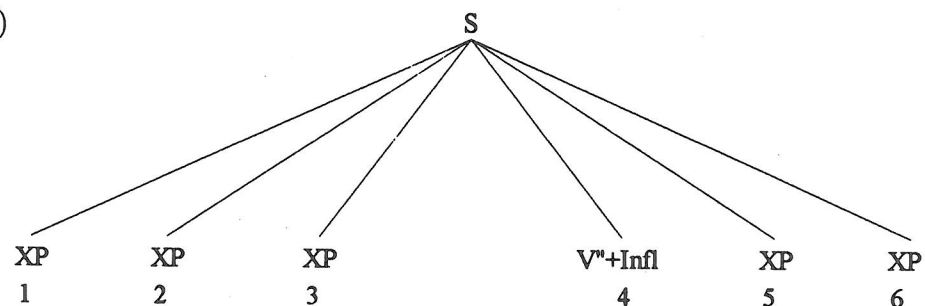
(26) (a)



(b)



(c)



The examples in (27) are sentences with all six positions filled. The readings of these sentences are intended to have focus on the constituent immediately preceding the verb.

(27)

- | | | | | | | |
|-----|-------------|---------|-------------|------------|-----------------------|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| (a) | [tegnap] | [Péter] | [a parkban] | [kérdzte] | [az angol játékról] | |
| | yesterday | Peter | the park-in | asked | the English toy-about | |
| | | | | | | 6 |
| | | | | | | [Jánost] |
| | | | | | | John-acc. |
| | | | | | | 'Yesterday Peter asked John about the English toy in the park.' |
| (b) | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| | [Jánossal] | [Júlia] | [a parkban] | [játszott] | [tegnap] | [egy meccset] |
| | John-with | Julia | the park-in | played | yesterday | a match-acc. |
| | | | | | | 'Julia played a match with John in the park yesterday.' |
| (c) | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| | [a parkban] | [Pál] | [játékból] | [verte] | [nyakon] | [Pétert] |
| | the park-in | Paul | playfully | hit | neck-on | Peter-acc. |
| | | | | | | 'Paul playfully hit Peter on the neck in the park.' |

Since we are assuming a focus reading of the items in (27), the only way these sentences can be pronounced as far as stress is concerned is with the usual stress on positions 1 and 2 and with SR applying to positions 3-6, as indicated in (28).

- (28) (a) "Tegnap "Péter a "parkban kérdezte az 'angol 'játékról 'Jánost.
 (b) "Jánossal "Júlia a "parkban játszott 'tegnap egy 'meccset.
 (c) A "parkban "Pál "játékból verte 'nyakon 'Pétert.

As far as LP is concerned, it should be noted that it may apply between words that are part of the string to which SR has applied, i.e. 3-6. Specifically, it may apply within position 5 in (27a) and between 5 and 6 in the same sentence. It does not apply between 1 and 2 in (27b) and between 2 and 3 in (27c).

The syntactic structures proposed by Horvath (26a), and by É. Kiss (26b), include a constituent that is coextensive with positions 3-6, VP and S', respectively,

Thus far, it seems that the syntactic structure in (26c) cannot account for the rules under investigation. Both (26a) and (26b), on the other hand, do provide constituents that can account for the application of the rules. Let us now examine two more sentences to see whether the structures in (26a) and (26b) still hold up.

- (29)
- | | | | | | |
|-----|---|---------|----------------------------|----------------|--|
| | 1 | 2 | 3 | 4 | |
| (a) | [tegnap] | [Péter] | [a parkban] | [beszélgetett] | |
| | yesterday | Peter | the park-in | spoke | |
| | 5 | | 6 | | |
| | [mindenkivel] | | [még az angol játékról is] | | |
| | everyone-with | even | the English toy-about also | | |
| | 'Yesterday in the park Peter spoke with everyone even about the English toy.' | | | | |
-
- | | | | | | |
|-----|---|---------|-------------|----------------|--|
| | 1 | 2 | 3 | 4 | |
| (b) | [tegnap] | [Péter] | [a parkban] | [beszélgetett] | |
| | yesterday | Peter | the park-in | spoke | |
| | 5 | | 6 | | |
| | [mindenkivel] | | [Jánosról] | | |
| | everyone-with | | John-about | | |
| | 'Yesterday in the park Peter spoke with everyone about John.' | | | | |

On the basis of the relation between constituent structure and SR, we would expect the sentences in (29) to have the same stress patterns as those in (27). They do not, however, and instead may have the fairly different ones seen in (30).

- (30) (a) "Tegnap "Péter a "parkban beszélgetett "mindenkivel még az "angol 'játékról is.
- (b) "Tegnap "Péter a "parkban beszélgetett "mindenkivel 'Jánosról.

If, as was seen above, VP and S' are the constituents within which SR applies in the Horvath and É. Kiss models, then there is no way to account for the unreduced stress in positions 5 and 6 in (30a) and SR and LP in positions 5 and 6 in (30b).

Finally, it should be recalled that in neutral sentences there is no SR. Consequently, the only place LP may apply is within a word or across words in a single constituent. In such cases, all of the models exemplified in (26) would need a special stipulation to the effect that only the terminal nodes of

the syntactic trees illustrated are relevant in determining the application of the rules in question.

The conclusion we must draw at this point is that none of the three types of syntactic analyses of Hungarian examined here provides constituents that correctly delimit the strings within which SR and LP apply. These rules of Hungarian are thus no exception to what has been found on the basis of other languages, namely that syntactic constituent structure alone cannot predict where phonological rules which operate above the word level may apply.

4.2. More complex relations between syntax and phonology

Since the application of SR and LP cannot be accounted for solely on the basis of syntactic constituents, we will now examine these rules in light of several recent proposals for more complex types of interactions between syntax and phonology. Specifically, we will consider three such approaches, which we will refer to as the c-command, the metrical grid and the prosodic constituent approaches. Before analyzing the Hungarian data, though, we will first outline those aspects of each proposal that are relevant to our analysis. It should be noted that all three proposals share the assumption that the only syntactic information that may be involved in the syntax-phonology interaction is that which is found in surface syntactic structure, though the specific type of information and the nature of the interaction vary from one approach to another.

According to the c-command approach, proposed by Kaisse (1985), phonological rules that apply in larger domains than the word may be of one of two types: fast speech rules or external sandhi rules.¹¹ It is proposed that the former are the purely phonological rules of a language in that they only make reference to phonological information. The latter, on the other hand, require reference not only to phonological information, but also to syntactic or morphological information. Since we are concerned here precisely with the interaction between syntax and phonology, we will limit our discussion to the second category of rules.

According to Kaisse's proposal, only two syntactic notions may play a role in the syntax-phonology interface. These two notions form the basis of the following two parameters:

¹¹ These are distinct from still another category of rules, those that involve cliticization and are, according to Kaisse, handled by the syntactic or morphological component of the grammar.

- (31) (a) C-command Condition: one of the words must c-command the other.¹²
 (b) Edge Condition: the sandhi pair (i.e. the words participating in the phonological rule) must be on the edge of the constituent that contains them. (Kaisse 1985, 186)

When values are supplied for each of these parameters, the result is the specification of the environment of the sandhi rule in question.

Thus, what the c-command approach predicts is that any phonological rule that is sensitive to syntactic information may apply only to a sequence of two words at a time, and only if the words are in the required syntactic relation to each other. There is no notion of domain in the sense of a string of potentially varying length extending from one point to another, nor consequently, as Selkirk (1986) points out, of the limit (i.e. beginning or end) of such a string.

