In: Harry van der Hulst and Norval Smith (eds):
Autosegmental Autosegmental studies on pitch accent.
Foris, Dordrecht (1988) 183-195

Hungarian Sentence Intonation

András Kornai László Kálmán

Institute of Linguistics, Hungarian Academy of Sciences

0 Introduction

The present paper describes the patterns of Hungarian sentence intonation using the model developed by Goldsmith (1982). In Part 1, we attempt to motivate this particular choice of framework, and to outline the interaction of our rule system with the rest of the grammar. Here certain basic principles of lexical phonology will be assumed, rather than argued. The rule system itself will be given in Part 2, and in Part 3 we offer our conclusions. The intonation patterns generated by the rule system are based on the descriptive work of Varga (1981): some minor differences are discussed in the text.

1 The organization of the grammar

Since intonation contours belong to the sentence as a whole, the rules generating them must be in the postlexical component of the grammar. Thus, in the lexical phonology framework, we must suppose that the rule system operates on lexically fully specified representations. Because of the traditional organization of generative grammars such a representation is not available until lexical insertion: therefore, the rules can make use of information provided by the syntax. In Section 2 we will see that only a diacritic **f** and the category labels will be actually used (the latter only in rules of cliticization). Our rule system is not sensitive to the segmental material of lexical items: the underlying representation will borrow only the inherent stresses and the syllable structure from the lexicon. The rules are governed by pragmatic information; we suppose that the semantic component can interpret only sentences with fully specified intonation contours.

Although Hungarian is not a pitch-accent language even under the most liberal interpretation of this term, the following phenomena show it clearly that an autosegmental treatment of sentence intonation is called for:
1) Contour tones on short vowels.

Bort.	Bort?	Bort,...	'wine-ACC'
HL	LHL	HLH	

2) Tonal melodies. Hungarian has four distinct tonal melodies: The 'raising' and the 'falling' contours of Varga (1981) are conflated here: see 2.4 below.

Megfeszitették. 'They crucified him.'
H L L L L

Megfeszitették? 'Did they crucify him?'
L L L H L

Megfeszitették... 'They crucified him, (and then...)'
H H H H H

Megfeszitették,... 'They did crucify him, (but...)'
H L L L H

3) Spreading.

```
Faj?  Fajta?  Fajtalan?  Fajtalanok?  Fajtalanokat?
/|\    |  |\   |  | |      \/  | |      \ | / | |
LHL    L  HL   L  H L       L  H L        L   H L
race  species  sodomite   sodomites   sodomites-ACC
```

Since on the postlexical level no segmental material is ever deleted, the remaining diagnostics (i.e. stability and floating tones, cf. e.g. v.d. Hulst–Smith 1982:2.2) are simply not applicable.

The well-formedness of autosegmental representations is usually maintained with the aid of an Association Convention that can reapply in every step of the derivation (cf. e.g. Clements–Sezer 1982:219). On the postlexical level, however, no rule can be applied more than once (see Kiparsky 1983). The Association Algorithm (AA) employed in this paper differs from the usual mechanisms like Tone Mapping (Williams 1971), Well-Formedness Conditions (Goldsmith 1976), etc. essentially only in having this 'once only' property.

(1) Association Algorithm[1]

(i) The domain of association is the phonological word.

(ii) Associate the first right-side neighbors of the previously associated elements with each other.

(iii) Apply (ii) as many times as possible, then repeat this process with left-side neighbors.

(iv) Associate the remaining unassociated syllables (P-bearing elements) with the tone (P-segment) associated to their neighbors.

After (iv), the representation cannot contain unassociated syllables, but unassociated tones might still be present. We suppose that in general these are simply deleted; in Hungarian, however, we also have

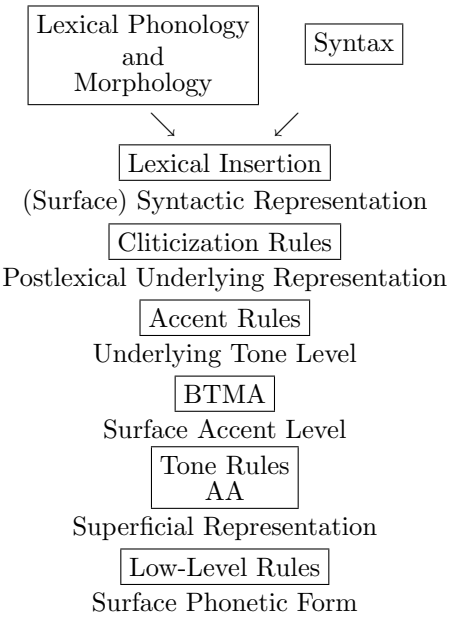
(v) Associate word-final unassociated tones to the last syllable.

