Variation of pitch accent patterns in Hungarian

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Abstract

In Hungarian, focussed elements occur in certain syntactic positions. Because of this limitation, prominence marking by means of prosody is less salient than in languages where focus can be expressed by accent shift without changes in word order. In this study, we examined Hungarian utterances that were identical in their segmental structure, but differed with regard to their semantic and pragmatic interpretations. Our aim was to see to what extent prosodic prominence marking is used, and which pitch accent patterns can occur in different sentence positions in this language. We found that (1) deaccentuation of content words was relatively seldom, (2) accented words were often preceded by a break, (3) the number of accent distribution patterns was limited, as was the number of (4) pitch accent types in utterance-initial and -final position: initially, late peaks dominated, whereas in final position most accent tones were falling ones. We argue that these uniform patterns are probably due to neutralisation processes.

Index Terms: intonation, Hungarian, prominence, focus, pitch accent.

1. Introduction

There are various ways marking relevant information in an utterance on the levels of syntax, morphology, phonology, and phonetics. The preference of one level in a given language can have an influence on the interaction with others. For example, languages with a more or less fixed word order make extensive use of prosody for focus marking. On the other hand, in languages like Czech or Hungarian, in which focus is expressed by word order, prosodic prominence could—at least in theory—be regarded as less relevant.

A further issue is the interplay of prosodic prominence marking and syntactic structure. In some languages, accentuation can have an additional demarcative function. This is the case in French where an effective way of prominence marking is to insert a boundary after the accented word or unit [1]. Another example is Czech where focussed units typically appear in utterance-final position [2], thus, prominence cannot be dealt with independently from syntax and boundary tones in this language.

Hungarian prosody is similar to Czech in several respects. First, prominent units typically appear in certain syntactic positions. Second, both Czech and Hungarian have fixed stress on the first syllable of lexical units. Third, vowel quantity is distinctive in these languages and thus lengthening cannot extensively be used for accentuation. Provided that prosodic means are not essential for prominence marking in these languages, they can be expected to be less salient, as proposed by [2].

The present paper gives a description of focus marking in Hungarian under the following aspects: (1) in terms of syntax, (2) accentuation patterns as described in intonational phonology, and (3) their phonetic realisation. While Hungarian has been subject to numerous studies in intonational phonology, e.g. [3, 4, 5, 6, 7, 8], only few phonetic investigations have been carried out, which either dealt with specific issues such as yes/no questions [9] or provided single examples rather than systematic descriptions [10]. In our ongoing research, we attempt to create a link between the three areas mentioned above. The present study has the aim to explore possible and typical accent patterns in non-spontaneous speech and is therefore to be understood as a first step towards a phonetic description of Hungarian intonation.

Let us first turn to syntactic structure. Hungarian sentences can be divided into a topic and a predicate part [11]. The topic part either contains constituents whose denotation (normally, an individual) counts as given in the context, or those denoting entities, properties or eventualities constituting new information that are intended to be contrasted to their alternatives. In sentences with a narrow or contrastive focus, the focussed unit is placed between the topic and the verb and must directly precede the latter—this is the focus position.

In other words, constituents before the verb are associated with specific functions, whereas units following the verb do not normally express new information. Given that Hungarian is an agglutinating language, i.e. grammatical information is expressed by suffixes rather than word order, the primary role of word order is to express information structure.

$$\textit{Mária ismeri Józsefet.} \qquad (1)$$

$$\textit{Józsefet Mária ismeri.} \qquad (2)$$

Thus, the utterance "Mary knows Joseph" can take the forms given in (1) and (2) without a semantic change (*Mary* is the subject and *Joseph* the direct object in both sentences), but the information structure is different: sentence (1) has either broad focus with an accent on all content words, or *Mary* is in focus and the accented unit in the sentence (verbs are deaccented if the focus position is filled). In the latter case, the sentence could be an answer to the question "Who knows Joseph?". In sentence (2), *Mary* is in focus, but the word order indicates that this sentence is about Joseph (= the topic) and includes the option of contrastivity ("...but it is Rebecca who knows Isaac").

Based on the limited role of accentuation in Hungarian, the following questions arise: (1) To what extent are f0 contours utilised for the marking of informational prominence? (2) Do limitations of accent distribution on higher ranking syntactic phrases such as determiner phrases (DP) lead to limitations on lower syntactic units such as nouns (N)? (3) Which pitch accent patterns can be observed in utterance-initial and -final position? (4) Do they differ from utterance-medial accents?

