

# Differentiation of segmentally identical expressions occurring in the same or different sentence zones in Hungarian by duration, pitch, intensity and irregular voicing

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## ABSTRACT

The paper presents the interpretation and explanation of the findings of two pieces of experimental research within the framework of Varga's (2016) pitch-tier model of the Hungarian declarative sentence. One of the experiments was established to investigate the information-structural contribution of quantified expressions (such as *mindhárom barátom* 'all three of my friends' and *Csaba is* 'Csaba also'). The other experiment explored the acoustic features of the spontaneous-speech specific discourse marker *hát* 'well/so'. The two topics can be regarded as interconnected if Varga's model is interpreted in the strong sense that pitch – presumably in a more or less strong correlation with intensity – is responsible for indicating the topic-comment dichotomy and other factors of the discourse-embedding of sentences. Thus, the reconciliation of our data with Varga's model requires the consideration of the pitch-tier substructures in their complex dynamism. The experiments support the plausible hypothesis that the variants of the discourse marker *hát* as part of the preparatory contour primarily differ in duration, while *is*-quantifiers in different pitch-tier parts differ in terms of pitch values.

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## KEYWORDS

topic-comment dimension, pitch tier, quantifiers and discourse markers in Hungarian, intensity, duration

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## 1. INTRODUCTION

The paper presents the findings of two pieces of experimental research which potentially challenge Varga's (2016) model on the topic–comment dimension of the Hungarian declarative sentence. In section 2, we provide a concise discussion of Varga's (2016) proposal concerning the contribution of intonation to the realization of simple declarative sentences in Hungarian. Sections 3 and 4 provide detailed descriptions of two experiments. The first one is a read-aloud-experiment for investigating ten frequent functions of the Hungarian spontaneous-speech specific discourse marker *hát* 'well/so', distinguishable on the basis of the pragmasemantic toolbox offered by Alberti et al. (2019). The other applies the same read-aloud methodology to the acoustic characterization of quantified expressions such as *mindhárom barátom* 'all three of my friends' and *Csaba is* 'Csaba also' used as part of the topic and the comment zone (Szeteli & Alberti 2018b). The conclusion summarizes our findings in light of Varga's (2016) work.

The experiments support the hypothesis that if, and only if, segmentally identical expressions belong to different parts of the pitch-tier model, they differ in pitch, while expressions belonging to the sentence-initial preparatory contour differ in duration. However, the experiment on quantifiers requires a somewhat more complicated model.

## 2. VARGA'S (2016) MODEL OF THE TOPIC–COMMENT DIMENSION OF THE HUNGARIAN DECLARATIVE SENTENCE

Varga (2016) provides a detailed analysis of the grammatically and informationally relevant intonational facts of simple Hungarian declarative sentences, concentrating on attitudinally neutral intonational solutions.

In his approach, intonation means superimposing certain pitch patterns on the segmental strings of sentences, and thereby producing utterances. The smallest units that are directly relevant to the realization of pitch patterns are not segments (sounds), but syllables, which in turn are composed of segments. The recurring pitch patterns that the syllables of utterances carry are called *intonation contours*, which Varga (2016) regards as being meaningful and having characteristic shapes, of which the most important ones are (a) the *Full Fall*, symbol: [  $\backslash$  ], (b) the *Rise* [  $/$  ], and the *Half Fall* [  $\updownarrow$  ].<sup>1</sup> Some of the syllables are *accented* in the following sense: they "are stressed (i.e. they have extra intensity or some other, non-pitch-involving feature that

<sup>1</sup>The (plurisyllabic) *Full Fall* is such that the voice radically drops down between the first and the second syllables. The *Full Fall* ends on the bottom pitch of the speaker's normal voice range and ends in a pause, while its starting point can be at different heights. The *Half Fall* is similar in shape to the *Full Fall* but it does not reach down to the bottom pitch of the speaker and does not end in a pause. The *Rise* is the name either of a steadily rising contour, or of a contour which keeps level for a large part and then moves upwards at its end. In both cases it can be high or low. Fig. 1 illustrates all these types of contour. It also illustrates a *preparatory contour* (on the string *és akkor* 'and then'). The shape of a preparatory contour is similar to a sustained contour (i.e. it can be rising, level, descending) but it lacks the extra prominence on the first syllable of its carrier string. It is realised anywhere in the region between mid low and high. The diagrammatic representation contains filled dots for the accented syllables and short lines for the other syllables, arranged at different heights above a long horizontal line, which represents the bottom pitch of the speaker's voice. Below this line the written text of the utterance can be seen, provided with the tonetic accent marks shown in the paragraph this footnote belongs to.



