

# Nucleus position within the intonation phrase: a typological study of English, Czech and Hungarian.

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## Abstract

In this paper we examine cases of non-final nucleus (or sentence stress) in English, Czech and Hungarian. These three languages differ substantially with respect to word order rules, prosodic plasticity (ability to signal information structure by shifting the nucleus) and the degree of grammaticalization in nucleus position. Recordings of parallel texts are studied with the aim to quantify different categories of shifts, as well as inter-speaker agreement in the position of the nucleus.

**Index Terms:** nucleus, sentence stress, plasticity, focus, information structure, English, Czech, Hungarian.

## 1. Introduction

Intonation phrase is a widely accepted unit of prosodic analysis which can be characterized, among other things, by (i) a following pause or at least a potential for it, (ii) a phonologically salient position, called nucleus or sentence stress, where functional contrasts such as declarative/interrogative, finality/ continuation or neutral/expressive are realized intonationally, (iii) intonation downtrends, (iv) initial prosodic reset, (v) pre-pause lengthening, (vi) syntactic coherence [1], [2].

### 1.1. Nucleus position in a comparative view

In English, a typical intonation phrase is a sequence of prosodic words with the nucleus (or sentence stress) placed on the last of them, e.g. (nuclear PW in capitals):

*Miss Trixie | opened | her eyes | AND WHEEZED. ||*

An interrogative (... *and wheezed?*), non-final (... *and wheezed, because...*) or expressive (... *and wheezed!*) version of the same phrase would differ primarily (though not only) in the realization of the nucleus and the subsequent boundary tone.

However, in some cases, the nucleus does not occupy the final position. This may occur for example:

- in narrow focus (*Let her ALONE? || She's ALWAYS been alone.*),
- with a final pronoun or adverbial (*She NEEDS someone.*),
- in noun + noun sequences (*How about your CANASTA circle?*), cf. the “compound rule” [3],
- before a relative or adverbial clause (*You oughta see them big UNIFORMS he's giving me to launder.*),
- in address (*NO, darling.*).

In all these cases, the position of the nucleus can be confirmed, as described above, by changing modality, expressivity or (to a lesser extent) finality. The elements following the nucleus (called *postnuclear*) are prosodically reduced, and constitute the *tail* of the phrase [4].

By contrast, in Czech, which is a language with free word order, there is a tendency (though not a strict rule) to keep the nucleus in final position, the focused words often being shifted into this position. For example, the sentence (nuclear PW in capitals):

*I DIDN'T fire any Gloria!* may be translated as:

*Já jsem NEVYHODIL žádnou Glorii!*

[I – AUX. – NEG.-fired – no – Gloria (ACC.)] or

*Já jsem žádnou Glorii NEVYHODIL!*

[I – AUX. – no – Gloria (ACC.) – NEG.-fired.]

In the first case, the focus is signalled prosodically, by a shifted nucleus, and in the second case, it is expressed by the shift of the focused word into the final position, which is the default position of sentence stress. Both variants seem to be equivalent in this case.

Nucleus shifts may occur in Czech:

- in narrow focus (cf. example above),
- before a relative or adverbial clause (*DÁCHNI SI, než ten starej pán přijde.* ‘Rest up till the old man comes.’; nucleus: ‘rest up’),
- with a question word (*CO je s tvým kanastovým kroužkem?* ‘How about your canasta circle?’; nucleus: ‘how’),
- in address (*NIKOLI, drahoušku.* ‘No, darling.’; nucleus: ‘no’).

In Hungarian, similarly to Czech, grammatical functions such as *subject* or *object* are not associated with specific sentence positions (i.e. the word order is free in a grammatical sense). However, sentence positions highly depend on the logical structure of the sentence. According to [5], a Hungarian sentence includes a *topic* designating the entity that will be predicated about, and a *predicative* including the verb. Important information is typically placed before the verb but within the predicative, while postverbal units often represent information with less informational weight. In the Hungarian equivalent of the English sentence *Mrs. Reilly put her ear to the wall*, the noun *wall*, together with a definite article and a suffix, appears before the verb and acts as a verb modifier (see below), since it is an argument of the verb *put*.

