The prosody of Hungarian complex noun phrases in focus

Corinna Langer
Goethe University Frankfurt

Tina Bögel
University of Konstanz

Proceedings of the LFG'25 Conference

Miriam Butt, Jamie Y. Findlay and Ida Toivonen (Editors)

2025

PubliKon

lfg-proceedings.org

Abstract

This paper analyses Hungarian complex noun phrases with varying focus patterns. The results of a production study on different focus conditions show that the assumption of a main focus accent on the first syllable of the comment with following deaccentuation might be too simplistic to capture the prosodic patterns of focus in Hungarian complex NPs. The paper provides a new analysis of the different accents, their shapes, and their possible combinations at the prosody-syntax interface in LFG.

1 Introduction

Hungarian is a discourse-configurational language with designated syntactic positions for topic and focus: Topics occur sentence-initially, while focused elements are typically placed in the preverbal position (see, e.g., É. Kiss 1995, 2002). If a verbal modifier (VM, cf. Laczkó 2023) is present, the VM is placed in the immediately preverbal position, unless a focused element occurs, in which case the VM follows the verb. The inverted order of the verb and the VM is thus a clear indicator of a filled focus position. In example (1), *János* 'John' occupies the topic position, and in (2) the focus position where the particle *el* 'away' occurs after the verb *ment* 'went'.

(1) János el-ment.
John away.VM-went.
'John went away.'

(2) János ment el.
John went away.VM
'It was John who went away.'
(É. Kiss 1995: 213, glossing adapted)

Previous research showed that in a non-neutral Hungarian sentence, that is, a sentence with a filled focus position as in (2), the main accent of the sentence falls on the first element of the comment (or 'essential section') of the sentence (see, e.g., Kálmán et al. 1986, Varga 2002)[1]. This focus accent, which is expressed by a high tone on the first syllable followed by a sharp fall in pitch, is typically described as an 'eradicating stress', deaccenting any postfocal elements (unless another focused element occurs, see, e.g., Kálmán et al. 1986, Varga 2002). The first element in the comment receiving the accent often coincides with the syntactic focus position, but can also be, for example, a quantifier occupying the quantifier position between the topic and the focus position (see, e.g. Kálmán et al. 1986). However, in her work on (multiple) question words, quantifiers, and negation, Mycock (2010) shows that it is not necessarily the leftmost scope operator that receives main stress, but the one with the widest scope (c.f. Hunyadi 2002).

There are multiple syntax-prosody mapping approaches proposed for Hungarian that are concerned with the sentence level, among them Mycock (2010) for LFG (for non-LFG approaches see Vogel & Kenesei 1987; É. Kiss 2002, 2009; Hamlaoui & Szendrői 2015, 2017). However, there is hardly any work on the phrase level which requires an analysis of prosodic patterns beyond the discourse-configurational expectations: For a complex NP occupying the syntactic focus position, the main accent should still fall on this position, but the exact prosodic pattern inside the NP might differ depending on whether the whole NP or only subparts (e.g. only the noun) are focused.

[1]Following, for example, É. Kiss 2002, we will use the division of sentences into (sentence initial) topic(s) and the comment (all elements behind the topic).

In this paper, we look at complex noun phrases with varying focus patterns. We show that Hungarian focus prosody on the phrase level cannot be (fully) explained by the assumption of a main focus accent on the first syllable of the comment with following deaccentuation but that a pure description in terms of scope operators is also not sufficient. We present the characteristic pitch patterns within the complex NP in different focus conditions that were identified by Langer & Kügler (2021) and Langer (in prep.) and provide a new analysis at the interface proposed in Bögel (2015), which takes the different accents, their shape, and their combinations into account.

2 Production study

Even though the syntactic focus marking is a crucial feature of Hungarian, there are cases where it does not suffice to disambiguate between multiple possible interpretations of a sentence. One of these cases occurs when the focus position is filled with a complex modified noun phrase (NP). In a sentence like (3), where the complex NP *a híres zenészt* 'the famous musician-ACC' occupies the syntactic focus position, the focus can be on the whole NP (NPF) or a narrowly focused subpart of the NP, such as the adjective (AF) or the noun (NF). Thus, the sentence in (3) can be the answer to each of the questions under discussion (QUD; Roberts 1996) given in (3a)-(3c).[2]

(3) **A híres zenész-t** tüntette ki a polgármester.
the famous musician-ACC honored VPRT the mayor
'The mayor honored [the famous musician]$^{\text{Syntactic Focus}}$.'

a. Which musician did the mayor honor? [AF: narrow adjective focus]

b. Which famous person did the mayor honor? [NF: narrow noun focus]

c. Who did the mayor honor? [NPF: broad focus on the whole NP]

This ambiguity of focus cannot be disambiguated by syntactic means, because a definite NP cannot be split to only place a focused subpart into the syntactic focus position (Jánosi 2014). Instead, prosody is said to disambiguate (at least some of) the possible focus conditions. According to Dékány & Csirmaz (2018), the default main accent falls on the left edge of the NP (excluding determiners) and, thus, both AF and NPF would have a single falling accent on the adjective. If there are later foci in a syntactically focused NP, as in the NF condition, 'the stress is shifted [to the focused element], but the word order does not change' (Dékány & Csirmaz 2018: 1065).

[2]Following Krifka (2008) (see Langer in prep. for the discussion), we assume that the focused constituent is a choice from a set of alternatives, in this case two. In line with Krifka, we use the terms 'narrow' and 'broad' focus as relational terms: the smallest relevant focus domain in our analysis, that is, focus on a single word, will be called 'narrow' focus, and focus on the whole NP will be called 'broad(er)' focus. This definition is roughly the same as the one discussed in Mycock & Lowe (2013) in that narrow focus assumes an approximate identity between focus extent and focus exponent, while the focus extent is larger than the exponent in broad focus. All three foci in example (3) would commonly be called 'contrastive', that is, +new and +prominent in Choi (1996)'s system, but since this paper does not discuss information structure or the difference between types of foci per se, we only indicate the focused predicate and the focus-type (narrow or broad) in our analyses (see Figure 10). See, e.g., Mycock (2006) or O'Connor (2004) for more detailed proposals discussing prosody and information structure.