gives them extra prominence) and, in addition, they are pitch-prominent (i.e. they are associated with a pitch-event, in the sense that they initiate an intonation contour). ... From the point of view of intonation it is the accented syllables that play a crucial role” (Varga 2016, 49). Intonation contours appear as melodic constituents within certain phonological structures called Intonation Phrases (IPs). IPs are units of intonation, i.e. containers of connected intonational events, with a characteristic internal structure. The obligatory part of Hungarian IPs is the Terminal Part, which begins on the last (or only) accented syllable.

Varga (2016, 75) provides a detailed argument in favour of the topic–comment dichotomy of the Hungarian sentence, which we illustrate in Fig. 1 by means of the most general pattern he provides.

The parentheses in the boxes associated with Fig. 1 mark the optional parts of the general intonation structure of Hungarian declarative sentences. The general structure thus consists of an optional Topic IP, which optionally contains an initial preparatory contour and obligatorily contain a Rise Terminal Contour, and an obligatory Comment IP, the (only) obligatory component of which is its Terminal Contour: a Full Fall, as a definitive part of the declarative sentence type. Both intonation phrases can contain, before their obligatory Terminal Contours, further intonation contours (called ‘Scale’), which tend to be Half Falls.

As also presented in Fig. 1, the expressions targeted in the experiments (which constitute the main empirical focus of this paper) are distributed in the general intonation structure as follows. Several variants of the discourse marker *hát*, the sentence-initial ones, are unaccented inhabitants of the preparatory contours of intonation phrases. The sentence-final *hát* variants are (not necessarily proper) parts of the terminal Full Fall of the obligatory Comment IP. The quantifiers under investigation are accented components of certain intonation phrases. Varga relies on the traditional view that quantifiers (DistP\*), if any, must appear at the beginning of the

*És akkor Izabella barátai elvitték a gyermeket az állatkertbe.*  
 and then Isabella friends.3SG.POSS away.took.3PL the child.ACC the zoo.ILL  
 ‘And then Isabella’s friends took the child to the zoo.’



(Topic Intonation Phrase)			Comment Intonation Phrase	
(Preparatory Contour)	...	Terminal Contour Rise	(Preparatory Contour) + (Scale)	Terminal Contour: Full Fall
Variants of <i>hát</i> (h1–h8)	∃ and ∀ quantifiers interpreted as topics		∃ and ∀ quantifiers interpreted as comments	Variants of <i>hát</i> (h9, hf)

Fig. 1. An utterance consisting of a Topic IP (with a sentence-initial preparatory contour) and a Comment IP, presented by Varga (2016, 52)



**Table 1.** Varga's (2016, 55) proposal for the (linearly ordered) structural positions in positive declarative sentences, on the basis of É. Kiss's (2002) syntactic model<sup>2</sup>

Sentence	
T <sup>*</sup>	Comment
	Dist* { (F) (PDMA)(VMod) } V PostV*

comment, see Table 1; while we intend to point out on the basis of parallel pragmasemantic and phonetic phenomena that they can also function as (non-contrastive) topics.

This pitch-tier model presented in Fig. 1 is of high importance for our approach since the expressions we are considering are hosted in four differentiated pitch-tier zones. On the other hand, our approach serves as a valuable contribution to Varga's (2016) model by providing a solid empirical foundation through rigorous statistical analysis. Varga's (2016) model leads to the following hypothesis concerning the role of duration and its division of labor with pitch, at least as a first approximation: if, and only if, segmentally identical expressions belong to different zones of Varga's pitch-tier model, their vocal differentiation is primarily due to their difference in pitch. The inherently unstressed *hát*-variants in the sentence-initial preparatory contour provide evidence for one direction of the hypothesis: if segmentally identical expressions belong to one and the same Varga-zone, they are correctly predicted to primarily differ in duration (without using pitch characteristics to signal differences). The other direction, according to which segmentally identical quantifier-like expressions in the topic zone and in the comment zone should be distinguishable on the basis of certain pitch values, is only partially corroborated by our analysis (4.1). A simple "static" approach is thus not satisfactory; the two IPS can be safely distinguished on the basis of a global "dynamic" intonational analysis (4.2).