Our present analysis is based on accented units within intonation contours. This is possible if we make use of some gen-

eral considerations of the AM framework such as the relevance of high (H) and low (L) tonal targets for accent typologisation. While tonal labels in the manner of the ToBI system have partly been applied for Hungarian intonation [6, 8], the notational system has not been fully adapted for this language. Therefore we will use simplified labels based on the raw f0 contour rather than phonological categories marked by stars that are yet to be established in further research.

2. Methods

Material: A sentence with identical segmental form but varied prominence was recorded in 12 short dialogues, similarly to the procedure in [12]. Since accent shift is not possible without a change in word order in Hungarian, a sentence with the structure *direct object + verb*, or, in terms of generative syntax, DP + V (determiner phrase + verb), was used: *A néma monoki manikűröst menesztették.* 'The silent manicurist from Monok was fired.' (Lexical stress is indicated by bold letters.) In the dialogues, the target sentence was preceded by a question, in the context of which one or more words of the target sentence constituted a narrow or contrastive focus. Thus, the four content words C: /neːmɒ/, B: /monoki/, A: /mɒnikyːrøʃt/, P: /mɛnɛstɛtteːk/ could be accented in all possible combinations such as CBAP, CBAp, CBaP etc., where capitals signalise accentuation. (The completely deaccentuated pattern cbap cannot occur in a single utterance and was thus omitted.) For example, the pattern CbaP was elicited by the question "Did you say that the contract of the talkative manicurist from Monok was extended?". 15 possible accent distributions across sentences were collected in this manner.

7 native Hungarian speakers (all female, between 27 and 62 years) were recorded in a sound-proof room via head-mounted microphones. All of them were experienced readers, but not professional speakers. They were familiarised with the dialogue before recordings took place. Speakers 1 to 6 were recorded in pairs. The role that contained the target sentences was first allocated to the first speaker, then to the second. After this, speakers were asked to read the same dialogues from a printout on which prominent words were underlined. The procedure was different for Speaker 7 who acted as a control speaker (see 3.1) and read the entire dialogue alone. Each speaker read the target sentence with 15 potential accent distributions, with two repetitions. Praat 5.1.07 was used for segmentation and f0 tracking (frame size: 40 ms, window shift: 5 ms).

Based on [13], pitch accent contours were classified as early, mid, and late peaks with further distinctions if necessary. It is important to note that these labels do not necessarily mark relevant distinctions for perception, but rather express phonetic categorisation. For this reason, forms such as L*H were avoided at this point.

Labels are listed and explained in Table 1. Labelling was based on f0 trajectories in the stressed vowel of each unit plus the flanking consonants /m/ or /n/ and thus included the stressed CV syllable and the onset of the next syllable.

3. Results

3.1. Distribution of accented and deaccented units

As said in 2, the data set was created so that the number of potentially accented lexical units was approximately as high as that of deaccented syllables (the initial definite article is ignored in the analysis). However, the proportion of deaccented units

Table 1: *Pitch accent labels*

label	characteristics
HL	early peak, often entirely falling
H	mid peak, often flat
L+H	mid peak with initial rise
H+L	mid peak with initial flat shape
LH	late peak, often entirely rising
L	flat shape with subsequent rise

was only as high as 21% of all syllables. Deaccentuation of the utterance-initial unit occurred only in 3% of all cases and ranged between 23% for the second and 31% for the last lexical unit. If a unit was deaccented, a neighbouring one often received an exaggerated accent. Deaccentuation on the other hand was often characterised by creaky voice and shorter syllable durations.

We could not exclude that the overall bias towards producing accented syllables even in semantically non-prominent units resulted from the nature of the reading task. This is why Speaker 6 and 7, both phoneticians and familiar with the research question, were included in the study. Their results will be reported separately from the other 5 subjects.

For Speakers 1 to 4, the most common strategy was to accentuate each lexical unit (as is usual in sentences with broad focus). They produced 53% (Speaker 4) to 73% (Speaker 1) of all utterances with this pattern. Speakers 5 to 7 did not show this tendency, but differed from each other with regard to their accent distributions: in the material of Speaker 5, the pattern CBap was overrepresented with 30%. Deaccentuation of medial lexical units (second or third word) with neighbouring accented words (such as CbAp or cBaP) was only produced systematically by Speakers 6 and 7 (the two speech scientists). If deaccentuation occurred in these positions, neighbouring accents were exaggerated and fairly unnatural (Fig. 1).