*Mrs. Reilly a FALRA tapasztotta fülét*

[Mrs. Reilly – the – wall-to – laid – ear-her (ACC.)]

Here *Mr. Reilly* is the topic which the rest of the sentence is about. The noun *falra*, being the first content word in the predicative, bears the perceptually strongest accent in the sentence. Should the word *fülét* (‘her ear’) be highlighted, a change in word order is necessary:

*Mrs. Reilly a FÜLÉT tapasztotta a falra*

[Mrs. Reilly – the – ear-her (ACC.) – laid – the – wall-to]

In the first case, the verb modifier deletes the accent of the verb but allows postverbal units such as *fület* to bear weaker accents. Verb modifiers are specific syntactic units such as prefixes, indefinite nouns, certain adverbials, attributes of copula verbs etc. [6]. If the sentence has no focus, verb modifiers typically precede the verb.

In the second case, the unit *a fület* is logically contrasted to all other possible objects Mrs. Reilly could put to the wall (her hand, a picture etc.), i.e. it is exhaustive in meaning and acts as a focus. The focus bears a so-called *eradicating accent* [6] and deletes not only the accent of the following verb, but also that of postverbal content words (at least in relatively short sentences). If the sentence has a focus, verb modifiers are moved into postverbal position. Some grammatical units behave like focus, such as negative adverbs and pronouns (*not, nobody*), question pronouns (e.g. *who*), and negative adverbs of frequency (e.g. *hardly*).

Non-terminal nuclei occur in the following cases in Hungarian:

- in narrow focus (*Bár ÉN élnék itt Ignatius-szal.* ‘I wish me and Ignatius lived here’, nucleus: ‘me’),
- with a final pronoun (*A teke SEGÍTETT rajta.* ‘The bowling’s helping that out’, nucleus: ‘helping’),
- in noun + noun or adjective + noun sequences (*SZEGÉNY öregember.* ‘Poor old man.’, nucleus ‘poor’),
- before a relative or adverbial clause (*Készíték magamnak MÉG egyet, ha nem bánod, aranyom.* ‘I’m gonna make me another one, if you don’t mind, sugar’, nucleus ‘another’),
- in address (see preceding example),
- with a question word (*HÁNY éves lehet?* ‘How old is he?’), nucleus ‘how (many)’),
- with negation (*NEM emlékszem.* ‘I can’t remember at the moment’, nucleus ‘can’t’),
- with a verb modifier (*ZOKNIT kaptam Gloriától* ‘Gloria gave me socks’, nucleus: ‘socks’).

Thus, Hungarian appears to be a strongly left-headed language [5], although [9] admits implicitly that there is still a certain tendency for the main accent to appear near the end of a sentence, and [10] assigns equal weight to all accents in the sentence, not granting higher priority to the left edge of the predicative.

Table 1. Concordance sample (prosodic words, PW, with shifted nuclei are given in capitals; the “Type” column contains information about the reason of shift; the columns “S1, S2, S3” indicate which of the speakers realized a nucleus shift; one star indicates cases where both a final and shifted nucleus are possible; two stars indicate cases where two different shifted nuclei are possible (both PW given in capitals). Empty cells correspond to phrases with no potential for nucleus shift.