The first association line (the one that will be the starting point of the AA) is provided by the Basic Tone Melody Association (BTMA) rule of Goldsmith 1982:

Associate the accented element of the Basic Tone Melody to the accented element of the word.

Thus, the organization of the grammar can be schematized as follows:

(2)



[1]For a less informal statement see the Appendix.

The portion of (2) starting with Postlexical Underlying Representation is essentially the same as the schema proposed by Goldsmith (1982:48): the intermediate levels here termed 'Surface Accent Level' and 'Superficial Representation' are introduced solely for the sake of expository convenience. Cliticization rules and low-level rules are tangential to our main purpose; they will be discussed briefly in Section 2.1 and Section 2.4, respectively. The term 'Surface Accent Level' is justified by the fact that the rule assigning surface stress can be collapsed with the BTMA: for details see Section 2.2 where the accent rules of Hungarian are described in full.

2 The rules

2.1 Rules of cliticization

In most cases the definite article is generated by the syntax under a separate node (for exceptions see Kornai 1989), and in complex NPs the article will not be a sister of the element following it. Nevertheless, the article is in the same phonological word as the subsequent item. Since 'lexical' word boundaries and phonological word boundaries do not always coincide in Hungarian,[2] it is necessary to apply certain "readjustment rules" in the sense of Chomsky–Halle (1968:9ff,371ff). These rules are trivial for connectives like *ha* 'if' (or *is* 'too') which are always proclitic (enclitic). Personal pronouns, however, behave proclitically only if they precede the main verb of the clause: otherwise, they are enclitic.

If we suppose that the usual word-initial stress is supplied by a lexical redundancy rule, and proclitics (enclitics) are marked as such in the lexicon, then the remaining cases can be handled with rules that are sensitive only to the categorial status of the adjacent elements. One such rule will delete the (lexical) stress from verbs preceded by some VM (Verbal Modifier, see Ackermann – Komlósy (1983)). Ackerman (1984) demonstrates that VM+V constructions can be lexical: in such cases the required stress pattern comes simply from the lexical redundancy rule mentioned above.

```
     *           *        *           *
# [ József ] [VM fát ] [V vágott ] [ az erdön ] # ->

     *          *               *
# [ József ] [ fát vágott ] [ az erdön ] #
    Joseph    wood-ACC cut the forest-in
```

If such rules are part of the grammar, the relatively open nature of the V' class can readily be explained: the Derivational Simplicity Criterion of Kiparsky (1982) forces us to reanalyze VM+V constructions as V's. In a 'percolation' theory of word-formation (such as Lieber 1980), no reanalysis is called for, since the trees resulting from compounding, affixation, and cliticization are identical.

2.2 Accent rules

Certain words appear in the syntactic representation with a diacritic **f** (read foykes). Words in Focus position (see É. Kiss, 1981) or having particular communicative functions (contrastive topic, see Szabolcsi, 1981; contrafocus, see Varga 1982; etc.) are marked by this diacritic. The role of **f** in the formation of the underlying phonological representation is that elements marked by it cannot cliticize. The rules generating the intonation patterns of corrective sentences (phrases) are also triggered by **f**. If a word is marked by **f** in the (postlexical) underlying representation, the Eradication Rule (ER) will delete the accent and word boundaries of the subsequent words up to the next **f** or phrase boundary (#).

```
|    *   |  |   *   |        |    *              |       |f
| S0 S S0| (|S0 S S0|)1  ->  | S0 S S0 (S0 S S0)1| / ___{
|f       |  |       |        |f                  |       #
```

[2]Cliticization phenomena are quite marginal in Hungarian, and the descriptive grammars we are familiar with ignore them completely. Vago (1980:ix) is typical in this respect: "...the initial syllable of a word is predictably stressed. This rule is merely assumed."