The metrical grid approach, a proposal advanced by Selkirk (1984), attributes the fundamental role in determining where a given (external) sandhi rule will apply to the rhythmic structure of the sentence, as expressed in terms of the metrical grid.¹³ Since grid structure is built on the basis of syntactic structure, it is precisely in the area of grid construction that we find an interaction between syntax and phonology. Another area of interaction involves the assignment of intonational structure to the surface syntactic structure of a sentence.

The aspect of grid construction that explicitly brings syntax and phonology above the word into contact is the assignment of silent demibeats, or positions in the representation of a sentence that do not correspond to phonetic material. This is achieved by the rule in (32).

(32) Silent Demibeat Addition

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

¹² It should be noted that the definition of c-command used by Kaisse (p. 159) is that of domain c-command, according to which "in the structure $[X^{\max} \dots \alpha \dots]$, X^{\max} is defined as the domain of α . Then α c-commands any β in its domain".

¹³ Note that Selkirk's use of the term "sandhi" is not the same as that of Kaisse. While for Kaisse sandhi rules are precisely those that are not affected by rate of speech, for Selkirk sandhi rules are those that *are* affected by rate of speech.

- (a) a word,
 (b) a word that is the head of a nonadjunct constituent,
 (c) a phrase,¹⁴
 (d) a daughter phrase of S. (Selkirk, p. 314)

Since, according to Selkirk, whether or not a given external sandhi rule applies depends on the amount of time (in relation to the silent demibeats) intervening between two segments, the more quickly a sentence is uttered, the less time there will be between the segments in question, and consequently, the more environments there may be for the application of the rule.

The other aspect of the syntax-phonology interface in Selkirk's approach is not directly related to grid structure. Here, instead, intonational phrasing is assigned freely to the surface syntactic structure of a sentence. Thus, although syntactic structure and phonological (i.e. intonational) structure are related to each other by such a mapping, it is not the case that the syntactic structure of a sentence determines its intonational phrasing. While the structures created by Silent Demibeat Addition serve in the determination of the application of external sandhi rules, according to Selkirk, intonational phrases do not.

Finally, it should be noted that although the metrical grid approach and the c-command approach account for the application of phonological rules above the word level in very different ways, the two approaches have in common the fact that neither one makes use of the notion of domain, a string throughout which a rule applies.

The third approach we will consider is the prosodic constituent approach, as proposed in Nespor-Vogel (1986). Though the prosodic theory of the interface between syntax and phonology actually dates back to earlier works such as Selkirk (1978, 1980), and Nespor-Vogel (1982), we will not consider these further here since they differ in a number of crucial ways from Nespor and Vogel (1986). According to the prosodic constituent approach, phonological structure is organized into a set of hierarchically arranged n -ary branching constituents ranging from the syllable to the phonological utterance. The various phonological constituents are defined on the basis of (morpho-)syntactic structure, though the phonological constituents are not necessarily isomorphic to any constituents found elsewhere in the grammar. It is thus the rules that map (morpho-)syntactic structure onto prosodic structure that define the nature of the relation between syntax and phonology in the prosodic constituent approach.

¹⁴ Note that Selkirk (p. 315) stipulates that (32c) must be restricted by a constraint such that when a phrase consists only of one word, the structure does not receive a second demibeat (i.e. in addition to the one assigned by (32a)).

It should be noted that in addition to the interaction between syntax and phonology in the prosodic constituent approach, there is also an interaction between semantics and phonology, at least at the two highest levels of the phonological hierarchy, the intonational phrase (IP) and the phonological utterance (U). The notion of focus and certain abstract semantic relations such as those expressed in English by *and*, *therefore* and *because* are needed in assigning stress, and accounting for restructuring in IP and U, respectively.

The prosodic constituent approach differs from the other two with respect to the treatment of external sandhi rules.¹⁵ Since the various prosodic constituents delimit strings of different lengths, it is possible according to Nespor and Vogel's proposal to make reference to domains of application of rules corresponding to the prosodic constituents. Specifically, it is claimed that external sandhi rules apply only in relation to strings that can be defined in terms of these domains. That is, they may apply throughout such a domain, at its beginning or end, or at the juncture of two domains.

Before concluding this section on prosodic constituents, it should be pointed out that Selkirk (1986) has taken a position in favor of a prosodic domain approach more along the lines of her earlier work and the proposal discussed here, thus moving away from the position taken in the metrical grid approach. The rules Selkirk uses to construct the prosodic constituents, however, differ from those found in Nespor-Vogel (1986). We will not go into them in detail here; it is sufficient to observe that the way constituents are created in Selkirk's new system is by marking the ends of certain types of syntactic constituents. The string between the end of one such constituent and the end of the next constituent is then a prosodic constituent.

In the following sections, we will examine the SR and LP data in light of the three approaches to the syntax-phonology interface just described. In order not to bias our evaluation of these proposals in relation to SR and LP by our choice of the syntactic model of Hungarian, we will consider each one in terms of all three of the models discussed above.

¹⁵ It should be noted that the definition of sandhi rule used in the prosodic constituent approach, as in Selkirk's (1984), includes only those rules that may be formulated uniquely in terms of phonological structure, following the syntax-to-phonology mapping, though no reference is made to rate of speech. They are thus opposed to those that must make direct reference to syntactic information, the sandhi rules in Kaisse's system.

4.2.1. The c-command approach

In relation to the c-command approach, it should be noted first of all that this approach can only be applied to a configurational type of syntactic structure. The notion of c-command thus applies only in a very limited way to the models of É. Kiss and Kenesei/Marác. Specifically, the definition of domain c-command used by Kaisse will only apply to the elements found within the phrasal nodes that are daughters of some S, though not between such phrases. Thus, of all the cases of LP application seen in 4.1, the only ones the c-command approach can account for are those between *angol* and *játékról* in (27a) and (29a). It does not even make sense to discuss SR in relation to these words alone since SR applies to much broader contexts. There is more chance the c-command approach can work in relation to Horvath's analysis of Hungarian syntax since it is configurational in nature. In a tree structure such as the one in (26a), the verb in position 4 would c-command positions 3, 5 and 6. Since segmental external sandhi rules such as LP require that the segments involved be adjacent at some level, the relation between 4 and 6 is irrelevant. Assuming there is no additional edge requirement, the c-command approach can predict LP between positions 3 and 4 and between 4 and 5, of which we have no examples in the sentences with 6 positions, though relevant cases were seen above in (24b) and (24e), respectively. Note that it will also work within a single constituent, and thus between *angol* and *játékról* once again. It also correctly predicts the lack of LP between positions 1 and 2 and positions 2 and 3 in the example seen in (27c). It cannot, however, predict LP between 5 and 6, where, in fact, the rule applies, as was seen in (27a) and (29b). It should be recalled, moreover, that the c-command approach only accounts for rules applying to pairs of adjacent words; it does not define longer strings as domains for sandhi rules. It cannot, therefore, account for SR, the environment of which is not defined in relation to two words, but rather precisely to sequences of varying length, depending on the sentence. Even as far as LP is concerned, the fact that the rule must operate on two words at a time means that the instances of LP within words must be treated separately, by lexical phonology, according to Kaisse. The only way to get SR to apply throughout a given string, and to account for word-internal and wordexternal LP with the same rule, would be to consider them both to be fast speech rules. Such a solution is not acceptable, however, since neither of the two rules is associated with a particularly fast tempo, and even more problematically, neither one applies "across the board", without reference to anything but phonological information; as required by Kaisse's definition of fast speech rules. Thus, SR and LP represent a type of phonological rule that is systematically excluded

by the c-command approach: one which is sensitive to more than phonological information but which applies throughout strings that may be longer than a sequence of two words and shorter than an entire sentence.