### 3. THE HUNGARIAN DISCOURSE MARKER *HÁT*

The first experiment, a read-aloud experiment of the most frequent Hungarian spontaneous speech specific discourse marker *hát* 'well/so' will serve as the topic of this section. The experiment was established to extend a former pilot study on the prosodic realization of the discourse marker (Szeteli, Gocsál & Alberti 2019) in multiple ways. On the one hand, it involved a higher number of participants ( $n = 53$ ), both females and males (28:25). On the other

<sup>2</sup>The obligatory comment is preceded by optional structural positions for Topic (T). Within the comment of positive Hungarian sentences we distinguish the following structural positions: Distributive (Dist) position, Positive Degree/Manner Adverb (PDMA) position, Focus (F) position, Verb Modifier (VMod) position, Verb (V) position, and Postverbal (PostV) position. All of these positions are optional, apart from the V position, which is obligatory in a prototypical Hungarian sentence. The F and the VMod positions are immediately before the V position, but they mutually exclude each other: either or neither of them is present but they cannot both be present before the verb. If the F or the VMod position is present, the constituent in it is accented, and the verb in the V position is accentless. All these positions are summed up in Table 1, where positions that are optional and repeatable are marked with the Kleene star: T\*, Dist\*, PostV\*; positions that are optional and non-repeatable are in parentheses: (F), (PDMA), (VMod); and the V position, which is obligatory and non-repeatable, has neither a Kleene star nor parentheses.



hand, it can serve as the constructive replication of *Dér & Markó's* (2017) study in the sense that some of the categories that were added to this extended experiment were created considering the criteria *Dér* and *Markó* used by identifying different monofunctional uses of the discourse marker *hát* in a database of Hungarian spontaneous speech, dubbed BEA (BESZÉLT NYELVI ADATBÁZIS). We examined *hát* in ten different contexts (also in different turn and sentence positions) in order to find out which categorization can pinpoint relevant differences in their usages from the perspective of pragmatics. Although *hát* went through a decategorization process, similarly to other discourse markers, its syntactic features (cf. *Szeteli & Alberti* 2018a) are worth to be discussed in an exhaustive syntactic theory in accordance with its prosodic realization. Since the usage of the discourse marker *hát* can only be adequately interpreted in whole utterances or, better, in discourse context, data collection was built around test situations. In this section, the test situations and their pragmasemantic differences are discussed, together with the connection of the discourse marker to the topic–comment dimension of the Hungarian declarative sentence.

In the test, various scenarios were described, at the end of which different alternatives were given as answers to the question presented in the test situation. These answers were designed to represent the alternative functions of *hát*, which were intended to be investigated. The first subset of situations was the corresponding one of the former pilot study of *Szeteli, Gocsál & Alberti* (2019). These situations are based on a hypothesis by *Alberti* (2016) called the “semaphore effect”, described in the pragmasemantic framework *REALIS* (*Alberti et al.* 2019). According to that hypothesis, the main difference between the various usages of *hát* and other discourse markers lies with exactly that semaphore effect, and the particular functions should be separated with respect to that feature. This theory is strongly rooted in discourse representation and its major insight is that discourse markers can signal how easy/difficult it will be for the listener to digest the message at hand. In this regard, the reciprocal attitudes of the speaker and the listener to each other and directed to the propositional content of a given sentence should be considered as well. In our research, we embedded the monofunctional uses in short dialogues between **A** (read out by the conductor of the experiment) and **B** (read out by the participant), and we built very explicit contexts around them. The participants had around ten minutes to familiarize themselves with the situations. They were also asked to speak as naturally as possible, reading out every single word in the given word order and playing the role by using a tone that is not monotonous. Elements of punctuation suggestive of tonal features were omitted.