Therefore, the segments from one **f** to the next one (or to the end of the phrase) will form one phonological word possessing only one accented syllable. This 'eradicating' stress (see Kálmán et al. 1989) is generally believed to be stronger than the normal stress. Minimal pair tests, however, do not show a linguistically significant contrast: in our opinion the quantitative difference between normal and eradicating stress is a secondary phenomenon due to the fact that eradicating stress generally appears on substantially longer phonological words (see also Kálmán et al. 1984). Nevertheless, it is possible to reformulate the BTMA in such a manner that the surface stresses of the accented syllables depend on the presence or absence of **f**:

```
|      *   |    |               |
|   S0 S S0| -> |   S0 '<'>S S0|
|          |    |          |   |
|<f>       |    |<f>      LHL  |
```

(For the other version see the Appendix).

We call our second accent rule Varga's Rule (VR) because the phenomenon described by it was discovered by Varga (1979). In Hungarian the 3rd Sg. present form of the copula is 0, and in sentences correcting the past (or future) tense of the copula, stress shifts to the preceding syllable:

– 'Próféta volt? 'Was he a prophet?'
– Nem, prófeTA. 'No, he IS a prophet.'

This rule is triggered by the foykessed 0:

```
|   *     | |  |    |    *|
|S0 S S0 S| | 0| -> | S0 S|
|         | |f |    |f    |
```

2.3 Tonal rules

Since in the unmarked case only the stressed syllable of a word has high tone in Hungarian, we take the basic tone melody to be LHL (with the H accented). This gives us peak-accent, which is apparently the most frequent choice cross-linguistically. Using this BTM, all the examples discussed so far can be derived without recourse to tonal rules. But high tones and stressed syllables are not in a one-to-one correspondence: both stressed L and unstressed H syllables occur for instance in the last words of yes/no questions:

```
'Megfeszitették?  'Did they crucify him?'
  L  L  L H  L
```

These contours can be derived in one step if we dissociate the (accented) H of the BTM and associate the L preceding it to the antepenultimate syllable.

```
(3A)  |                  |
      |   S0 'S S0 S S S|# / [.+?]
      |       |   /     |
      |       |  /      |
      |       = /       |
      |       |/        |
      |       /         |
      |      /|         |
      |(f)   LHL        |
```

If the ((ante)pen)ultimate syllable was accented, we apply rule (3B):

```
(3B)  |                |
      |   S0 'S (S (S))|#  / [.+?]
      |       =        |
      |      /|        |
      |(f)   LHL       |
```

(If we allow for a class of Initial Tona Association rules which precedes the BTMA, then the H of the BTM can be associated to the penultimate syllable in yes/no questions initially, and this will bleed the BTMA rule. This would make it possible to conflate (3A) and (3B) using only the accepted notational conventions of autosegmental phonology.[3]) The intonation contours of non-final phonological words in questions can be derived by deleting the final L of the BTM: this rule has to apply in tandem with (3A-B).

The same adjustment takes place in words preceding foykessed words:

```
|        | |         |
|S0 'S S0| | S0 'S S0|
|    |   | |     |   |
|   LH L | |f   LHL  |
       v
       0
```

This rule, like all the rules in our rule system, is obligatory:

```
[a 'bárkába] [az a bizonyos 'öreg] [f az 'összes állatból tett]

 L   H  L L   L  L  L L  L   H H      L   H   L  L  L  L   L
*L   H  L L   L  L  L L  L   H L      L   H   L  L  L  L   L

 'the ark-into that particular old every animal-from put'
```

There are two tonal rules that operate only on phrase-final phonological words. The first of these generates the 'comma-intonation' (cf. Hetzron 1980): it has to be applied in enumerations, before subordinate clauses, and in interrupted sentences.[4] The Comma-Rule (CR) deletes the final L in the BTM in words preceding phrase boundaries:

```
  |           |
 (|   S0 'S S0|)1
  |       |   |    |           |
  |(f)   LHL  |  } |   S0 'S S0|#
                   |       |   |    / [.+,]
                   |(f)   LH L |
        #                    v
                             0
```

The most important application of the Three-Dot Rule (3DR) is in threats:

```
                    |             |
  |           |     |   S0 'S S0 S|
 (|   S0 'S S0|)1   |       |    :|
  |       |   |     |(f)   LHL   H|
  |(f)   LHL  |
                }{                 }   #  / [.+,...]
                    |             |
                    |   S0 'S     |
        #           |       |     |
                    |(f)   LHL    |
                              ^
                              H
```

[3]This solution was suggested by Nick Clements.