4.2.2. The metrical grid approach

The metrical grid approach can, in principle, apply to nonconfigurational as well as to configurational structures. By way of evaluation of this approach, let us consider the sentences examined above (27a-c), repeated in (33). The way the silent demibeats would be introduced in relation to the six positions in such sentences is given in (34i), (34ii) and (34iii) for the Horvath, É. Kiss and Kenesei/Marác models, respectively. Lines (a)-(d) correspond to Selkirk's four rules of Silent Demibeat addition (cf. (32) above).¹⁶

(33)	1	2	3	4	
(a)	[tegnap]	[Péter]	[a parkban]	[kérdezte]	
	yesterday	Peter	the park-in	asked	
		5	6		
	[az angol játékról]	[Jánost]			
	the English toy-about	John-acc.			
	'Yesterday Peter asked John about the English toy in the park.'				
	1	2	3	4	5
(b)	[Jánossal]	[Júlia]	[a parkban]	[játsozott]	[tegnap]
	John-with	Julia	the park-in	played	yesterday
		6			
	[egy meccset]				
	a match				
	'Julia played a match with John in the park yesterday.'				

¹⁶ The silent demibeats (SD) in line *b* have been placed in parentheses in (i) and (ii) as a result of the ambiguity of applying Selkirk's rule to both Horvath's and É. Kiss's structures since in some cases position 1 contains an argument (e.g. (33b)) and thus requires an SD, while in other cases it contains a free adjunct (e.g. (33a, c)) and thus does not require an SD. Our SD assignment is based on an extrapolation of Selkirk (1984), since she does not specify how non-argument phrases at the level of S are to be treated. In (iii), we have placed parentheses around the x in position 4, following the verb, because it is unclear from Selkirk's proposal how the verb should be treated in Hungarian, where V' differs significantly from VP in configurational structures. The parentheses around the other x's indicate that each position might or might not be filled with a nonadjunct constituent.

The SDs are in parentheses in line *c* because every one of them follows a phrase that may consist of a single word (cf. footnote 12).

The SDs in parentheses in line *d* are those which are daughters of S' or S'', positions which are not discussed by Selkirk (1984).

	1	2	3	4	5
(c)	[a parkban]	[Pál]	[játékból]	[verte]	[nyakon]
	the park-in	Paul	playfully	hit	neck-on
		6			

[Pétért]

Peter-acc.

'Paul playfully hit Peter on the neck in the park.'

(34)		1	2	3	4	5	6
(i)	(a)	x	x	x	x	x	x
	(b)	(x)	x	x	x	(x)	(x)
	(c)	(x)	(x)	(x)	0	(x)	(x)
	(d)	(x)	x	0	0	0	x
							(x)
(ii)	(a)	x	x	x	x	x	x
	(b)	(x)	(x)	(x)	x	(x)	(x)
	(c)	(x)	(x)	(x)	0	(x)	(x)
	(d)	(x)	(x)	(x)	0	x	x
							(x)
							(x)
(iii)	(a)	x	x	x	x	x	x
	(b)	(x)	(x)	(x)	(x)	(x)	(x)
	(c)	(x)	(x)	(x)	(x)	(x)	(x)
	(d)	x	x	x	x	x	x

The fewer silent demibeats there are between two words, the more likely it is that an external sandhi rule will apply in that position. Not one of the representations in (34) comes close to providing the appropriate environments for SR and LP for sentences such as those in (33). We will not list all the difficulties here, but what the reader should note is that in each of the representations there are words between which the rules should be blocked that are rhythmically the same or closer than others between which the rules should apply. Compare, for example, the juncture of 1-2 with that of 5-6.

4.2.3. The prosodic constituent approach

In order to evaluate the prosodic constituent approach, it is necessary to determine whether one of the constituents in the hierarchy corresponds to the domain of application of SR and LP, given any of the three syntactic analyses available. To begin with, we can exclude the phonological utterance (U), since it includes the entire string dominated by the highest node in the syntactic tree. This cannot be the appropriate domain, given that the rules in question are often blocked at specific points within a sentence. The next smaller constituent, the intonational phrase (IP), must also be excluded on the grounds that it often delimits a domain which is too broad. All of the sentences we have been considering in this section, for example, would be analyzed as consisting of a single intonational phrase each, since each one corresponds to a single root sentence in the syntactic tree and does not contain any of the types of constructions that obligatorily form intonational phrases on their own (e.g. parentheticals, vocatives). The constituent below IP, the phonological phrase (φ), is defined by Nespor-Vogel (1986) only for configurational structures. We can thus examine this constituent only in relation to Horvath's analysis of Hungarian, and to those places in the two others where a configurational structure appears. If we take the recursive side in Hungarian to be the left side with respect to a head, the phonological phrase would be defined as consisting of a clitic group (i.e. the next smaller prosodic constituent) containing the head of a phrase, X, plus all the material to its right up to, but not including, the next clitic group containing a head outside of the maximal projection of X. Let us consider this definition in relation to the sentence in (27a), repeated in (35).

- (35)
- | | | | |
|-----------|---|-------------|------------|
| 1 | 2 | 3 | 4 |
| [tegnap] | [Péter] | [a parkban] | [kérdezte] |
| yesterday | Peter | the park-in | asked |
| | 5 | 6 | |
| | [az angol játékról] | [Jánost] | |
| | the English toy-about | John-acc. | |
| | 'Yesterday Peter asked John about the English toy in the park.' | | |

According to the above definition, the phonological phrase structure of (35) would be that in (36), as applied to Horvath's model.

- (36) [tegnap] φ [Péter] φ [a parkban] φ [kérdezte az angol játékról Jánost] φ

If we were to posit φ as the domain of application of SR and LP, this would account for the observed lack of application of these rules (where the correct segmental context occurs in the case of LP) between positions 1 and 2 and between 2 and 3. It would also account for the application of the rules between 4 and 5, and 5 and 6. It could not, however, account for their application between 3 and 4 in sentences such as those in (27) and (35). It should also be noted that 4-6 would incorrectly form a single φ in a neutral sentence. In É. Kiss's model, where S° is the maximal projection of V, the six positions would be grouped into φ s in the same way as in Horvath's analysis. In the Kenesei/Marác model each of the six positions would correspond to a φ , and thus not predict any of the applications of the rules across constituents. Thus, on the whole, the prosodic constituent approach fails to account for the phonological rules under investigation, as do the other two approaches.

Before concluding this section, for the sake of completeness, we will also briefly examine Selkirk's (1986) phonological constituents. Essentially, they can be identified by placing brackets at the right (or left) end of words and phrases:]_{word} and]_{X^{max}}. We will not be concerned here with the domain identified as the phonological word since SR and LP must be allowed to apply in a domain consisting of more than one word. The only other possibility is the phonological phrase, determined in relation to the ends of X^{max}.