The story had the following common frame with nine different outcomes (containing ten samples of *hát*), depending on the answer of character **B**:

**A** and **B** are twenty-year-old university students in love with each other, who have been going to the cinema for a year on a weekly basis. They take turns in choosing the movies and they know each other's tastes quite well. This time it is **B**'s turn to decide and this is an excerpt from their dialogue when **B** has already browsed the cinema program and s/he has made her/his decision, but s/he has not told **A** yet, who is eagerly waiting for the “announcement of the result”. Three movies are competing, namely (i) an English detective story nothing out of the ordinary, (ii) an Icelandic drama which seems depressive and (iii) an American comedy presumably full of dirty jokes.

For one subset of the situations five different (but uniformly) turn-initial positions were examined, out of which four were sentence-initial ones, and one was sentence-final. In the examples shown in (T1–9) ‘a.’ always gives the context (the thoughts, more formally the



intension, of **B**) to the particular dialogue, ‘b.’ is the same question of **A** in every case and the rest of the example is the answer to that question, containing the discourse marker *hát* with different functions, concerning the given context.<sup>3</sup> The first four situations were built up to express the functions of *hát* as a semaphore and their pragmasemantic contribution was elaborated in the representationalist framework *ReALIS* by Szeteli (2019) and Szeteli, Gocsál & Alberti (2019). The straightforward answer (which will appear as h1) can be uttered in a situation that is expected for both participants.

(T1) Straightforward Answer (Hát – h1)

- a. **B** is sure that s/he has made the single good decision and even **A** could not have made a better one. This opinion becomes clear from **B**'s argumentation itself which consists of true facts without any lies, distortions or pleasantries.

- b. A: Na melyik filmet választottad?  
A: so which movie.ACC select.PAST.2SG  
A: ‘So which movie have you opted for?’

- c. B: Hát a krimi  
B: well/so the detective-story.ACC  
B: ‘The detective story, surely!’

- d. Az mindkettőnknek be szokott jönni  
Az ízléstelen vígjátékokból a múltkor végképp elegünk lett  
a nyomasztó északi drámákért pedig még én sem rajongok  
bár én alapjában véve kedvelem a komolyabb műfajokat

‘That (kind of movie) works for both of us.  
Last week we got utterly fed up with these tasteless comedies.  
As for depressive dramas, I’m not keen on them either.  
Although I’m basically fond of serious genres.’

However, *hát* in an uncertain answer (h2) is a marker of the difficulty of making a choice:

(T2) Uncertain Answer (Hááát – h2)

- a. **B** is not sure if s/he has made the best decision. S/he feels that based on the current cinema program there is no decision which could be argued enthusiastically. S/he thinks that their mutual experience is such: In the past, several detective stories proved to be boring but acceptable. **A** tends to choose comedies, but last week even s/he herself/himself was shocked by the tastelessness of the movie s/he had opted for. Finally, **A** cannot tolerate dramas.

- b. A: Na, melyik filmet választottad?

<sup>3</sup>In (T4) there are two discourse markers embedded, and in more turns, but it also follows the same pattern.



- c. B: Hát a krimit  
 B: well/so the detective-story.ACC  
 B: ‘The detective story...’
- d. Az azért többé-kevésbé mindkettőnknek be szokott jönni  
 Az ízléstelen vígjátékokból a múltkor már neked is elegend lett  
 a nyomasztó északi drámákért pedig még én sem rajongok  
 Vagy nagyon unod már a krimiket?

‘That more or less works for both of us.  
 Last week even you got utterly fed up with the tasteless comedies.  
 As for depressive dramas, they don’t enthuse even me.  
 Or are you very tired of watching detective stories?’

In our experiment, the anxiety of the speaker due to the listener’s contrary desire was considered as a different case than (T2). Szeteli (2019 370) found that in this subtype of uncertainty (uncertainty resulting from the partner’s opinion) the discourse marker *hát* is more often collocated with a filled pause than by the other subtype (T2), although this is only a tendency.