In order to empirically test Dékány & Csirmaz's (2018) claims, and, thereby, investigate whether prosodic means can be used to disambiguate these syntactic ambiguities, Langer & Kügler (2021) conducted a production study (expanded in Langer in prep.), analyzing the prosodic patterns of Hungarian sentences such as the one in (3). In the following sections, we will briefly summarize their methods and results.

2.1 Methods

The production experiment tested sentences with complex NPs occupying the syntactic focus position. Each sentence consisted of the target NP (a noun modified by a single adjective), a particle verb to unambiguously mark the NP as syntactically focused, and at least one postverbal NP. The sentences were embedded into contexts eliciting the different possible focus domains (narrow adjective focus (AF), narrow noun focus (NF), or broad NP focus (NPF)) in the target sentence, which was syntactically identical between focus conditions. Each context ended in a question that the target sentence was the answer to. Example contexts for the sentence in (3) are given in (4), eliciting narrow adjective focus, (5), eliciting narrow noun focus, and (6), eliciting broad NP focus:

(4) AF: *A Balaton melletti kisvárosban minden évben megrendendezésre kerül a díjkiosztó gála, ahol a polgármester ünnepélyes keretek között adja át egy tehetséges polgárnak a kitüntetést. Ebben az évben* ***egy híres zenészt*** *és* ***egy fiatal zenészt*** *jelöltek a dírja. Melyik zenészt tüntette ki a polgármester?*
'In a small town next to Lake Balaton, every year, a prize-winning gala is organized, where the mayor ceremoniously presents the award to a talented citizen. This year, **a famous musician** and **a young musician** were nominated for the prize. Which musician did the mayor honor?'

(5) NF: *... Ebben az évben* ***egy híres zenészt*** *és* ***egy híres festőt*** *jelöltek a díjra. Melyik híres művészt tüntette ki a polgármester?*
'... This year, **a famous musician** and **a famous painter** were nominated for the price. Which famous artist did the mayor honor?'

(6) NPF: *... Ebben az évben* ***egy híres zenészt*** *és* ***egy szorgalmas diákot*** *jelöltek a díjra. Kit tüntette ki a polgármester?*
'... This year, **a famous musician** and **a hardworking student** were nominated for the price. Who did the mayor honor?' (Langer in prep.)

During the experiment, the contexts were presented in randomized order in both written form on a screen and as pre-recorded audio files to twenty native speakers of (standard) Hungarian (18-72 years, ∅ 35,8; 4 males/16 females). Their task was to answer the question at the end of the context with the visually presented target sentence 'as naturally as possible'. The participants were recorded in a quiet environment at home using a handheld Zoom H4n Pro recorder and a Rode Lavalier condenser microphone.

2.2 Analysis

After annotating words, syllables and vowels in Praat (Boersma & Weenink 2025), Langer & Kügler (Langer & Kügler 2021, Langer in prep.) measured f0 maxima and minima inside the vowels for (i) a categorical analysis of contour types (falling, rising,

plateau) per word and (ii) gradual analyses of height and position of maxima/minima as well as slopes of falling and rising contours. Additionally, they extracted pitch at ten points per syllable in the target NP used for contour comparisons in generalized additive mixed models, and marked non-modal voiced syllables. For all pitch related analyses, f0 was converted into semitones with speaker dependent baselines to reduce the influence of inter-speaker variation. Langer & Kügler also investigated intensity contours and the duration of syllables. However, these analyses showed no significant results and will thus not be discussed in the present paper. Figure 1 shows a schematic representation of the pitch-related measurement points.

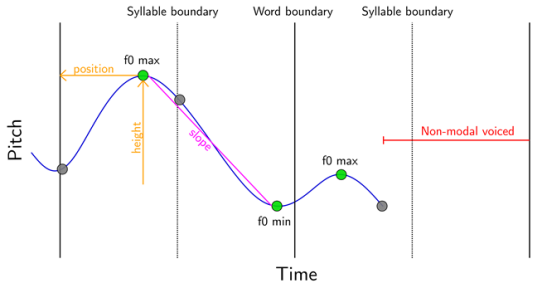


Figure 1: Schematic representation of the pitch-related measurement points inside the target NP (excluding the determiner) (Langer in prep.)

2.3 Results

Figure 2 shows the waveform of one of the utterances produced in the experiment. This sentence was uttered in AF, that is in the condition eliciting focus on the adjective *híres* ('famous'), by a female speaker. The speaker produced falling contours on both parts of the NP and deaccentuation (on the verb) or creaky voice on every word following the syntactic focus position. This pattern of deaccentuation/non-modal voice starting at the verb until the end of the sentence was found in every target sentence irrespective of speaker or focus condition. Consequently, differences between focus conditions are only investigated inside the target NP that occupies the syntactic focus position.

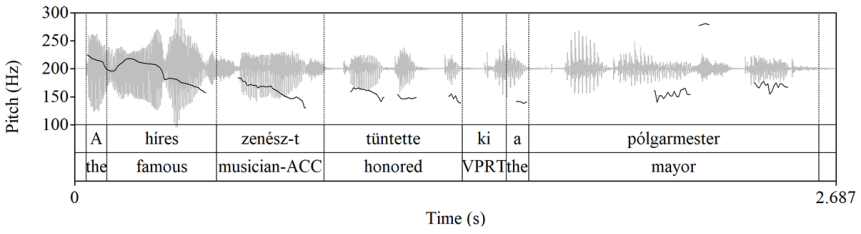


Figure 2: Waveform, pitch track and associated annotation layer of sentence (3) produced in the AF condition; VPRT = VM (Langer in prep.)