Let us consider again the sentences seen in (27)/(33). If we assume that the X^{max} brackets are to be placed at the left end of the appropriate syntactic constituents, we end up with five phonological phrases in Horvath's model, where X^{max} and V form a single phrase. The result for the É. Kiss model is the same as that for the Kenesei/Marác model, and it is incorrect. That is, we would place a bracket at the left of each of the six positions, creating one phonological phrase per position. If we place the X^{max} brackets to the right of the relevant syntactic phrases, we end up with the same results for the Horvath and É. Kiss syntactic structures, but slightly different ones for the Kenesei/Marác structure, as indicated in (37a) and (37b), respectively.

- (37) (a) [1][2][3][4 5][6] phonological
phrases
- (b) [1][2][3][4] [5][6]

At this point, it might seem that there is no hope of accounting for SR and LP in any systematic way. What we believe is that this is true if the only type of nonphonological information considered is syntactic constituent

structure. It will be demonstrated in the next section, however, that there is indeed a "system" to the phenomena in question, but it depends crucially on the introduction of semantic information as well.

5. Accounting for SR and LP

It has often been noticed that there is some connection between the stress pattern and the semantics of a sentence in Hungarian, especially such notions as topic and focus (cf. also 3.3 above). As these notions constitute part of the logical form (LF) component of the grammar, we will first briefly outline the relevant principles of LF and how they apply to Hungarian. It will be shown subsequently how scope relations and whether or not an item bears a logical function relate directly to the application of LP and SR. At this point, too, we will be forced to choose among the three models of Hungarian syntax we have been considering all along: only the "flat" structure proposed by Kenesei and Marác will allow us to account for the phenomena under investigation. Finally, we will propose a way of integrating the appropriate semantic notions with syntactic and phonological structure to provide a simple and straightforward account of LP and SR. Specifically, we will propose that the domain of these rules is the prosodic constituent IP (i.e. intonational phrase), and that the mapping rules that construct this phonological constituent must take not only syntactic, but also semantic, information into consideration.

5.1. The contribution of logical form

The surface order of the constituents of a Hungarian sentence does not depend on their grammatical functions. Instead, in general, it is determined by their logical functions, or rather, in terms of current grammatical theory, the other way around: the linear order of maximal projections determines the logical form of the sentence. By way of illustration, consider the following examples, in which the sentences of each pair differ as far as the order of constituents, in terms of their grammatical functions, is concerned, but not as far as their scope relations and stress patterns are concerned:

- (38) (a) "Mindenki 'Pétert kérdezte 'meg.
everyone-nom. Peter-acc. asked perf.
'For every person *x*, it was Peter *x* asked.'
- (b) "Mindenkit 'Péter kérdezett 'meg.
everyone-acc. Peter-nom. asked perf.
'For every person *x*, it was Peter that asked *x*.'

- (39) (a) "Péter kérdezett 'meg 'mindenkit.
'It was Peter that asked everyone.'
- (b) "Pétert kérdezte 'meg 'mindenki.
'It was Peter that everyone asked.'
- (40) (a) Nem "Péter kérdezett 'meg 'mindenkit.
not
'It wasn't Peter that asked everyone.'
- (b) Nem "Pétert kérdezte 'meg 'mindenki.
'It wasn't Peter that everyone asked.'
- (41) (a) "Péter nem kérdezett 'meg 'mindenkit.
'It was Peter that didn't ask everyone.'
- (b) "Pétert nem kérdezte 'meg 'mindenki.
'It was Peter that not everyone asked.'
- (42) (a) Nem "Péter nem kérdezett 'meg 'mindenkit.
'It wasn't Peter that didn't ask everyone.'
- (b) Nem "Pétert nem kérdezte 'meg 'mindenki.
'It wasn't Peter that not everyone asked.'

In each of these examples, the linear order of focus, negation and the universal quantifier fully determines the relative scopes of these elements. In descriptive terms, we can say that the various constituents of Hungarian sentences, with or without a logical reading, line up as shown in Fig. 1, where 'Q' = quantifier, 'XP' = any maximal projection without a lexically specified logical function, and commas signify arbitrary order. Except for the verb, all constituents are optional. (Recall that Hungarian is a pro-drop language, so it can have sentences that consist solely of a finite verb.)

Initial Field	Quantifier Field					Verb	Postverbal Field
XP's ("topics"), Existential Qs, Downgraded uni- versal Qs	<i>Even</i> -phrase <i>No</i> -phrases	Neg	Universal Qs	only	XP (focus)	Neg+V	XP's, <i>Even</i> -phrase, <i>No</i> -phrases, Existential Qs, Universal Qs
	<i>wh</i> - phrases						

Fig. 1. Fields in Hungarian sentences

Within the Quantifier Field (QF), the elements are strictly ordered, and any constituent in QF takes scope over any other one to its right, whether it is

in QF too, or not. Observe that QF only contains expressions that carry a logical function, which we will call operators here; no nonoperator may occur in QF.¹⁷

Since operator status and scope relations are crucial to the question of word order in Hungarian, we will briefly consider how they are determined. As is well known, LF is responsible for attributing to the various operators their logical readings and assigning them scopes. The latter is achieved by the LF version of move- α : quantifier raising (QR). A quantifier can have scope over some expression if and only if the quantifier c-commands it. Thus QR moves constituents from A-positions to non-A-positions by Chomsky-adjointing them to phrasal nodes including S (cf. May 1985). QR accounts for scope asymmetries in subject and object positions.¹⁸ Now, if phrase structure (PS) is flat in Hungarian as suggested by independent considerations, all the operators c-command one another and their relative scopes are not determined by their grammatical functions, as they (in effect) are in configurational languages. We may suppose that LF assigns operator status to the appropriate categories in familiar ways on the basis of lexical specifications of their content. The only

¹⁷ There are also co-occurrence restrictions between operators that are due to constraints on relative scopes such as prohibitions against any operator appearing to the left of a wh-phrase (cf. (i)–(ii)), or against a wide-scope universal quantifier followed by negation (cf. (iii)–(iv)). It is possible, however, to have a downgraded universal quantifier followed by negation, as in (v).

- (i) *Még Pál is kit kérdezett meg?
even Paul-nom. prt. who-acc. asked perf.
- (ii) Kit kérdezett meg még Pál is?
'Who did even Paul ask?'
- (iii) *Pál "mindenkit nem kérdezett 'meg.
everyone-acc. not
- (iv) Pál nem kérdezett meg mindenkit.
'Paul didn't ask everyone.'
- (v) "Pál "mindenkit "nem kérdezett 'meg.
'idem'

We will not go into the co-occurrence restrictions within QF further here, however, since this is beyond the scope of the present paper.

¹⁸ Compare (i) and (ii):

- (i) (a) What did everyone buy for Max?
(b) [S' what_i [S everyone_j [S e_j buy e_i for Max]]]
- (ii) (a) Who bought everything for Max?
(b) [S' who_i [S e_i [VP everything_j [VP bought e_j for Max]]]]

In (ib) either quantifier can have scope over the other since both are immediately dominated by the same maximal projection, S', thus they c-command one another. In (iib), however, *everything* does not c-command *who*, therefore it has narrow scope.

exception is the constituent that is to be assigned focus function. Focus is assigned simply by (optionally) ascribing it to the category node immediately preceding the (finite) verb.¹⁹ We will assume that all operators are marked by a diacritic [+OS] and no nonoperator is so marked.