Breaks were also used for prominence marking: in 9% of all cases, a break was inserted before the accented unit, but never before unaccented ones. Given the syntactic structure of the sentence, breaks as boundary markers are only possible between the direct object and the verb, thus between the third and fourth content word. However, breaks were equally distributed between the four word boundaries (the first being between the definite article and the first content word). While breaks are usually taken to signal strong boundaries and thus separate intonational phrases, this seems not to apply for Hungarian where the f0 contour in sentences with breaks did not differ substantially from those without breaks.

3.2. Tonal patterns of pitch accents

It seems that breaks were used for accent strengthening rather than boundary marking. Since the role of breaks in Hungarian prosody has not been described so far, lexical units with preceding or following breaks were excluded from further analysis. Unnatural accents were also disregarded, as they might be an artefact of this specific task (see previous subsection). The remaining data set included 463 accented units.

3.2.1. Final patterns

We first look at the final accented syllable within the sentence. As said in the introduction, this accent is generally described as falling, but a distinction between pitch accent and phrase tone is missing in the descriptions.
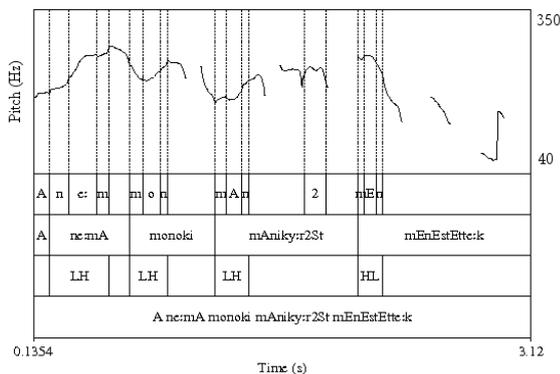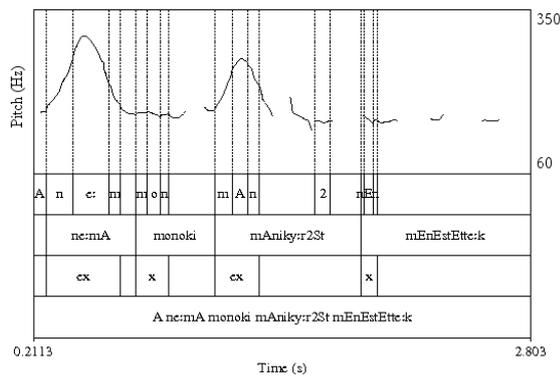
Figure 1: *Utterance of the form CbAp with two prominent lexical units and exaggerated accents (Speaker 7, top), the same utterance with accents on each lexical unit (Speaker 2, bottom).*

Final accents were realised on the last lexical unit in 79% of all cases and were always preceded by at least one further accent. In the remaining cases, the final accent was located on the third content word (Fig. 2).
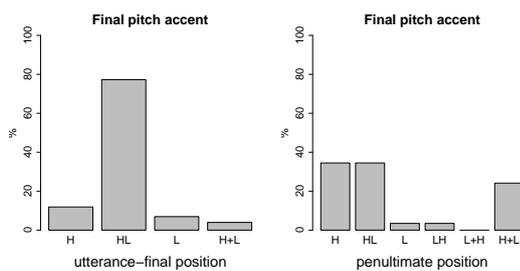

Figure 2: ***Left:*** *patterns of final pitch accents on the last (4th) content word and* ***right:*** *on the second to last (3rd) content word when the last unit was deaccented.*

3.2.2. Initial patterns

Initial accents were rising in 79% of all cases. Initial accents that were located on the second content word (two cases) also had the pattern LH (Fig. 3).

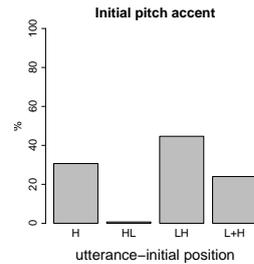The rise observed in the first accented syllable had a sub-

Figure 3: *Patterns of initial pitch accents.*

stantially larger range than LH accents on the second or the third unit (average f0 differences for unit 1: 57 Hz, unit 2: 22 Hz, unit 3: 18 Hz). Fig. 4 shows a typical example.
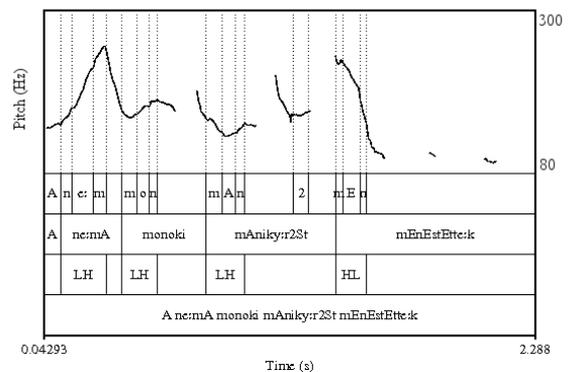