For an initial investigation, Langer & Kügler (Langer & Kügler 2021, Langer in prep.) used generalized additive mixed models (GAMMs) that assume non-linear relations between predictor variable(s) (time) and a response variable (pitch). The GAMMs were used to visualize the mean-pitch trajectories of the three focus conditions (Figure 3) and to calculate windows of significant differences between these trajectories.

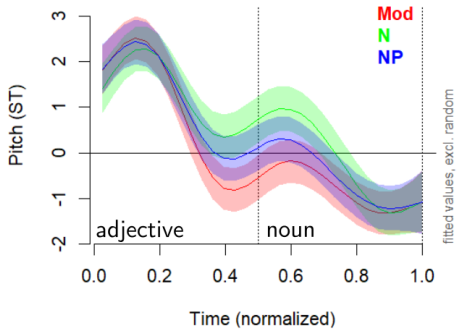


Figure 3: Generalized additive mixed model for the three mean-f0 trajectories (in semitones) per focus condition based on ten equidistant measurement points per syllable (Mod = AF; N = NF; NP = NPF) (Langer in prep.)

The results showed that the highest prosodic prominence was always at the beginning of the adjective.[3] Significant differences were found for the second part of the adjective and the first part of the noun: The adjective ends lower in the AF condition compared to the NF condition, and the noun starts higher in the NF condition compared to the two other focus conditions. The GAMM found no significant differences between the narrow AF and the broad NPF.

Since the GAMM compares the means of all data points, differences between conditions can be influenced by both categorical and gradual differences. For example, the mean-f0 trajectory on the adjective might end lower when it is narrowly focused (AF) because of a higher number of falling contours in this condition as opposed to more prefocal rising contours in NF. However, it could also be the case that the adjective is always produced with a falling contour, but this contour falls steeper in narrow AF compared to the other focus conditions. To disentangle these categorical and gradual effects, both were investigated further.

For the categorical analysis, Langer & Kügler (see Langer in prep. for the detailed analysis) calculated contour types per word based on the f0 minima and maxima. They took one semitone as the threshold for a 'just noticeable difference' between minima and maxima, classifying everything below as a plateau contour. If the difference was at least one semitone, the contour was classified as rising or falling depending on the direction of the difference. Table 1 shows the distribution of contour types per focus condition on the adjective and the noun.

Contours on the adjective				Contours on the noun			
Focus	Fall	Plateau	Rise	Focus	Fall	Plateau	Rise
A	92	3	5	A	58	31	11
N	72	9	19	N	82	9	9
NP	79	7	14	NP	75	14	11
Total	81%	6.3%	12.7%	Total	71.7%	18%	10.3%

Table 1: Distribution (counts = percentages) of contour types on the adjective (left) and the noun (right) per focus condition (Langer in prep.)

[3]The determiners were excluded as they were always unaccented and often very short or even omitted (see, also, Dékány & Csirmaz 2018).

A chi-square test found significant correlations between focus and contours type on both words (adjective: X-squared = 13.438, df = 4, p-value < 0.05; noun: X-squared = 19.287, df = 4, p-value < 0.05). As the correlation plots in Figure 4 show, there is a strong correlation between rising contours in narrow NF and a strong anticorrelation between rising contours and narrow AF.

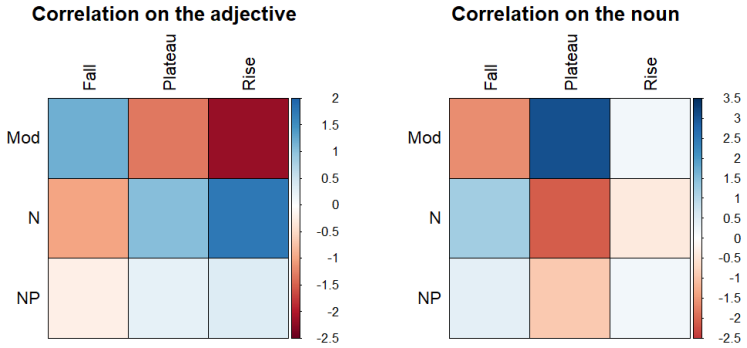


Figure 4: Correlation plots for the correlations (blue) and anticorrelations (red) between focus condition and contour type on the adjective (left) and the noun (right); darker color indicates a stronger (anti)correlation; Mod = A (Langer in prep.)

On the noun, AF correlates with plateau contours. This means that there are (i) more rising contours and less falling contours on the adjective if it is prefocal (narrow focus on the noun) than if it is narrow focused, and (ii) more plateau contours on the noun if it is postfocal (narrow focus on the adjective). Still, both the adjective and the noun are most often produced with falling contours. Thus, for the gradual anlysis, Langer & Kügler investigated the slope of falling contours (visualized in Figure 5).

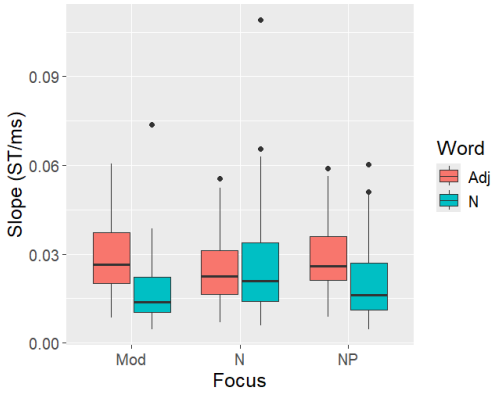


Figure 5: Slope of falling contours per word per focus condition (Langer in prep.)