Next let us consider scope assignment. Ignoring the various language specific restrictions on scope relations for the time being, it is always the leftmost operator that has the widest scope. Let LF, then, mark this constituent by the diacritic [+SC]. All the other operators will be ordered with respect to scope in relation to the constituent bearing the feature [+SC].²⁰ Note that the diacritic [+SC] or an equivalent device to determine which quantifier has the largest scope, which is independently needed for LF interpretation, in effect draws the boundary between the Initial Field and the Quantifier Field in Fig. 1.

We will not go into further detail about the proposals concerning the rules and principles within LF here; however, see Kenesei (1986, 1989) for a discussion of some of these. Though we believe our approach is correct, it should be noted that the question of the existence of QR is not crucial; even if QR must be an integral part of LF, it will in any case, yield the appropriate scope relations, and that is all that must be taken into account here. The issue of whether the logical form of sentences is hierarchical is immaterial. Finally, we will make use of the features introduced here for ease of exposition, leaving open the possibility that they may represent completely different mechanisms of derivation.

Let us now consider some of the examples of LP contexts and stress patterns seen above, supplemented with the features that the relevant rules of LF contribute to their structures.²¹ Only features with positive values are

¹⁹ Or more precisely, it is assigned to the one before (Verb +) Tense, since verbs can also carry focus function. For more details, see Kenesei (1986).

Note also that if Culicover-Rochemont's (1983) proposal for Strong Assignment in syntax is not followed, focus assignment will also have to be part of the LF component in configurational languages. In this case, some device is needed by which LF and the phonological component are associated, for example, the mapping rules that build (prosodic) phonological structure on the basis of various types of nonphonological information.

²⁰ This may perhaps be regarded as comparable to Chomsky's (1981) "Assume a GF", proposed to account for the freedom of NP ordering with respect to grammatical function in Japanese.

²¹ Note that the contexts for LP are rather restricted in the Quantifier Field since, proceeding from left to right in Fig. 1, *even*- and *no*-phrases are accompanied by particles ending in /s/, /ε/ or /m/; the negative can end in either /m/ or /ε/; and the word for 'only' ends in /k/. That leaves only universal quantifiers and focus to be examined for LP in QF.

indicated; [+SC] implies [+OS]. The ls that undergo LP are in italics, while those that do not are in boldface.

- (43) (a) [[*"Tegnap*]_{PP} [*beszélt*]_V [*"Pál*]_{NP} [*"Jánossal*]_{NP}]_S
 [+SC]
 yesterday spoke Paul-nom. John-with
 'It was yesterday that Paul spoke with John.'
- (b) [[*"Pál*]_{NP} [*"Jánossal*]_{NP} [*"tegnap*]_{PP} [*beszélt*]_V]_S
 [+SC]
 'idem'
- (44) [[*"Minden angol*]_{NP} [*"Jánossal*]_{NP} [*beszélt*]_V [*"először*]_{PP}]_S
 [+SC] [+OS]
 every Englishman John-with spoke first-for
 'For every Englishman *x*, it was John that *x* first spoke with.'
- (45) [[*"Pál*]_{NP} [*"Jánossal*]_{NP} [*beszélt*]_V [*"először*]_{PP}]_S
 [+SC]
 'It was John that Paul spoke with first.'
- (46) [[*"Pál*]_{NP} [*"bottal*]_{NP} [*jár*]_V [*"be*]_{PP} [*az 'iskolába*]_{NP}]_S
 [+SC]
 Paul-nom. stick-with walks in the school-to
 'It is a stick that Paul walks into the school with.'
- (47) [[*"Pál*]_{NP} [*"játékból*]_{NP} [*"Jánosra*]_{NP} [*ütött*]_V]_S
 [+SC]
 Paul-nom. play-from John-on patted
 'It was John that Paul playfully patted.'
- (48) [[*"Minden nyúl*]_{NP} [*"Jánost*]_{NP} *sem* [*szereti*]_V]_S
 [+OS] [+SC]
 every rabbit John-acc not-even loves
 'Not even John is loved by every rabbit.'²²

²² This sentence contains a downgraded universal quantifier.

- (49) (a) [[*"Pál*]_{NP} [*"fél*]_V [*"Jánostól*]_{NP}]_S
 Paul-nom. fears John-from
 'Paul is afraid of John.'
- (b) [[*"Pál*]_{NP} [*fél*]_V [*"Jánostól*]_{NP}]_S
 [+SC]
 'It is Paul that is afraid of John.'

What these examples show is that LP is possible across constituents whenever the appropriate segmental context occurs to the right of the operator that has the widest scope, i.e. the one marked [+SC]; it is blocked, however, between constituents to the left of [+SC]. In other words, scope relations, which are computed for totally independent reasons, play a crucial role in the application of LP.

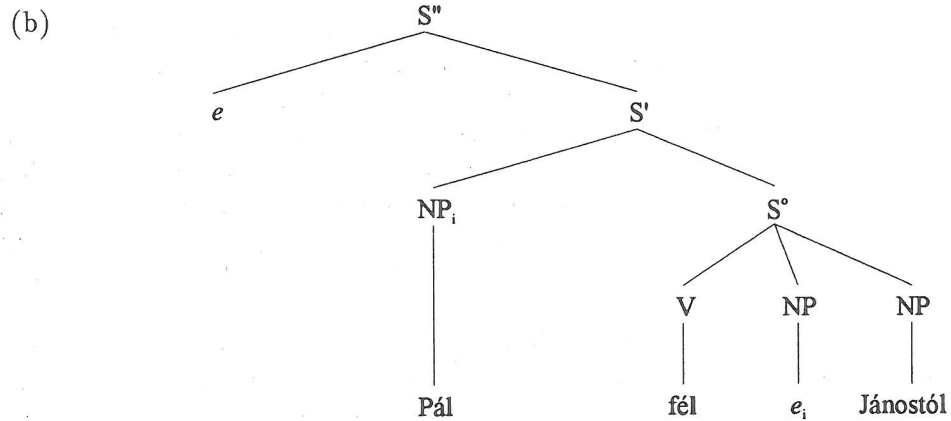
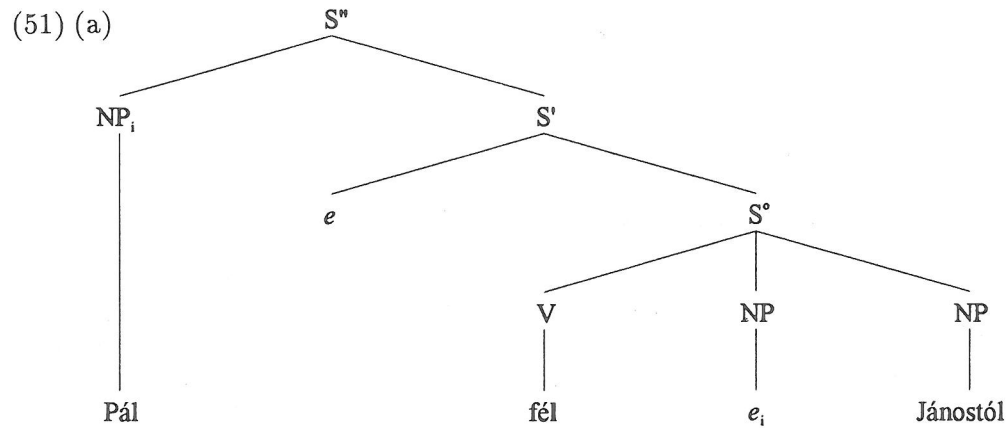
Scope relations also play a role in determining the stress pattern of a sentence. Specifically, those words that bear [+SC] or [+OS] (as well as certain words to the left of [+SC]) are assigned the type of stress we have been marking with a double stroke (i.e. *"*), though, as we discuss below, minor readjustments may take place under certain circumstances. The relationship between SR and LP can thus be seen in the asymmetry both display in relation to the positions to the left and right of [+SC]. That is, both may apply only to the right of the word bearing [+SC]; if no word bears [+SC], as in (49a), neither rule may apply (across constituents).