Figure 4: *f0 contour of the utterance* A néma monoki manikűröst menesztették. *A typical accent pattern with LH on the initial and medial syllables and HL on the final one.*

3.2.3. Medial patterns

In medial positions, the pitch accent type LH was the most common one, followed by L and H (Fig. 5) It is important to note that accents labelled with H often lacked a pronounced peak and had a rather flat contour. Syllable durations for this accent type were especially short and did not substantially differ from unstressed syllables. The nature of the distinction between deaccented syllables and those with H pitch accent was investigated on a smaller data set including only the second lexical unit (/monoki/), since the number of H tones and deaccented syllables was comparable in this position (35 H tones and 49 deaccented units).

Because of non-equal variations in the samples, non-parametric Kruskal-Wallis test was performed for duration which proved not to be significantly different for the two groups ($p = 0.1428$). However, H tones were introduced by higher f0 in the preceding phrase than were deaccented syllables that did not show a pitch reset.

4. Discussion

The present paper introduces a study of accent distributions and tonal patterns of Hungarian. This investigation is meant to be a
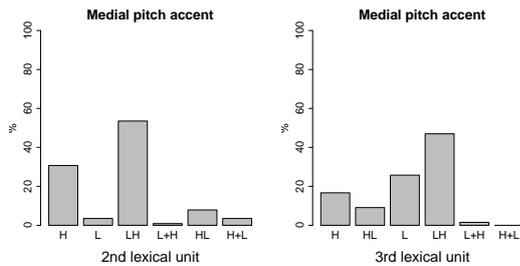
Figure 5: *Patterns of medial pitch accents.*

first step towards a systematic description of Hungarian intonation in terms of ToBI and can only provide speculative answers to the questions raised in the introduction.

Due to the rich morphological system of Hungarian, grammatical relations (such as subject and object) can be expressed without syntactic information. Therefore answers are often elliptical and contain only the new (focussed) information. However, participants in the present experiment were forced to use entire sentences as answers to questions. This might be one of the reasons why utterances with broad focus were overrepresented in our sample.

Given the close interplay of syntax and accent distribution, it seems that prominence marking just by means of accentuation is not widespread in Hungarian. In our data base, patterns such as cbAP were only produced at the cost of naturalness, and only by speech scientists aiming to produce exactly these patterns. Therefore it is concluded that accentuation distributions are limited in Hungarian, not only between larger constituents, but also within them, overall accentuation being the default pattern. On the other hand, this claim is limited to laboratory speech at present and has yet to be investigated in other speech styles.

Another finding is the utilisation of breaks for accent marking. This might be interpreted in line with the strong rise on the first accented syllable that was most often of the form LH or L+H. It is often claimed in scientific discussions that Hungarian sentences begin with a strong accent followed by weaker ones, but this observation has not been explicitly described in publications to our knowledge. The universal character of the utterance-initial rise was also observed by [8], but there it is interpreted as a surface phenomenon, in other words as "phonologically insignificant (and practically inaudible)" (p. 473). Another possible interpretation of this phenomenon is that the initial f0 rise that signalises a late peak and thus a strong accent is due to phrase-initial strengthening (described in [14]), expressed not only by lengthening, but also by additional f0 cues in Hungarian. The usage of breaks supports the importance of initial strengthening, since each content word following a boundary is obviously always prominent. This again is in line with the fixed word-initial stress in this language. The concept of initial strengthening could account for the very limited distribution of tonal patterns in utterance-initial position and could be interpreted in terms of neutralisation: in order to reach a high f0 target following a low tone on the first accented syllable, the peak is delayed [15] which is manifested in a rising pitch accent.

Similarly, final accent patterns showed little variation and were—when associated with the last lexical unit—of the type HL or H+L. This pattern is very different from those in other languages: e.g. [16] found a wider range of utterance-final patterns such as H+L*, L*+H or L* in southern German varieties. It is possible that Hungarian utterance-final positions are again subject to a neutralisation process, whose nature is still to be explored.

The last observation to be addressed here is that accentuation can be realised by means of f0 changes on the preceding syllables rather than on the accented syllable itself. A speculative explanation would be that the previous phrase or boundary tone could act as an alternative means of prominence marking. As mentioned in the Introduction, similar patterns were found in French where boundaries *after* the prominent unit lead to a more prominent perception of the final lexical unit in the preceding phrase. The opposite seems to be the case in Hungarian, yet this finding has to be tested in following perception studies.

5. Acknowledgements

6. References

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