(T3) Uneasy answer (Hátöo – h3)

- a. **B** feels that detective stories are getting more and more boring. As for comedies, even **A** has recognized that they are no longer funny but rather disgusting; but what s/he (**A**) truly and deeply hates are depressive Nordic dramas. **B**, however, has heard about this Icelandic drama from a university friend, a philologist. **A** is jealous of that friend, maybe not without a reason. **B** finally decides to exercise his/her right but with a deep concern... What if **A** wants to know who suggested that movie...
- b. A: Na, melyik filmet választottad?
- c. B: Hát a drámát  
 B: well/so the drama.ACC  
 B: ‘Well... the drama.’
- d. Tudom hogy nem nagyon rajongsz ezért a műfajért  
 de mintha ezt az izlandi filmet valahol nagyon dicsérték volna  
 Asszem valami díjat is nyert  
 A krimiket már kissé unom  
 a mostanában futó vígjátékok alpáriságából pedig a múltkor már neked is elegend lett  
 úgy emlékszem

‘I know that you are not very keen on this kind of movies  
 but this Icelandic one was praised... somewhere...  
 and I also think it received some kind of award.  
 I’m getting a little bored with detective stories  
 and last time even you got fed up with the disgusting comedies  
 as far as I can remember.’



Furthermore, the discourse marker *hát* can express complex attitudes such as, for example, teasing. However, this is only an option, since the characteristic tone of teasing, “waving at length”, can be associated with different elements in the sentence (Szeteli 2019: 370), so it should rather be described as a separate feature of pragmatics.

(T4) Teasing and Confirmation (HáÁÁÁát and ...hát! – h4 and “final” hf)

- a. **B** feels that detective stories are getting more and more boring but what **A** truly hates are depressive Nordic dramas. S/He would get depressed, and s/he would probably badger her/him the whole evening that the freaking movie had been recommended by the hot friend from the university, the charming philologist. Therefore, **B** decides to choose the comedy (it cannot be as tasteless as last week’s one), but now s/he (**B**) can afford to tease her/him (**A**) in exchange for her generous decision. Her/his (**B**’s) goal is as follows: At first, **A** should not believe that s/he is prepared to watch a comedy after last week’s nightmare. This should make **A** even happier and the evening will be great.
- b. A: Na, melyik filmet választottad?
- c. B: Hát a vígjátékot  
B: well/so the comedy.ACC  
B: ‘Why, the comedy!’
- d. A: A vígjátékot?!  
A: the comedy.ACC  
A: ‘Have you opted for the comedy?!’
- e. B: A vígjátékot hát  
B: the comedy.ACC well/so  
B: ‘The comedy, for sure!’
- f. Tudom hogy mennyire élvezed az amcsi vígjátékokat  
és úgy szeretem ha vidám vagy este

‘I know how much you enjoy Hollywood comedies, and you know how much I like it when you are happy in the evening.’

The first category which was not part of the pilot study (cf. Szeteli, Gocsál & Alberti 2019) was the resigning answer, see (T5). From the perspective of discourse representation, it can be categorized as a minimal pair of uneasy (h3) *hát*.

(T5) Resigning Answer (Háát... – h5)

- a. **B** is not convinced whether s/he will enjoy the chosen movie. S/he is also considering the possibility of asking **A** if they want to stay home instead of going to the cinema. Finally, s/he picks a movie, although s/he is disinterested because s/he knows that **A** would hate to stay home instead of having fun.
- b. A: Na, melyik filmet választottad?





- c. B: Hát a vígjátékot  
 B: well/so the comedy.ACC  
 B: ‘The detective story...’
- d. Nem igazán repesek  
 de unom már a krimiket  
 ennek a rendezőnek a drámái meg iszonyatosan nyomasztanak  
 Talán jobb lesz, mint otthon ülni
- ‘I’m not especially keen on it  
 but I’m bored with detective stories  
 and the dramas of that director are so depressive  
 Maybe it [watching the comedy] will be better than staying home’

The reason why it is extremely difficult to account for the meaning or function of *hát* is that it has several different interpretations depending on the mental state of the speaker who utters it. It can indicate strong-mindedness and hesitation, and it can carry complex suprasegmental tones such as teasing, as shown in (T1–T5). Furthermore, there is no consensus on the relevant functions of the discourse marker between researchers. We attempted to involve situations in our read-aloud experiment to find out the relationship between our former categories and the categories of Dér & Markó (2017).

Dér & Markó (2017) investigated monofunctional uses of the discourse marker in their corpus-based study and examined distinct turn positions. They identified a turn-initial, a turn-medial and a turn-final position, and they also had a fourth, purely pragmatic category for *hát* indicating judgment. From these four categories, only the turn-medial *hát* proved to be significantly longer than the others. The other functions of *hát* did not differ in their duration characteristics from the straightforward function identified by Alberti (2016), in our experiment. However, *h6* affects another level of discourse while introducing a new topic instead of being associated with the propositional content of the sentence. We identified this as the ‘metatalk’ feature of *hát* to suggest the concept of the rhetorical relations (cf. Asher & Lascarides 2003).