Nr.	English					Czech					Hungarian				
	Text	Type	Shift?			Text	Type	Shift?			Text	Type	Shift?		
			S1	S2	S3			S1	S2	S3			S1	S2	S3
1	<i>She’s ALWAYS been alone.</i>	focus	Y	Y	Y	<i>VŠICHNI ji vždycky nechali být.</i>	focus*	N	N	N	<i>Hogy mindig MAGA volt?</i>	verbal modifier (copula)	Y	Y	Y
2	<i>She NEEDS someone.</i>	final pronoun	Y	Y	Y	<i>POTŘEBUJE někoho.</i>	final pronoun	Y	Y	Y	<i>Pedig RÁSZORULNA valakire.</i>	final pronoun	Y	Y	Y
3	<i>... an UNSATISFACTORY arrangement...</i>	focus*	Y	N	N										
4						<i>To NENÍ správné.</i>	focus*	Y	N	N	<i>Ez NEM helyes.</i>	negation	Y	Y	Y
5	<i>I AM VERY tired.</i>	focus**	N	Y	Y	<i>Jsem STRÁŠNĚ unavená.</i>	focus	Y	Y	Y	<i>FÁRADT vagyok.</i>	verbal modifier (copula)	Y	Y	Y

## 1.2. Prosodic plasticity and grammaticalized shifts

The potential of a language to express information structure by means of nucleus mobility has been called “plasticity” by [7], who correlates this property with word order: languages with fixed word order like English have “plastic” prosody, i.e. allow nuclei in other than the default positions, whereas languages with free word order like Catalan would be “non-plastic”, i.e. more resistant towards nucleus shift from the default position. The plasticity has been reformulated as a gradual variable rather than a categorical parameter by [8].

The present paper investigates aspects of nucleus mobility in English (EN), Czech (CS) and Hungarian (HU), with respect to syntactic properties of these languages. We include into the category of *nucleus mobility* not only cases where the nucleus is displaced to express informational structure (i.e. prosodic plasticity, as defined above), but also cases of grammaticalized behaviour which does not convey focus [9], such as the deaccenting of final adverbs in English, or the shift of the nucleus on the question pronoun in Hungarian WH-questions. We limit the scope of this study to nucleus position, leaving aside aspects of its phonetic realization.

For the sake of comparability, we consider the phrase-final position as the default position of the nucleus for all three languages, even if the standard view of Hungarian sentence prosody is not compatible with this idea (cf. section 1.1). All cases of non-final nucleus placement are considered as “marked” at this stage.

The proposed analysis should bring empirical validation to R. Ladd’s claim that *there appears to be a fairly sharp division between languages in which rightmost main accent is overwhelmingly the norm [...], and languages that allow the main accent to be placed earlier in the sentence for a variety of other reasons* [9].

For the purposes of typological comparison, we use the term *nucleus* as equivalent to *nuclear prosodic word*, irrespective of the fact that in English, the nucleus is mostly defined as covering a single syllable [4].

## 2. Methodology

### 2.1. Text and recording

Our objective was to cover instances of nucleus mobility (including both prosodic plasticity and grammaticalized behaviour) on comparable material in three languages. The method that we adopted for this purpose is the reading of a literary text in parallel translation, which offers strictly comparable material for all languages studied (provided that the translations are correct and natural). A large proportion of dialogues ensures variability in information structure, and thus increases the potential for nucleus displacements.

The text used for the present study is taken from Chapter 8 of *A Confederacy of Dunces*, a novel by John Kennedy Toole, in its original English version as well as in Czech and Hungarian translations [11], [12], [13]. The selected text has about 2 300 words in the English version, and is made up of approx. 87% of dialogues (counting clauses introducing direct speech like “... he said” as making part of the dialogues). All the above examples are taken from this book.

Three speakers having good competence in reading aloud were recorded for each language (English: a professional speaker with acting experience, an English teacher and a trained phonetician; Czech: one expert in elocution and two students of Translation studies; Hungarian: two speakers with acting experience and a graduate in law). They were asked to study the text prior to recording, and to deliver a clear and not too fast reading of it.

### 2.2. Auditory analysis

All cases of non-final nucleus placement were identified in the recordings. The analysis was carried out on an auditory basis by the authors. The data were arranged in a concordance so as to see the behaviour of all languages parallelly (cf. Table 1). Each entry in the table contains the reason of nucleus shift. The categorization was based on literature, but some categories were adopted *ad hoc*.