The ANOVA found a significant effect of word (df = 1, f = 26.18, p < 0.05), and the interaction of word and focus (df = 2, f = 10.08, p < 0.05). Focus alone was not significant (df = 2, f = 0.22, p = 0.8). The post-hoc Tukey-HSD test found a syntagmatic effect in both AF and broad NPF: the slope on the adjective was significantly steeper than on the noun (p < 0.05 for both comparisons). In the paradigmatic comparison, the only significant difference was on the noun: It was significantly steeper in narrow NF compared to narrow AF (p < 0.05). This means that falling contours on the adjective were

equally strong in each focus condition, while the strength on the noun differed: it was significantly stronger if the noun was narrowly focused than if it was postfocal (narrow focus on the adjective), with the broad focus realisation not differing from either and thus being produced 'in between' the other two.

Of course all these analyses show the overall results across all 20 speakers that might obscure relevant inter- and intra-speaker variation. For example, it might be the case that some speakers use other prosodic cues such as intensity or voice quality for focus marking. Therefore, an in-depth analysis of the variation is planned. Still, the data show strong evidence for pitch-related cues to be relevant in the marking of focus in Hungarian. In the next section, we will thus present the phonological abstractions that Langer & Kügler conclude based on the statistically significant phonetic differences described here.

2.4 Discussion

The categorical analysis presented above found (i) more rising contours on the adjective in NF and (ii) more plateau contours on the noun in AF. Langer & Kügler (2021) and Langer (in prep.) analyze these findings as a reduction of the prefocal prominence in NF and reduction or deletion of accents on the noun in AF. Still, falling contours are the most common contour type on both word categories in all focus conditions. Especially the adjective shows a strong preference for falling contours irrespective of focus condition (81% of the data). A closer investigation found that only half of the speakers use rising contours on the adjective in NF and NPF, and that even those speakers do not do so consistently (at most 50% of the NF/NPF data points). Langer & Kügler (2021) and Langer (in prep.) therefore conclude that the 'default' pattern of NP accentuation includes a falling contour on the adjective irrespective of focus condition, while the cases with rising (or plateau) contours on the adjective are an alternative pattern, in which the adjective gets reduced to enhance the prominence on the noun. This alternative pattern needs to be investigated further (see, e.g., the discussion in Langer in prep.).

The slope analysis found no significant differences between falling contours on the adjective (paradigmatic comparison) and between contours on the adjective and a following narrow focused noun (syntagmatic comparison). Langer & Kügler thus conclude that accents on the left edge and accents on narrowly focused elements are equally strong.[4] On the noun, the slope analysis found a significant paradigmatic difference between narrow NF and narrow AF: The falling contours were steeper in NF than in AF. Together with the higher number of plateau contours on the noun in AF, Langer & Kügler take this as an argument for a reduced (or deleted) accent on post-focal words (similar to post-focal accentuation on the sentence level, see, for example, Kálmán et al. (1986), Varga (2002)). Since there is no significant difference on the noun between NPF and the other two focus conditions, Langer & Kügler (2021) conclude that it is produced with neither a strong (as in NF) nor a reduced accent (as in AF).

[4]This might be counter-intuitive as narrow foci are often made more prominent than other parts of the utterance, which is true for the alternative pattern mentioned above in which the prominence on the adjective is reduced.

Following these considerations, Langer & Kügler (2021) and Langer (in prep.) suggest a three-way distinction of accent types in complex NPs occupying the syntactic focus position:

- a *neutral accent* on words that are part of a broad(er) focus domain (O)
- an *enhanced accent* on the left edge of the phrase containing the focus & on narrowly focused words (+)
- a *reduced/deleted accent* on post-focal words (–)

Figure 6 summarizes the 'default' prosodic patterns found by Langer & Kügler for accentuation in complex NPs. In all three conditions, the highest prosodic prominence was found at the left edge of the syntactic focus position, that is, the first syllable of the adjective. Significant differences between the three focus conditions are found on the noun: The accent (second black line) is boosted in relation to broad focus if the noun is narrowly focused, and reduced if it is postfocal, that is, in the adjective focus condition.

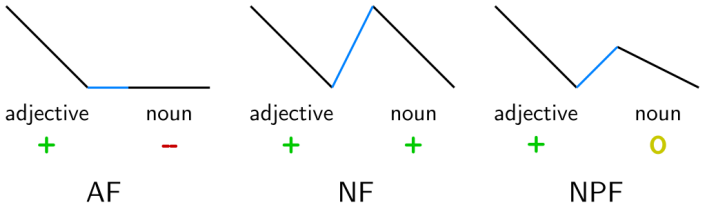


Figure 6: Schematic representation of the prosodic patterns of narrow adjective (AF), narrow noun (NF) and broad (NPF) focus in the NP (Langer in prep., added symbols for accent type)

Similar to the claims made in the literature (see, e.g., Dékány & Csirmaz 2018), the narrowly focused element always bears a strong (falling) accent, and all elements after the syntactic focus position are deaccented. The found patterns digress, however, in two ways: First, AF and NPF are not identical. Instead, the expected deaccentuation on the noun was only found in AF. Second, contrary to the claims, there is an accent on the adjective irrespective of the focus condition, that is, even if the noun is narrowly focused. Langer & Kügler conclude that, in the default pattern, there is an obligatory left-edge accentuation in the NP occupying the syntactic focus position, post-focal deaccentuation (on the noun in AF) and focal 'boosting' of later narrowly focused elements (the noun in NF, see Féry & Ishihara 2010 for the notion of 'boosting by focus'). This pattern can neither be fully explained by assuming only an eradicating stress on the first syllable of the focus, nor by the scope-stress correspondence proposed by, for example, Mycock (2010) for focus on the sentence level.

3 LFG analysis

We adopt the syntactic structure proposed by Laczkó (2014), who assumes that VMs and focused constituents (here: the complex NP) both occur in Spec, VP, the former in neutral, and the latter in non-neutral sentences (see Börjars et al. 1999, Gazdik 2012

for other approaches; Laczkó 2023 for an overview). Figure 7 shows the c-structure for the VP of example (3), where the focused constituent is in the preverbal (VP-Spec) position.