[4]Thus, the conditions of its application are almost identical to the orthographic conventions regulating the placement of comma.

3DR has to be applied in every 'negative' context, e.g. before subordinate clauses headed by *de* 'but'. Since CR, QR, and 3DR are triggered by different pragmatic contexts, they cannot follow each other in any derivation. In general, there is no need to impose any (extrinsic) ordering on our tone rules.

Sentences with more than one **f** imply multiple contrast: in general, such constructions are rather infrequent in Hungarian.[5] Their intonation contours are generated by the Multi-Foykes (MF) rule, which allows for a certain amount of free variation.

```
  Mig   a   'pásztorok 'Betlehemben 'örvendeztek,
  while the shepherds  Bethlehem-in  rejoiced
  a   'háromkirályok 'Názárethben 'imádkoztak.
  the Magi           Nazareth-in  prayed

  |           |    |         |   |         |
 (|   S0 'S S0|)0 (| S0 'S S0|)0 | S0 'S S0|#
  |       |   |    |     |   |   |     |   |
  |(f)   LHL  |    |f   LH L |   |f   LHL  |
                          v
                          0
```

2.4 Low-level rules

Dynamic tones can appear only on word-final syllables in Hungarian, and contours made up from three level tones (HLH or LHL) are restricted to accented, phrase-final syllables.[6] The third tone is never realized in full: phonetically, it simply marks a relative increase (or decrease) in pitch. In absolute terms, the final part of HLH syllable is lower, and the final part of a LHL syllable is higher than mid, see below. In unstressed HL or LH syllables, the second tone behaves in a similar manner (see column 2 below). In stressed syllables, however, it is realized in full.

(4)

```
 Contour              Realization
              Stressed          Unstressed
              syllables         syllables

   S
   |            N/A               _/        'megfeszitetTÉK,
   LH

   S           |                   _
   |           |_      'BORT.       |        'JÓZSEF?
   HL

   S          |
   |           V       'BORT,...    N/A
  HLH

   S          _
   |         /        'BORT?        N/A
  LHL       /
```

In addition to this, surface phonetic forms will differ from our Superficial Representations due to the effects of two low-level rules, here called Downdrift and Tonal Assimilation. Downdrift is well known from the study of tone

[5]For the syntax and the semantics of multi-foykes sentences, see Bánréti 1983.

[6]These 'tonotactic' regularities need not be stipulated: given the BTM and our rule system, contour tones will be generated only in these positions.

languages; Tonal Assimilation (which might well be language specific) operates most strongly in the neighborhood of stressed H syllables. Its effects are cumulative: the assimilation of Ls flanked by Hs is nearly complete. The 'raising' melody of Varga (1981) is in free variation with the falling (superficial HH...HH) contour: this seems to be the effect of a universal low-level rule operating in higher registers.[7]

3 Conclusions

Previous descriptions of Hungarian sentence intonation made use of four, five, and sometimes even more levels of tone. We found that by systematic application of minimal-pair techniques, we were able to reduce the inventory of tone levels, boundary symbols, diacritics etc. substantially. In most cases, no further reduction is logically possible: for instance, we have only two tone levels and only one stress (intensity) marker.

Moreover, this parsimonious use of phonological primitives does not put a disproportionate burden on the phonetic component of our grammar: voice synthesizers having our Superficial Representations as input and producing the actually observable surface F0 contours as output could operate on quite natural principles. Since Downdrift and Tonal Assimilation appear to be universal, perhaps it will be possible to derive their effects from the dynamic control properties of the neuro-anatomical mechanism responsible for the implementation of pitch.