We decided to exclude from our analysis clauses which introduce direct speech, e.g. the last three words in “*Thank goodness,*” *Miss Trixie sighed*. These stretches of speech mostly have a reduced prosodic realization, and could be seen as postnuclear. However, since they only appear in literary texts, where they function as a specific means of “wrapping” direct speech, and are somewhat artificial, they were not taken into account in our analysis. After excluding these clauses, the text was realized (average for 3 speakers) in 416 intonation phrases in EN, 450 in CS and 499 in HU.

## 3. Results

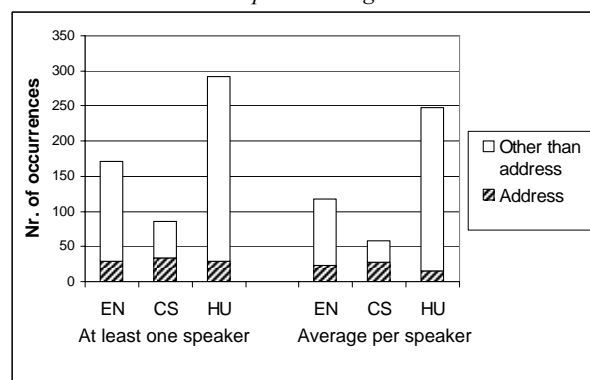
### 3.1. Overall frequency of nucleus shifts

Figure 1 gives the frequency of nucleus shifts in the three texts. We give statistics for cases where *at least one speaker* made a nucleus shift (first three columns), and for the *average number* of shifts per speaker (last three columns). The first approach exploits the potential of the given language to allow nucleus shift, while the second is more realistic in that it counts actual occurrences. Each column expresses the number of nucleus shifts found in a text of identical length, and thus the propensity of each language towards nucleus shift. The lower (shaded) part of each column corresponds to shifts due to address (e.g. ‘Irene’ in *Take it EASY, Irene.*). The syntactic

and prosodic status of address is rather comparable in all three languages: unlike other types of shift, the address is syntactically autonomous, and has a reduced prosodic realization when placed at the end of the sentence.

The language with the greatest proportion of potentially non-final nuclei (59% of all intonation phrases) is Hungarian, followed by English (41%) and Czech (19%).

Figure 1. Overall frequency of nucleus shifts in a text of comparable length.



### 3.2. Categories of nucleus shifts

Table 2 gives an overview of the different categories of nucleus shift and their frequency.

Table 2. Categories of nucleus shift (“0” refers to theoretically possible, but not observed shifts, whereas “–” refers to cases that are not relevant for the given language.)

Category	Occurrence			Example
	EN	CS	H	
1. Address	32	36	30	<i>NO, darling</i>
2. N+N, Adj.+N	27	–	19	<i>Thirty GAS stations.</i>
3. Final pron., adv., aux. or particle	59	2	26	<i>What do you DREAM about?</i>
4. Focus	52	38	91	<i>Let her ALONE? – She’s ALWAYS been alone.</i>
5. Subordinate clause	4	7	2	<i>You oughta see them big UNIFORMS he’s giving me to launder.</i>
6. Expressivity	0	2	1	<i>TICHO tady!</i> [Silence here!] ‘Silence!’
7. Question pronoun	0	1	19	<i>MIT álmodott?</i> [What dreamt-you?] ‘What did you dream about?’
8. Negation	–	–	30	<i>NEM emlékszem.</i> [Not remember-I.] ‘I don’t remember.’
9. Verb modifier	–	–	56	<i>ZOKNIT kaptam Glóriától.</i> [Socks got-I Gloria-from.] ‘I got socks from Gloria.’
10. Verb in initial position	–	–	18	<i>LÁTTAM a magam szemével.</i> [saw-I the own-my eye-with.] I saw it with my very own eyes.