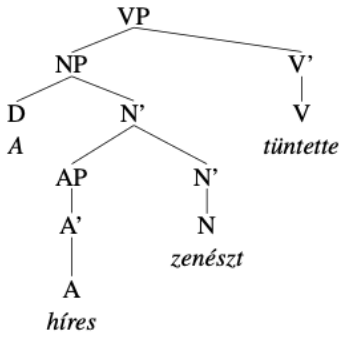


Figure 7: C-structure for the VP of example (3).

The results of the production experiment described in Section 2 and illustrated in Figure 6 show that the left edge of the comment always seems to receive a main accent (possibly a phrase accent), which often coincides with the focus accent. However, as the pattern for the narrow noun focus shows, this is not always the case. In order to identify the correct focus position, reference to p-structure is thus crucial.

In this paper, we follow the approach to the prosody-syntax interface proposed in Bögel (2015) and illustrated in Figure 8.

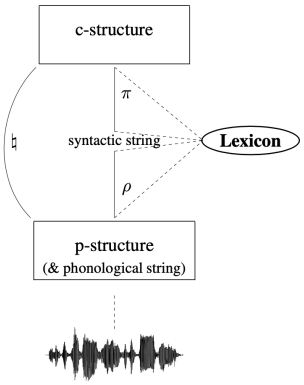


Figure 8: The syntax–prosody interface (Bögel 2015)

Two transfer processes regulate the exchange of information at the interface. The *transfer of structure* (⟊) exchanges information on syntactic and prosodic grouping and on intonation, while the *transfer of vocabulary* (ρ) associates morphosyntactic and phonological information of lexical elements and projects them to their respective structures. P-structure is represented by the p-diagram (see below in Figure 9), the underlying representation of the speech signal itself.

The approach distinguishes two views on the interface: Production, which describes the transfer of information from syntax/c-structure to prosody/p-structure, and compre-

hension, which takes the speech signal as a starting point and exchanges information from prosody to syntax (see Bögel (2023) for a detailed discussion). With regard to the question how focus interpretation is associated to the distribution of prosodic events in a complex NP in Hungarian, the paper will assume comprehension, that is, going from the speech signal to p-structure to c-structure.

In our analysis of the prosodic structure of complex NPs, we rely on the combination of accent and accent shape proposed in Bögel & Zhao (2025), where both accent and shape can be recorded in one representation. Table 2 illustrates how each level of L or H is characterized by a particular height and shape of the slope leading to it (*lead*) and following it (*tail*).

Cat.	Max/Min	lead	tail
H4/L4	Max/Min	steep	steep
H3/L3	Max/Min	steep	flat
H2/L2	Max/Min	flat	steep
H1/L1	Max/Min	normal	flat

Table 2: Tone and slope system from Bögel & Zhao (2025: 19)

H4 and L4 thus represent accents where the lead and the tail show a strong rise and fall respectively, while H1 and L1 are relatively flat. L2/L3 and H2/H3 are the accents between these two extremes, with each having a different combination of slopes. In contrast to the less fine-grained traditional ToBI annotations (Silverman et al. 1992), these accents include both the scale and the shape of the pitch accent in question, which allows for a distinction between the two accents on the noun in the NPF and NF condition (see Figure 6). H4 can thus be used to represent the boosted (main) accent generally found on the left edge of the comment or the narrow focused element in the AF and NF condition, and H1 would represent the 'neutral' accent on the noun in the broad NPF condition. Postfocal deaccentuation is signalled by retaining a low pitch L.[5] The following Table 2 illustrates the three possible combinations.[6]

Comment		
Adjective	*Noun*	*Condition*
H4	L	AF
H4	H4	NF
H4	H1	NPF

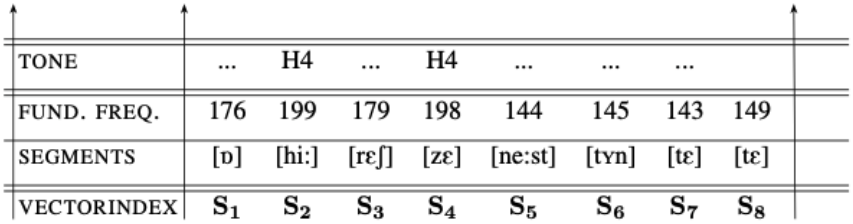
Table 3: Constraining accent combinations for narrow (AF/NF) and broad focus (NPF)

P-structure is represented by the p-diagram, a linear representation of the speech signal

[5]These accent combinations are based on the default patterns established in Section 2.

[6]The description of gradient pitch movement in a speech signal as categorical accents in p-structure points to one of the main problems at the interface between phonetics and phonology: How can one determine a threshold and is setting a threshold justified? We will not be able to resolve this issue here. The threshold values used in this paper are based on the statistical levels; any signal with pitch accents values below this level cannot be uniquely identified. To indicate probabilities (here, for example, NPF is the most probable version if there are no prosodic indicators) Optimality Theory style constraints (Frank et al. 1998; Bögel 2020) could be used.

in syllables over time. Figure 9 shows the p-diagram of a sentence in the NF-condition during comprehension, that is, the answer to the question in (3b), eliciting narrow focus on the noun *zenész-t* [zɛne:st] 'musician'.