As far as LP within constituents is concerned, it should be noted that the rule may apply regardless of the presence or absence of [+SC]. Thus, LP applies within a constituent to *angol* but not across constituents to *játékról* in (50), a neutral sentence where no item bears the feature [+SC].

- (50) [[*"Péter*]_{NP} [*"beszélgetett*]_V [*az "angol 'játékról*]_{NP} [*"Jánossal*]_{NP}]_S

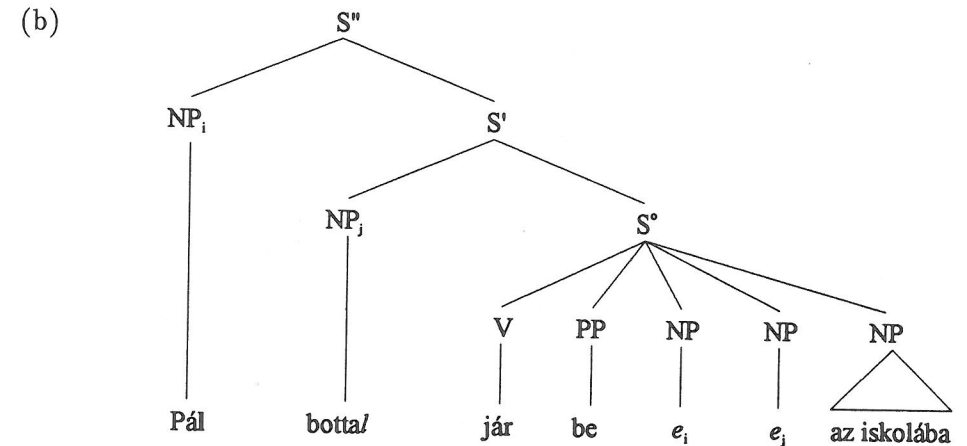
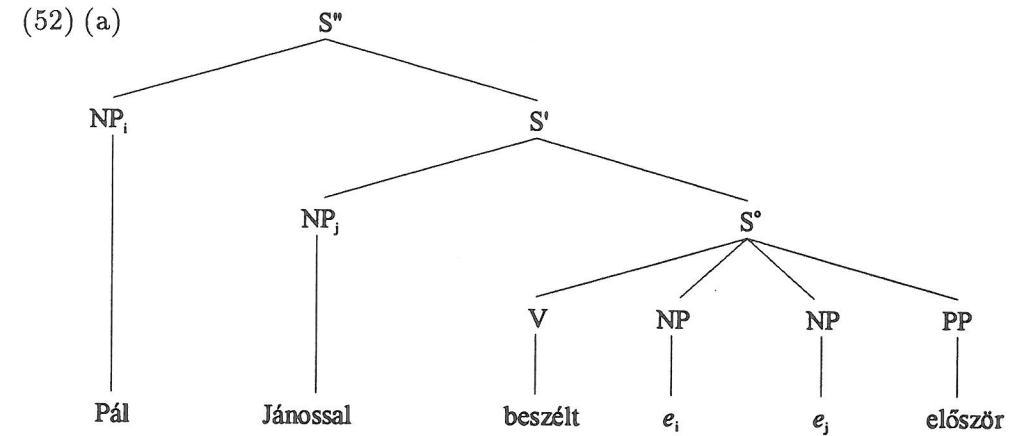
In such cases, the domains for SR and LP do not coincide. Logical function is also irrelevant for LP application within words, including compounds, and thus in these cases, too, the contexts for SR and LP are different.

Thus far we have only examined the possibility of combining LF information with the flat syntactic structures proposed by Kenesei and Marácz. In fact, if we make use of either of the "hierarchical" models proposed for Hungarian, it turns out that the difficulties in accounting for LP and SR become insurmountable. Consider, for example, the structures assigned by É. Kiss to (49a, b), given in (51a, b).



Since the two structures are identical in S_0 , we would have to claim that a topic trace blocks LP (cf. (51a)), while a focus trace does not (cf. (51b)). There is, however, no principled way to distinguish between these two cases.

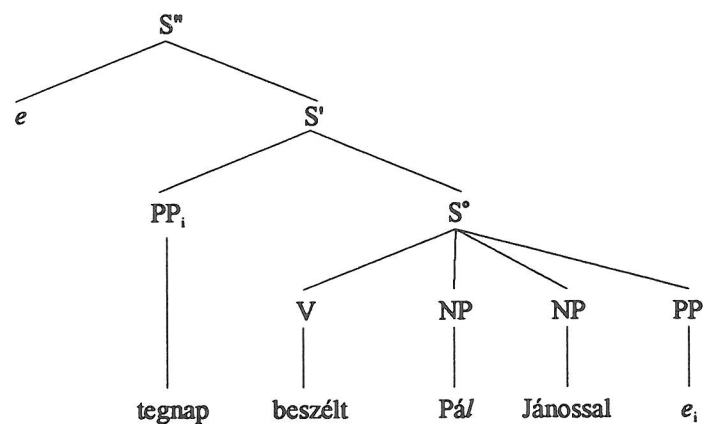
In addition, there is hardly any structural difference between (45) and (46), which would have the structures (52a) and (52b), respectively.



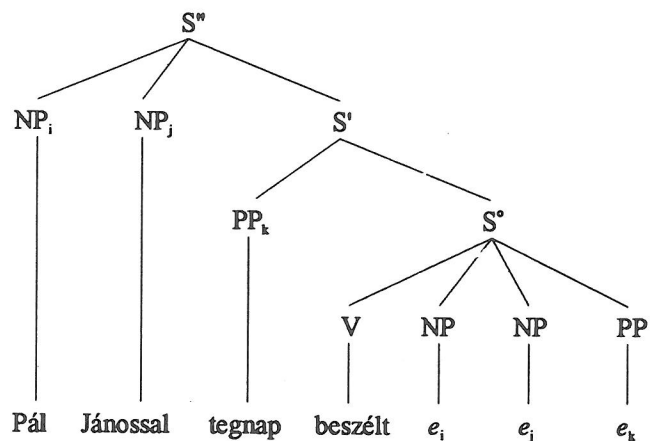
That is, LP should be constrained as inapplicable between a constituent under S'' (topic) and another under S' (focus) as in (52), but not between a focus and the verb under S° .

Again, (43a) and (43b) exhibit identical configurations at the relevant points, as illustrated in (53a) and (53b), respectively, although LP is possible only in the former case.