- (T6) Straightforward metatalk (cf. introducing a topic by Dér & Markó 2017, Hát – h6)
- a. B is eager to report on her/his decision and analyzing the losing movie.
- b. A: Na, melyik filmet választottad?
- c. B: Hát most eredményt hirdetek  
 B: well/so now result.ACC announce.ISG  
 B: ‘Well, now I will announce the results!’
- d. A krimi nyert  
 mivel mindketten szeretjük  
 ellenben a másik kettő egyáltalán nem győzött meg  
 A dráma túlértékeltnek tűnik  
 a vígjáték pedig sekélyesebbnek  
 mint valaha bármelyik ebben a műfajban



‘The detective story won  
since it works for both of us  
however, the other two didn’t convince me  
The drama seems to be so overestimated  
and the comedy more one-dimensional  
than every other one’

- (T7) Inferring straightforward (cf. turn-final by [Dér & Markó 2017](#), ...hát... – h7)
- a. **B** wants to share her/his opinion on the movies and then announce the results as a summary of that.
  - b. A: Na, melyik filmet választottad?
  - c. Az ízléstelen és felszínes vígjátékokból a múltkor végképp elegünk lett a nyomasztó északi drámákért pedig még én sem rajongok bár én alapjában véve kedvelem a komolyabb műfajokat A krimi viszont általában mindkettőnknek be szokott jönni *Hát* a sekélyes vígjátékkal és a lehangoló drámával szemben a krimi tűnik nézhetőnek

‘Last week we got utterly fed up with these tasteless comedies  
as for depressive dramas, I’m not keen on them either  
although I am basically fond of serious genres  
However, the detective story works for both of us  
Well, the detective story won against the one-dimensional comedy and the depressive drama’

- (T8) *Hát* with a subjective predicate (cf. judgment by [Dér & Markó 2017](#), *Hát* – h8)
- a. **B** thinks that it is important to emphasize her/his opinion on the losing movies before announcing the result.
  - b. A: Na, melyik filmet választottad?
  - c. B: *Hát* a vígjátékok szörnyűek  
B: well/so the comedy.PL terrible.3PL  
B: ‘Well, comedies are terrible’
  - d. ...a drámák meg nyomasztóak  
Maradt a krimi  
szerintem azt mindketten szívesen nézzük majd  
  
‘...and dramas are depressive  
So, it turned to be the detective story  
I think both of us will enjoy watching that one.’

A sentence-final inferring *hát* was involved since it preserves the inferential core meaning of *hát* in contrast to *hf*, which is used for signal confirmation. Their prosodic characteristics highly



differ, h9 is a regularly voiced *hát* whilst hf is voiced irregular in most of the cases. A Chi-square test of independence was carried out to determine if there is an association between creaky voice quality and *hát* function. The results confirmed a statistically significant association,  $\chi^2(1, N = 106) = 20.699, P < 0.001$ , which means that irregular phonation is a characteristic feature of hf (presumably with a hidden variable in the background).<sup>4</sup>

(T9) Sentence-final inferring (...*hát* – h9)

a. **B** can't decide by following her/his heart, because s/he's getting a little bored with a detective story again, and the trailer of the drama wasn't very convincing either. Thus s/he figures out that choosing the right movie for **A** is the best decision.

b. A: Na, melyik filmet választottad?

c. Krimiből sokat néztünk mostanság  
ez a dráma meg nyomasztónak tűnik  
Nem volt jobb ötletem  
a vígjátékot választottam *hát*  
Gondoltam  
ezzel legalább neked kedvezek  
Talán még nekem is tetszeni fog  
ha kellően ráhangolódok

'We've seen a lot of detective stories recently  
and that drama seems to be depressive  
I don't have a better idea,  
so, I choose the comedy.  
I thought it works, at least, for you.  
Maybe even I will enjoy it  
if I can gett myself into the right mood'