TONE	...	H4	...	H4	...	...	...	
FUND. FREQ.	176	199	179	198	144	145	143	149
SEGMENTS	[ɒ]	[hi:]	[rɛʃ]	[zɛ]	[ne:st]	[tʏn]	[tɛ]	[tɛ]
VECTORINDEX	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8

Figure 9: p-diagram of a speech signal in the NF-condition (example 3b)

In the p-diagram, each syllable vector is associated with a number of values related to attributes like SEGMENTS or FUNDAMENTAL FREQUENCY. During comprehension, these values are directly taken over from the speech signal. However, in order to establish the focus structure of the complex NP, the analysis is dependent on the exact determination of categorical tone distributions in the p-diagram. The calculation of tones can be accomplished by means of the fundamental frequency values associated with each syllable vector. In Figure 9, for example, the strong rises and falls in fundamental frequency on vectors S_2 and S_4 are interpreted as H4 accents on the first syllables of the adjective and the noun, respectively.[7] As illustrated in Table 3, this is the combination indicating that there is a narrow focus accent on the noun. However, before this information can be processed in a meaningful way, the signal has to be syntactically parsed.

3.1 The transfer of vocabulary

As part of the information exchange at the interface, the transfer of vocabulary matches the incoming segments against the p-forms of the lexicon, that is, against abstract phonological representations of possible Hungarian words. Table 4 shows the lexical entries for the words *híres* 'famous' and *zenészt* 'musician'.

concept	**s-form**			**p-form**	
FAMOUS	*híres*	A	(↑ PRED) = 'híres'	SEGMENTS	/h i: r ɛ ʃ/
			...	METR. FRAME	$(\prime\sigma\sigma)_\omega$
MUSICIAN	*zenészt*	N	(↑ PRED) = 'zenészt'	SEGMENTS	/z ɛ n e: s t/
			(↑ PERS) = 3	METR. FRAME	$(\prime\sigma\sigma)_\omega$

Table 4: Lexical entries for *híres* 'famous' and *zenészt* 'musician'

Following Levelt et al. (1999), the lexicon distinguishes between different dimensions for each lexical item: An abstract concept, which contains semantic information, a s(yntactic)-form, which includes the morpho-syntactic information associated with each item, and the p(honological)-form which contains information on the segments and the metrical frame for each lexical item. For example, for *zenészt*, the lexicon includes the

[7] Note that while the p-diagram only shows the mean fundamental frequency as a way to represent coarse-grained pitch movement, tones are calculated based on a more fine-grained analysis and by using semitones to account for speaker differences (see Bögel & Zhao (2025) for a detailed description).

abstract notion of MUSICIAN, the morphosyntactic information of *zenészt* being a noun and third person (with further attributes not shown here), and the phonological information on segments and that *zenészt* is a prosodic word consisting of two syllables, with stress on the first syllable.

During comprehension p-structure matches the information against the p-form section of the lexicon. Once a match has been made, the associated morphosyntactic information becomes available as well and a syntactic string can be formed. This s-string then serves as the input to c- and f-structure.

3.2 The transfer of structure

During the transfer of structure, information on prosodic phrasing and on intonation is exchanged at the interface between c-structure and p-structure. For the case at hand, access to the exact tone distribution within the range of the NP is crucial. In order to assign narrow focus to the noun, two conditions have to be met: There must be a H4 tone associated with the first syllable of the N-node, and a H4 accent with the first syllable of the adjective. The c-structure annotation given in (7) for the N-node provides the detailed constraints and mapping functions to p- and i-structure.

(7) c-structure annotation on N:

a. ($\natural$(T(*)) S_{min} TONE) =$_{\mathbf{c}}$ H4

b. ($\natural$(T(<*)) S_{min} TONE) =$_{\mathbf{c}}$ H4

c. ($\downarrow$ PRED-FN) $\in$ ($\uparrow_i$ FOC)

d. ($\uparrow_i$ FOCUS-TYPE) = narrow

The annotation in (5a) states that for all the terminal nodes of the current node (T(*), which in this case is the predicate of N, *zenészt* 'musician'), take the syllable with the smallest index (S_{min}; corresponds to the first syllable of the noun) in p-structure ($\natural$). For the attribute TONE, this syllable must have (=$_c$) the value H4. The annotation in (5b) is identical to (5a), except for (T(<*)). <* refers to the left sister of the current node[8], in this case the adjective *híres* 'famous', which is required to have a H4 accent on its first syllable as well. If both constraints are met, then the noun is in focus. This information is projected to i-structure by means of the annotation in (5c) (following the proposal made in King (1997)), together with the information that this is a narrow focus (5d). Figure 10 illustrates the relevant part of the resulting i-structure representation.

$$\begin{bmatrix} \ldots & \\ \text{FOC} & \left\{ \begin{bmatrix} \text{PRED-FN} & \text{'zenészt'} \\ \text{FOCUS-TYPE} & \text{narrow} \end{bmatrix} \right\} \\ \ldots & \end{bmatrix}$$

Figure 10: I-structure representation of a narrow noun focus on *zenészt* 'musician'.

[8]For <* see (Dalrymple et al. 2019: 223), who follow Nordlinger (1998). XLE has similar notations: LS* and RS* are short for left and right sister, respectively (Crouch et al. 2022).

In contrast, for the H4 accent on the adjective to be interpreted as a narrow focus, the following noun (the right sister *>) must have an L as tone value.

(8) c-structure annotation on A:

a. (♮(T(*)) S_{min} TONE) =$_c$ H4

b. (♮(T(*>)) S_{min} TONE) =$_c$ L

c. (↓ PRED-FN) ∈ (↑$_i$ FOC)

d. (↑$_i$ FOCUS-TYPE) = narrow

Figure 11 shows the complete analysis of a narrow noun focus during comprehension from p-structure to c-structure to i-structure.