(53) (a)

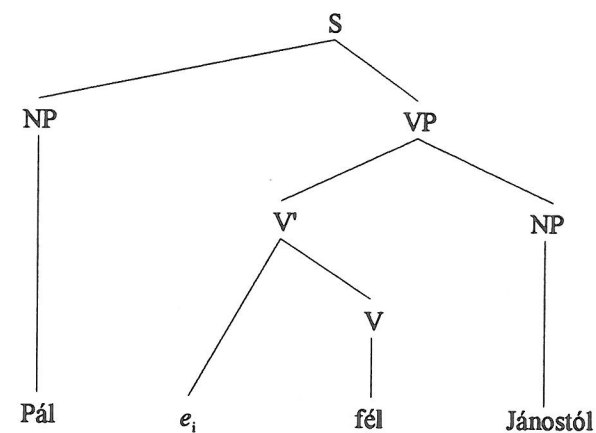


(b)

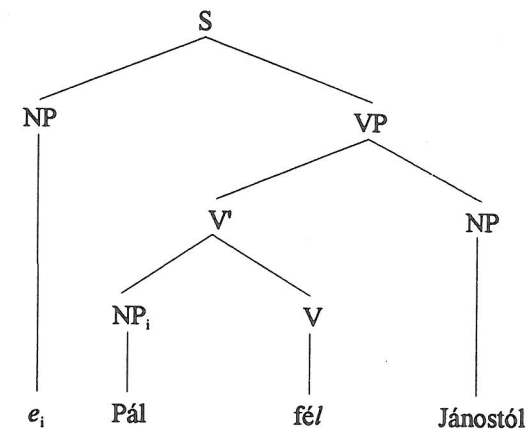


The analyses that would be given within Horvath's framework fare no better in this respect. For example, (49a) and (49b) would have to be analyzed as in (54a) and (54b), respectively, while (45) and (44) would have the S-structures seen in (55a) and (55b), respectively.

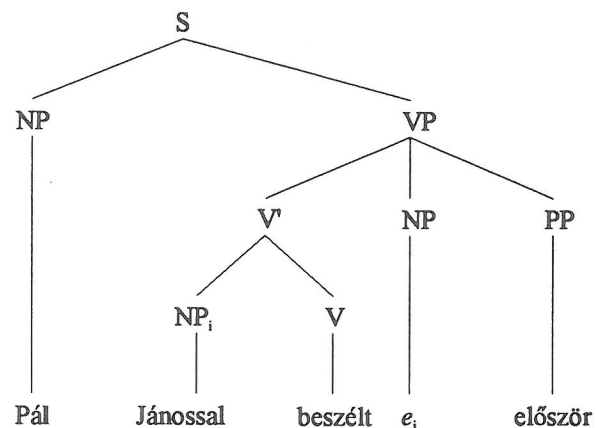
(54) (a)



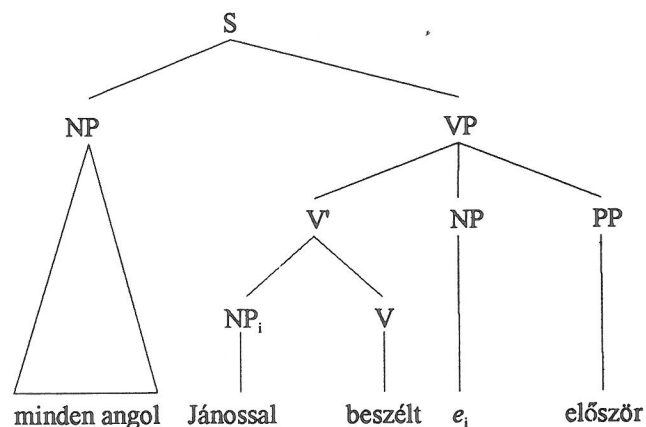
(b)



(55) (a)



(b)



In both pairs of sentences, the structures are identical, though LP may apply in (54b) and (55b), but not in (54a) and (55a). The structures provided by Horvath's model do not allow us to predict this difference in the application of LP.

In general, then, what we have seen is that the only model of Hungarian syntax that provides structures that allow us to correctly predict where LP (and SR) may apply is the "flat" one proposed by Kenesei and Marác. The hierarchical S-structures proposed by É. Kiss and Horvath both fail to make correct predictions about the environments of the phonological rules under examination here, though both are explicitly intended to account for stress patterns, including SR.

5.2. The intonational phrase

What is needed now is a way to integrate the phonological facts of SR and LP with the flat syntactic structure analysis of Hungarian and scope relations shown by means of the features [+SC] and [+OS] assigned by LF. As a basis for this interaction, we must exclude Kaisse's c-command approach since, as we have shown above, it cannot by definition handle phonological phenomena that apply throughout strings of more than two words but which are, at the same time, sensitive to syntactic information. There is, furthermore, little role for semantics in Kaisse's model.

In Selkirk's metrical grid approach, a role is given to semantics in relation to the intonational phrase (IPh)²³, in the form of the Sense Unit Condition which states that "the immediate constituents of an intonational phrase must together form a sense unit" (p. 286). The intonational phrase is, moreover, the only unit corresponding to a given span within a sentence (i.e. that over which an intonation contour spreads) in Selkirk's framework, since as was seen above, grid construction does not create phonological units, but instead only introduces time intervals at certain points within a sentence. Recall, however, that Selkirk claims that the IPh does not serve as the domain of application of sandhi rules. Any rules that have in the past been considered to apply within the intonational phrase are, according to Selkirk, most likely additional instances of juncture-sensitive rules, to be handled in terms of the metrical grid as well. That is, their application, like that of other external sandhi rules, depends on the amount of time intervening between the relevant segments. The only difference, then, between what were thought to be intonational phrase domain rules and other sandhi rules would be that the former may apply across more silent demibeats than the latter. They are only blocked by substantial pauses since a relatively large number of silent demibeats will usually be assigned at such points. This account of SR and LP will not work, however, since the strings over which intonation contours spread in Hungarian are not necessarily bounded by pauses. As Varga (1985) points out, in a sentence such as the one in (56), where there are three intonation units ('tone groups' in Varga's terms) indicated orthographically by the commas, a pause may occur between 1 and 2, but it would be highly unlikely between 2 and 3 (cf. Varga, p. 211).²⁴

²³ Selkirk uses the symbol 'IPh'. Since Selkirk's definition of the intonational phrase differs from the one proposed by Nespor-Vogel (1986), abbreviated as 'IP' here, we will maintain the different symbols to distinguish between the two proposals.

²⁴ See Varga (1983, 1985) for a systematic analysis of intonation contours in Hungarian.

- (56) 1 2 3
 Ha készen vagy, amikor megjövök, fizetek.
 'If you are ready (now), when I get back, I'll pay you.'

Despite the lack of a pause between 2 and 3, according to Varga, other "juncture" phenomena may occur at this point, such as the lack of assimilation when the segmental environment would otherwise permit it.