It poses no great problem to describe the 'superficial' patterns of Hungarian sentence intonation in a framework developed specifically for this purpose, and the same holds for any relatively unconstrained representational system (like Pierrehumbert 1980) that has been developed with postlexical phenomena in mind. On the other hand, we find it highly significant that the postlexical phonology of one language can be described in a model that has been developed on the basis of the lexical phonologies of typologically unrelated languages.

This fact, aside from lending strong support to the model, enables us to draw some more general conclusions. Since the order of rule application is determined intrinsically, we might suppose that accent rules, tone rules, and low-level rules are always present (and necessarily in this order) in the phonology of natural languages. Lexical insertion (which is the starting point of Cliticization Rules), however, is subject to intrinsic ordering only in that it must precede low-level rules. If accent rules and tone rules are lexical, we get tone languages; if they are postlexical, we get languages like Hungarian. The intermediate case, where accent rules are lexical but tone rules are postlexical is represented by languages like English. In sum, the typological differences between these languages stem not from the presence or absence but rather from the precise location of tone and accent rules in the phonology.

Acknowledgements

We would like to express our gratitude to Shosuke Haraguchi, Nick Clements, and László Varga for their comments and criticisms.

References

Ackerman, F.- Komlósi A. 1983: Some steps towards the understanding of Hungarian word order. ms. (in Hungarian)

Ackerman, F. 1984: Verbal modifiers as argument taking predicates. *Groninger Arbeiten zur germanistischen Linguistik* **25** 23-71

Bánréti Z. 1983: A megengedő kötőszavak szintaxisáról és szemantikájáról. *Nyelvtudományi Értekezések* **117**

Chomsky, N.- M. Halle 1968: *The Sound Pattern of English.* Harper and Row, New York

Clements, G. N.- E Sezer 1982: Vowel and consonant disharmony in Turkish. In: v.d.Hulst-Smith (eds): *The Structure of Phonological Representation* II. Foris, Dordrecht 213-256

É. Kiss K. 1981: Structural relations in Hungarian, a 'free' word order language. *Linguistic Inquiry* **12**

[7] We owe this observation to Shosuke Haraguchi.

Goldsmith, J. 1976: *Autosegmental Phonology.* IULC (Published by Garland Press 1979)

Goldsmith, J. 1982: Accent systems. In: v.d.Hulst-Smith (eds): *The Structure of Phonological Representation.* Foris, Dordrecht 47-64

Hetzron, R. 1980: Hungarian Tonosyntax. *Nyelvtudományi Értekezések* **104** (in Hungarian)

v.d.Hulst, H.- N. Smith 1982: An overwiew of autosegmental and metrical phonology. In: v.d.Hulst-Smith (eds): *The Structure of Phonological Representation.* Foris, Dordrecht 1-46

Kálmán C.Gy. -Kálmán L. - Nádasdy A'. - Prószéky G. 1989: A magyar segédigék rendszere. *Általános Nyelvészeti Tanulmányok* **XVII** 49-103

Kiparsky, P. 1982: From cyclic phonology to lexical phonology. In: v.d.Hulst-Smith (eds): *The Structure of Phonological Representation.* Foris, Dordrecht 131-176

Kiparsky, P. 1983: Word-formation and the lexicon. In: Ingemann (ed): *Proceedings of the 1982 Mid-America Linguistics Conference*, University of Kansas, Lawrence

Kornai A. 1989: A főnévi csoport egyeztetése. *Általános Nyelvészeti Tanulmányok* **XVII** 183-211

Lieber, R. 1981: *On the Organization of the Lexicon.* IULC

Pierrehumbert, J.B. 1980: *The Phonology and Phonetics of English Intonation.* MIT Thesis.

Szabolcsi, A. 1981: Compositionality in Focus. *Folia Linguistica.*

Vago, R.M. 1980: *The Sound Pattern of Hungarian.* Georgetown University Press.