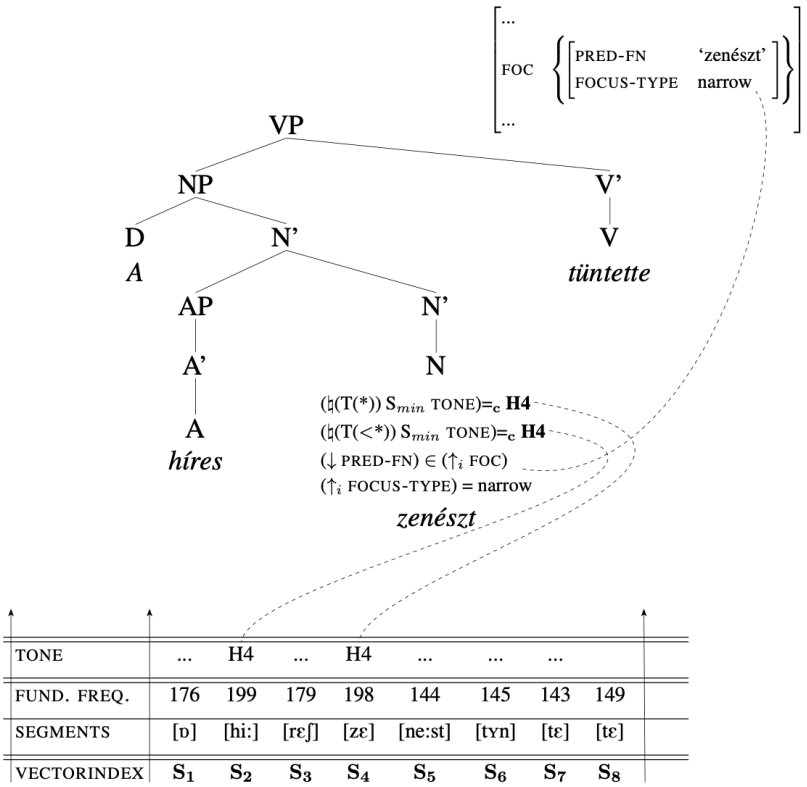


Figure 11: A narrow noun focus in the preverbal position at the prosody-syntax interface

4 Conclusion

This paper presented an analysis of different focus structures in complex NPs in the Hungarian preverbal position, namely narrow adjective focus, narrow noun focus, and broad NP focus. A production study established different accent shapes and accent combinations across the NP and provided a more detailed analysis of the eradicating stress patterns found in varying focus conditions (independently of syntactic focus position), thus adding to and extending previous analyses of Hungarian focus prosody.

The paper furthermore showed how an inclusion of these different tones and their combinations in p-structure allows for a more fine-grained analysis of focus in complex Hungarian NPs at the prosody-syntax-information structure interface in LFG.

5 References

Boersma, Paul & David Weenink. 2025. Praat: doing phonetics by computer. http://www.praat.org/.

Bögel, Tina. 2015. *The Syntax-Prosody Interface in Lexical Functional Grammar*. Konstanz. Ph.D. thesis, University of Konstanz. http://nbn-resolving.de/urn:nbn:de:bsz:352-0-403020.

Bögel, Tina. 2020. German case ambiguities at the interface: production and comprehension. In Gerrit Kentner & Joost Kremers (eds.), *Prosody in Syntactic Encoding* (Linguistische Arbeiten 573), 51–84. Berlin: De Gruyter. https://www.degruyterbrill.com/document/doi/10.1515/9783110650532/.

Bögel, Tina. 2023. Prosody and its interfaces. In Mary Dalrymple (ed.), *The Handbook of Lexical Functional Grammar*, Berlin: Language Science Press. https://doi.org/10.5281/zenodo.10037797.

Bögel, Tina & Tianyi Zhao. 2025. From speech signal to syntactic structure: A computational implementation. *Journal of Language Modelling* 13(1). 1–42. https://doi.org/10.15398/jlm.v13i1.397.

Börjars, Kersti, Erika Chisarik & John Payne. 1999. On the justificaton for functional categories in LFG. In Miriam Butt & Tracy H. King (eds.), *Proceedings of LFG'99*, Stanford, CA: CSLI Publications. https://typo.uni-konstanz.de/lfg-proceedings/LFGprocCSLI/LFG1999/index.html.

Choi, Hye-Won. 1996. *Optimising structure in context: scrambling and information structure*. Ph.D. thesis, Stanford University. https://doi.org/10.7282/T3WH2NX2.

Crouch, Richard, Mary Dalrymple, Ronald M. Kaplan, Tracy H. King, John T. Maxwell III & Paula Newman. 2022. *XLE online documentation*. Palo Alto, CA: Palo Alto Research Center. https://ling.sprachwiss.uni-konstanz.de/pages/xle/doc/xle_toc.html.

Dalrymple, Mary, John Lowe & Louise Mycock. 2019. *The Oxford Reference Guide to Lexical Functional Grammar*. Oxford: Oxford University Press. https://doi.org/10.1093/oso/9780198733300.001.0001.

Dékány, Éva & Anikó Csirmaz. 2018. Numerals and quantifiers. In Gábor Alberti & Tibor Láczko (eds.), *Syntax of Hungarian: Nouns and Noun Phrases*, vol. 2, 1044–1150. Amsterdam: Amsterdam University Press. https://doi.org/10.1515/9789048532759-008.

É. Kiss, Katalin. 1995. NP movement, operator movement, and scrambling in Hungarian. In Katalin É Kiss (ed.), *Discourse Configurational Languages*, 207–243. Oxford: Oxford University Press. https://doi.org/10.1093/oso/9780195088335.003.0008.

É. Kiss, Katalin. 2002. *The Syntax of Hungarian*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511755088.

É. Kiss, Katalin. 2009. Syntactic, semantic, and prosodic factors determining the position of adverbial adjuncts. In Katalin É. Kiss (ed.), *Adverbs and Adverbial Adjuncts at the Interfaces*, 21–38. Berlin: Mouton de Gruyter. https://doi.org/10.1515/9783110214802.

Féry, Caroline & Shinichiro Ishihara. 2010. How focus and givenness shape prosody. In Malte Zimmermann & Caroline Féry (eds.), *Information Structure. Theoretical, Typological, and Experimental Perspectives*, 36–65. Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199570959.001.0001.