Even if we reversed Selkirk's position and did allow the IP_h to be the domain of application of sandhi rules, the metrical grid approach would still fail to account for the Hungarian rules under investigation. Specifically, this approach would run into difficulty in the way in which it divides a sentence into IP_hs. Essentially, surface structure is partitioned freely into IP_hs, regardless of the syntactic structure of the sentence in question. This generates a large number of possibilities, many of which will be ruled out in LF by the Sense Unit Condition, a sense unit being defined as a constituent, the immediate constituents of which "must bear either a head-argument relation or a head-(restrictive) modifier relation to each other" (Selkirk 1984, 28). This condition, however, will incorrectly rule out certain structures in Hungarian that must form a single intonational phrase, despite the fact that their immediate constituents do not bear the necessary relations to each other. In particular, this type of problem will arise in the case of discontinuous head and argument constituents, as seen above in (27b), where the verb *játszott* 'played', the head of the phrase, is separated from its object argument *egy meccset* 'a match-acc.' by the free adjunct *tegnap* 'yesterday'. It will also arise when a head is separated from its modifier as in "*Almát ettem kettőt* 'It is apples that I ate two of' (lit.: 'apple-acc. I-ate two-acc.'). where the head *almát* is separated from its modifier *kettőt* by the verb. This leaves the prosodic constituent approach, which also allows for the introduction of semantic information in addition to syntactic and phonological information in the creation of phonological structure. Specifically, the notion of focus is needed in assigning relative prominence within the intonational phrase once it has been constructed. As we have seen above, however, none of the prosodic constituents as defined by Nespor-Vogel (1986) provides the appropriate domains of application for SR and LP. What we would like to suggest here is that there is indeed a constituent of the prosodic hierarchy that delimits the correct domains, the intonational phrase, but this constituent must be defined in a different way for Hungarian, and perhaps more generally. That is, instead of bringing LF into

See also Kálmán-Kornai (1988) for a treatment of Hungarian intonation patterns within the autosegmental framework.

play only after IP has been constructed, it must come into play earlier, as part of the mapping rules that construct IP. Specifically, we propose to formulate the rule for IP construction as in (57). This rule will apply in relation to flat syntactic structures to which [+SC] and [+OS] have been assigned in LF by the principles seen above.²⁵ The prosodic constituents (PCs) that are grouped into IP_hs are coextensive with the daughters of S in the syntactic tree.

(57) (a) IP Construction:

- i. Group the PC containing an element marked [+SC] with all PCs to its right until either another constituent with a logical function (marked [+OS]), or the end of the sentence, is reached; each remaining PC forms an IP on its own.
- ii. If no PC is marked [+SC], each PC forms an IP on its own.

(b) IP Relative Prominence:

s/w* (w* = any number of weak PCs).

Given this definition of IP, we can now account for SR and LP. They are both span rules that operate throughout the intonational phrase. Stress is automatically reduced on all of the PCs following the one marked [+SC] by the relative prominence rule. Additional phonetic interpretation rules will be needed to account for the total destressing of the PC following a focused element (i.e. the verb) and the less extreme stress reduction on PCs farther to the right in IP. As far as LP is concerned, this rule may apply whenever its segmental context is present within IP, as stated in the following rule:²⁶

(58) l → j / [IP ... ___ j ...]_{IP}

It should be noted that this formulation of LP not only accounts for the rule's application across (syntactic) constituents, but for its application within constituents and within words as well. That is, since the smallest possible IP must contain one entire syntactic constituent (= one PC), the segmental context for LP across words within a constituent will automatically also fall within a single IP. Similarly, any segmental context for LP within a word will also automatically be within an IP. The rule in (58) also accounts for why LP does not apply across constituent strings involving topic position or across

²⁵ Note that it is the standard T-model that we have followed and proposed to modify here so that an interface could be set up between LF and the prosodic mapping rules. For alternative proposals, of which van Riemsdijk-Williams (1981) and Williams (1986, 1988) appear to be most promising, see Vogel-Kenesei (forthcoming).

²⁶ This may be subject to additional stylistic considerations, as was mentioned above, but due to the absence of information about this matter, we will not go into the problem further here.

constituents in a neutral sentence. LP is blocked in the former case because any PCs to the left of [+SC], and thus topics, form IPs on their own. Since LP does not apply across IP boundaries, it will not apply across the constituents that compose the separate IPs. By the same token, since each daughter of S in a neutral sentence corresponds to its own IP, we would not expect LP to apply across such constituents either.²⁷

It has been pointed out (cf. among others, Selkirk 1984; Nespor-Vogel 1986) that the intonational phrase is a fairly flexible constituent. The IP in Hungarian is no exception, and as the basic IPs in Nespor-Vogel's system may under certain circumstances undergo restructuring, so may those created by the basic IP construction rule in (57). Once again, however, the present proposal differs from that in Nespor-Vogel in that, at least for Hungarian, the restructuring rule too makes reference to semantic information, specifically to whether or not an item bears [+OS], as seen in the rule in (59).

(59) IP Restructuring:

Short IPs to the right of a constituent marked [+SC] may optionally be joined into one larger IP (possibly including the IP with [+SC]).

This rule is subject to a general constraint. That is, it is not possible for an inflected verb marked [+OS] to participate in restructuring, as illustrated by the comparison of (60) and (61).

(60) (a) [Péter fél]_{IP} [Jánostól is]_{IP}
 [+SC] [+OS]
 Peter fears John-from even
 'It is Peter that is afraid even of John.'

(b) [Péter fél Jánostól is]_{IP}
 [+SC] [+OS]

(61) (a) [*Nem minden nyúl]_{IP} [*játszik 'Marival']_{IP}
 [+SC] [+OS]
 not every rabbit plays Mary-with
 'Not every rabbit plays with Mary.'

(b) *[*Nem minden nyúl 'játszik 'Marival']_{IP}²⁸
 [+SC] [+OS]

²⁷ IP boundaries also predict where pauses may be inserted in a sentence. This accounts for the relatively high percentage of pauses in our data in those contexts where no LP was predicted (cf. footnote 7).

²⁸ Note that (61b) would be a possible Hungarian sentence if the verb *játszik* did not bear [+OS] and thus did not have a contrastive meaning.

Thus, the sentence in (60a) may be restructured as in (60b), while the one in (61a) may not be restructured as in (61b), as demonstrated by the possibility of LP applying to the *l* in italics in (60b) but not to the one in (61b).

6. Conclusions

In trying to account for two phonological rules of Hungarian, Stress Reduction and *l*-Palatalization, both of which apply above the word level, we found that a combination of only syntactic and phonological information was not sufficient to define their domains of application. Specifically, three current proposals for complex interactions between syntax and phonology were examined and all were found to be inadequate, as was a more simple type of interaction in which syntactic constituents themselves define the contexts for phonological rules. Since it was clear that the rules had to make reference in some way to syntax because they apply above the word level but not always throughout an entire sentence, it was also necessary to decide what model of syntax should be used for Hungarian. Three proposals were considered, and on the basis of the phonological rules under investigation, it was shown that only a "flat", nonhierarchical, type of structure was tenable. Finally, it was demonstrated that the clue to the analysis of SR and LP lay in the introduction of semantic information in the determination of their domains of application. It was argued, specifically, that the domain of both rules is the intonational phrase, a (prosodic) phonological constituent that in this case must be defined in relation to the semantic notions of scope relations and the operator status of specific words, assigned in LF to a flat S-structure. The interface between syntax and phonology must thus be enriched to include an interface with semantics as well. The question that arises at this point is how general such a situation is. In the area of focus, relevant in our analysis, too, it has been suggested on different occasions that semantics must be allowed to interact with phonology. What the Hungarian phenomena show, however, is that semantics may play an even more specific role. One possibility is that the additional semantic notions needed in order to account for Hungarian may in fact be fundamental in accounting for nonconfigurational languages in general, where the syntactic structure provides less information. It might also be the case, however, that the type of interaction between semantics and the other components of the grammar seen in Hungarian will turn out to be relevant for configurational languages as well, and provide insight into some of the problems that have not yet been resolved in such languages. Hopefully, future research will provide more information about the role of semantics in the syntax-phonology interface.

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