Fig. 2 shows the duration data of the ten investigated functions and also gives a brief summary of their pragmasemantic contribution. This information is given in the formalism of the representationalist framework  $\mathfrak{R}eALIS$  (Alberti et al. 2019). The strings (e.g. iBuB<sup>+</sup>) represent possible wordlets of their holder, which is indicated by the first symbol of them (i = I (the speaker), u = you (the listener), r = underspecified holder). The second symbol represents the modality of the possible wordlet, associated with the propositional content of the sentence by the holder of the wordlet (indicated by the first symbol, mentioned above). It can be, for example, a belief (B), desire (D) or intension (I). The modality is followed by an element of the powerset of  $T = \{-, +, 0\}$  which indicates the temporal features of the wordlet ('-' for past, '+' for future, '0'

<sup>4</sup>Note in passing that variant h9 is unstressed, just like h1, ..., h8, in contrast to hf. In the relevant example this unstressed *hát* occurs in the tail of a sentence-final Full Fall, but in other examples it could be in the tail of a scalar (= sentence medial) Half Fall, too (see Varga 2016, 52), just after the verb: *Kiválasztottam (te)hát a vígjátékot*. Thus, the most important difference between hf and h9 is that the former is strongly stressed (*A vígjátékot hát!*), while the latter is unstressed. The former takes the sentence-final Full Fall on itself, the latter is in the tail of the sentence-final Full Fall (see Fig. 1 in Section 1).



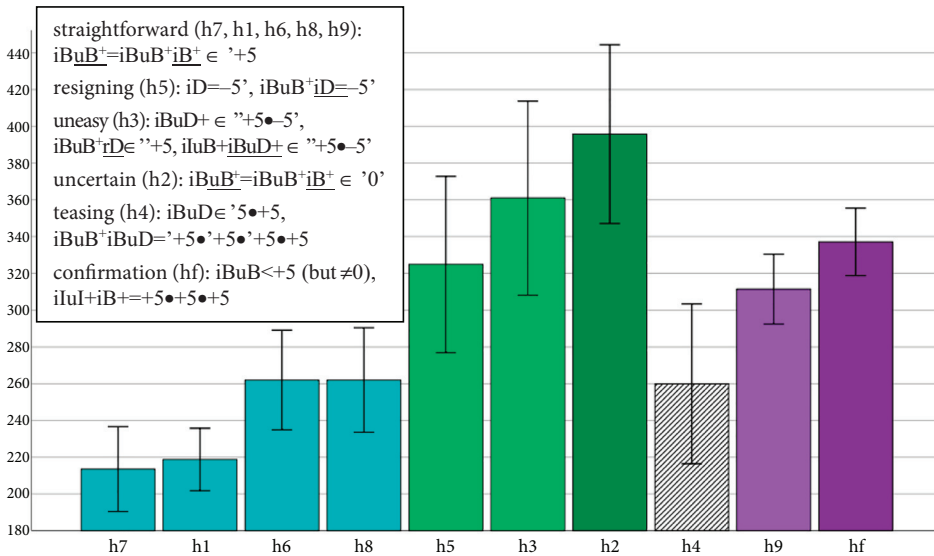


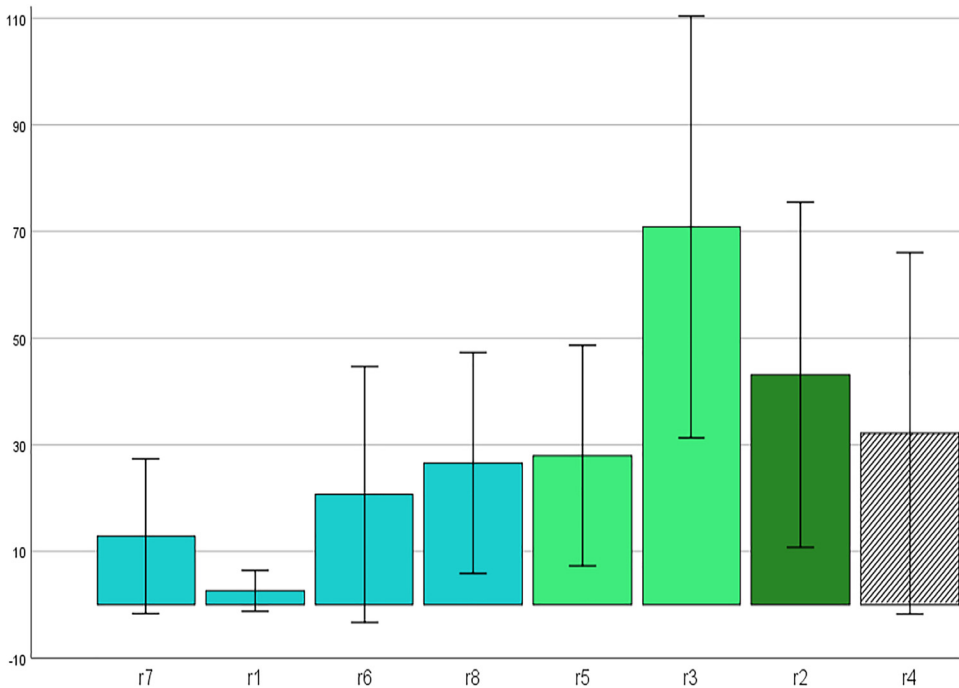
Fig. 2. Differences between duration data concerning háť (bar charts with 95% confidence intervals)<sup>5</sup>