Frank, Anette, Tracy Holloway King, Jonas Kuhn & John T. Maxwell III. 1998. Optimality Theory style constraint ranking in large-scale LFG grammars. In *Proceedings of LFG'98*, Stanford, CA: CSLI Publications. https://typo.uni-konstanz.de/lfg-proceedings/LFGprocCSLI/LFG1998/index.html.

Gazdik, Anna. 2012. Towards an LFG analysis of discourse functions in Hungarian. In Ferec Kiefer & Zoltán Bánréti (eds.), *Twenty Years of Theoretical Linguistics in Budapest*, 59–92. Hungarian Academy of Sciences, Research Institute for Linguistics & Tinta Publishing House. https://archive.nytud.hu/szakcsoport/huszeves/kotet.html.

Hamlaoui, Fatima & Kriszta Szendrői. 2015. A flexible approach to the mapping of intonational phrases. *Phonology* 32(1). 79–110. https://doi.org/10.1017/S0952675715000056.

Hamlaoui, Fatima & Kriszta Szendrői. 2017. The syntax-phonology mapping of intonational phrases in complex sentences: a flexible approach. *Glossa: a journal of general linguistics* 2(1). https://doi.org/10.5334/gjgl.215.

Hunyadi, László. 2002. *Hungarian Sentence Prosody and Universal Grammar: On the Prosody-Syntax Interface*. New York: Lang. https://www.peterlang.com/document/1093218.

Jánosi, Adrienn. 2014. *Long Split Focus Constructions in Hungarian with a View on Speaker Variaton*. Ph.D. thesis, KU Leuven.

Kálmán, László, Gabor Prószéky, Ádam Nádasky & C. György Kálmán. 1986. Hocus, focus, and verb types in Hungarian infinitive constructions. In Werner Abraham & Sjaak de Meij (eds.), *Topic, Focus and Configurationality: Papers from the 6th Groningen Grammar Talks 1984* Linguistik Aktuell/Linguistics Today 4, 129–142. Amsterdam: John Benjamins. https://doi.org/10.1075/la.4.07kal.

King, Tracy H. 1997. Focus domains and information structure. In *Proceedings of LFG'97*, Stanford, CA: CSLI Publications. https://typo.uni-konstanz.de/lfg-proceedings/LFGprocCSLI/LFG1997/index.html.

Krifka, Manfred. 2008. Basic notions of information structure. *Acta Linguistica Hungarica* 55.3-4. 243–276. https://doi.org/10.1556/aling.55.2008.3-4.2.

Laczkó, Tibor. 2014. Essentials of an LFG analysis of Hungarian finite sentences. In Miriam Butt & Tracy H. King (eds.), *Proceedings of LFG'14*, Stanford, CA: CSLI Publications. https://web.stanford.edu/group/cslipublications/cslipublications/LFG/19/lfg14.html.

Laczkó, Tibor. 2023. LFG and Finno-Ugric languages. In Mary Dalrymple (ed.), *Handbook of Lexical Functional Grammar*, chap. 31, 1469–1532. Berlin: Language Science Press. https://doi.org/10.5281/zenodo.10037797.

Langer, Corinna. In prep. *Focus and Prosody in Hungarian*. Ph.D. thesis, Goethe University, Frankfurt.

Langer, Corinna & Frank Kügler. 2021. Focus and prosodic cues in Hungarian noun phrases. In *Proceedings of the 1st International Conference on Tone and Intonation (TAI)*, 219–223. https://doi.org/10.21437/TAI.2021-45.

Levelt, Willem J.M., Ardi Roelofs & Antje S. Meyer. 1999. A theory of lexical access in speech production. *Behavioral and Brain Sciences* 22. 1–75. https://doi.org/10.1017/S0140525X99001776.

Mycock, Louise. 2006. *The Typology of Constituent Questions: A Lexical-Functional Grammar Analysis of 'WH'-Questions*. Ph.D. thesis, University of Manchester.

Mycock, Louise. 2010. Prominence in Hungarian: the prosody-syntax connection. *Transactions of the Philological Society* 108(9). 265–297. https://doi.org/10.1111/j.1467-968x.2010.01241.x.

Mycock, Louise & John Lowe. 2013. The prosodic marking of discourse functions. In *Proceedings of LFG'13*, Stanford, CA: CSLI Publications. https://web.stanford.edu/group/cslipublications/cslipublications/LFG/18/lfg13.html.

Nordlinger, Rachel. 1998. *Constructive Case: Evidence from Australian Languages.* Dissertations in Linguistics. Stanford, CA: CSLI Publications. https://web.stanford.edu/group/cslipublications/cslipublications/site/1575861348.shtml.

O'Connor, Rob. 2004. *Information Structure in Lexical-Functional Grammar: The Discourse-Prosody Correspondence in English and Serbo-Croation*. Ph.D. thesis, University of Manchester.

Roberts, Craige. 1996. Information structure in discourse: Toward a unified theory of formal pragmatics. *Ohio State University Working Papers in Linguistics* 49. 91–136.

Silverman, Kim, Mary Beckman, John Pitrelli, Mari Ostendorf, Colin Wightman, Patti Price, Janet Pierrehumbert & Julia Hirschberg. 1992. ToBI: a standard for labeling English prosody. In *Proceedings of the 1992 International Conference on Spoken Language Processing*, Banff. https://doi.org/10.21437/ICSLP.1992-260.

Varga, László. 2002. *Intonation and Stress: Evidence from Hungarian*. New York: Palgrave Macmillan. https://link.springer.com/book/10.1057/9780230505827.

Vogel, Irene & István Kenesei. 1987. The interface between phonology and other components of grammar: the case of Hungarian. *Phonology Yearbook* 4. 243–263. https://www.jstor.org/stable/4615419.