Cases of address are the most stable cross-linguistically. CS has no potential for deaccenting the second element of N + N compounds and Adj. + N phrases, while EN and HU do. Final adverbs in CS are not deaccented, unlike in EN and HU. Focus is the best represented category in our survey: the lowest percentage was found in CS, where focusing may be achieved by placing the word in the final position; the highest

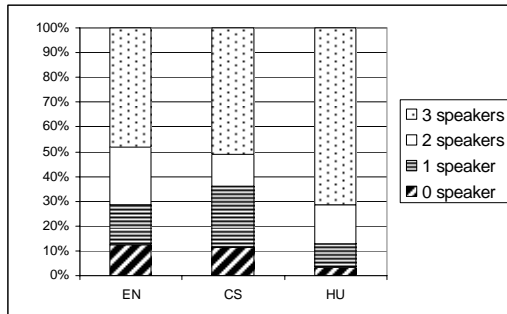
percentage was observed in HU, where focused words, unlike in EN or CS, usually take the position left from the verb. A certain potential for the deaccenting of subordinate clauses was found in all three languages. The categories 7–10 are only typical of HU, and correspond to cases of grammaticalized behaviour.

### 3.3. Inter-speaker agreement

As it appears from Table 1, some prosodic phrases allow more than one position of the nucleus. For instance, the Czech sentence *To není správné*. ‘This is not good.’ (line 4), one speaker realized the nucleus on *není* (‘is not’), and two on *správné* (‘good’). In this case, both realizations are equally acceptable. On line 5, the English sentence *I am very tired* (occurring in the following context: “*Miss Trixie, you think that you’re old and tired. This is very bad.*” – “*Who?*” – “*You.*” – “*Oh, I am. I am very tired.*”) was realized with the nucleus on *tired* by one speaker, on *am* by the second, and on *very* by the third (the most natural variant being that with nucleus on *very*).

To analyze inter-speaker agreement, we calculated the proportion of shifts realized, in one and the same phrase, by all three speakers, by two speakers, and by one speaker. Potential shifts, which were not realized by any of the three speakers, but were judged possible by the authors, were added as well. Figure 2 shows the relative proportion of these four degrees of inter-speaker agreement.

Figure 2. *Inter-speaker agreement in nucleus shifts. The labels “3/2/1 speakers” denote the number of speakers who realized a shift in a given phrase. “0 speakers” denotes potential shift which was not realized by any speaker.*



The most striking difference is that between HU and the other two languages: 71% of all shifts were realized unanimously, against 48% and 51% in EN and CS, respectively. Also, the percentage of virtual shifts (possible, thought not observed in our material) is visibly lower in HU. The differences EN-HU and CS-HU are significant ( $\chi^2 = 29.631$ ,  $df = 3$ ,  $p < 0.001$ ;  $\chi^2 = 24.979$ ,  $df = 3$ ,  $p < 0.001$ ), the difference EN-CS is not ( $\chi^2 = 5.323$ ,  $df = 3$ ,  $p = 0.150$ ).

## 4. Conclusion

Table 3 gives an overview of the examined aspects of nucleus placement. According to this scheme, each language pair has two features in common:

- EN-CS: final nucleus and low inter-speaker stability;
- EN-HU: non-final nucleus in focus and grammaticalized shifts;
- CS-HU: free word order and word order changes with focus.

Table 3. *Features of nucleus shift – typological scheme*

	EN	CS	HU
1. Fixed word order	+	-	-
2. Focus triggers word order rearrangement	-	+	+
3. Focus triggers non-final nucleus	+	-	+
4. Nucleus is mostly final (outside focus)	+	+	-
5. Frequent cases of grammaticalized nucleus shifts	+	-	+
6. High inter-speaker stability of nucleus position	-	-	+

However, considering the relative importance of the features, as well as their quantification, we have good reasons to think that the most important typological gap is that between Hungarian on the one hand, and English with Czech on the other hand. 59% of potentially non-final nuclei give us sufficient ground for the assumption that it is not the end of the phrase which is the dominant nucleus position in Hungarian, but rather the left edge of the predicative as was suggested by [5].

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