Varga L. 1979: Az ellentéti hangsu'ly különleges helye. *Magyar Nyelv* **75** 332-334

Varga L. 1981: A magyar intonáció – funkcionális szempontból. *Nyelvtudományi Közlemények* **83** 313-339

Varga L. 1982: Két szintaktikai pozicióról. *Magyar Nyelv* **78** 159-169

Williams, E. 1971: Underlying tone in Margi and Igbo. *Linguistic Inquiry* **7** (1976) 463-484

Appendix

CLITICIZATION RULES

```
|      *    | |     *    |    |             *    |
|   S0 S S0 | |  S0 S S0 | -> |  S0 S S0 S0 S S0 |
|VM         | |V         |    |V                 |

|       *    | |     *    |    |             *    |
|    S0 S S0 | |  S0 S S0 | -> |  S0 S S0 S0 S S0 | m.i.
|pro         | |V         |    |V                 |
```

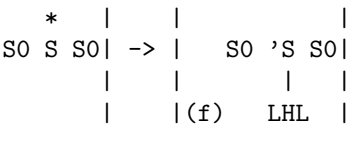
ERADICATION RULE

```
|    *   |  |   *   |      |    *              |       |f
| S0 S S0| (|S0 S S0|)1 -> | S0 S S0 (S0 S S0)1| / ___{
|f       |  |       |      |f                  |       #
```

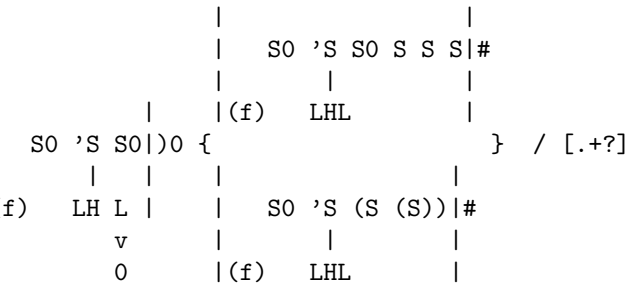
VARGA'S RULE

```
|   *     | |  |    |    *|
|S0 S S0 S| | 0| -> | S0 S|
|         | |f |    |f    |
```

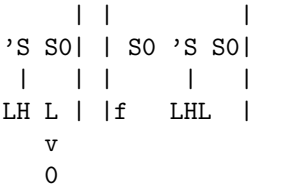
BTMA



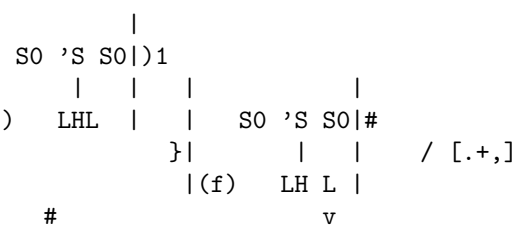
QUESTION RULE



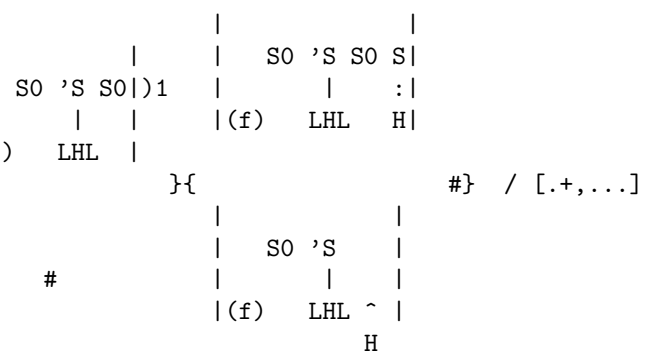
ERAD2



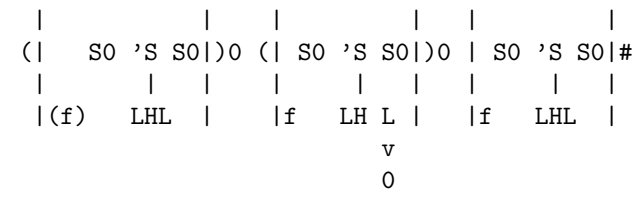
COMMA RULE



3 DOT RULE



MULTI-FOYKES RULE



ASSOCIATION ALGORITHM

1. S S S0|
   | : | m.i.
   T T T0|

2. S S S0|
   |; | m.i.
   T |

3. (only for Hungarian) S |
   / : |
   T T T0|