for present, in the string usually unmarked) if that string is followed by a new holder, modality and temporal feature, it means that it is embedded into the previous wordlet. A scale was introduced for the values referring to false (-5), true (+5), underspecified (0) and to various degrees between them (which more or less correspond to Farkas & Roelofsen’s (2017) credence levels). The ‘-s and ‘-s express our claim that the truth values show a character which can be described by a certain distribution. The values are not specified in every case, so the underlined part of the string can show which part of the worldlet became a specified one due to the given value. Our claim, that h5 is the counterpart of h3 from a representationalist perspective, is now understandable: by h3 the listener was supposed ( $iBuD = '+5 \bullet -5'$ ) to reject the movie ( $uD = -5'$ ), however, in h5 the speaker would reject it ( $iD = -5'$ ) if s/he could.

The crucial differences in the length feature are shown in Fig. 2, but the results of the investigation of the pausing after háť (shown in Fig. 3) are also highly consistent with the *semaphore effect* hypothesis of Alberti (2016). The characteristics in pausing tend to follow the patterns predicted by the pragmasemantic representations of the tested situations. The blue columns all show the data of uttering háť while having a high value on the belief scale and on the scale which says “your listener will know that you have a high value on the belief scale” ( $iBuB^+ = iBuB^+ iB^+ \in '+5$ ), too. However, h1 – the purest form of that function – is followed by the shortest pausing. It was also mentioned that the uneasy háť is a result of háť and the filled pause after it, which can be regarded as a collocation. Fig. 3 shows that the other types of háť without the negative character in the desire did not collocate with long pauses after them.

<sup>5</sup>The dialogues and all the data discussed in the paper were recorded with a dictaphone (44,1 kHz/16 bit). The relevant extracts from the recordings were analyzed in PRAAT 6.0.24. The statistical calculations were executed by SPSS 23. Further relevant data are summarized in an appendix.





**Fig. 3.** Pausing values ( $r_i$ ) after the sentence-initial *hât* variants ( $h_i$ , respectively) referred to as  $h_7$ , ...,  $h_4$  in Fig. 2 [ms] (bar charts with 95% confidence intervals)

It would go beyond the scope of the paper to thoroughly discuss either the formal pragmasegmental details summarized in Fig. 3 or the sophisticated statistical apparatus, partly presented in Figs 3 and 2, on the basis of which the phonetic forms of several *hât* variants can be distinguished from each other. What is relevant now is that it was possible to point out significant differences in temporal characteristics; as for pitch characteristics, however, as indicated by the yellow line in Fig. 4, there are no significant differences among the different sentence-initial usages. Given that variants  $h_1$ – $h_8$  occur in the preparatory contour with  $h_9$  and  $h_f$  occurring in the Full Fall (see Fig. 1), this can be explained by the following plausible consequence of the pitch-tier model: if segmentally identical expressions belong to one and the same pitch zone, they will primarily differ in duration (without using pitch characteristics to signal differences) (Fig. 5).

#### 4. THE TOPIC-COMMENT VARIABILITY OF RELEVANT-SET BASED OPERATORS

The second experiment under discussion was established to investigate the contribution of Hungarian quantified noun phrases to the logical dimension of information structure and the topic-comment dimension. These phrases show a logico-pragmatic relation between their



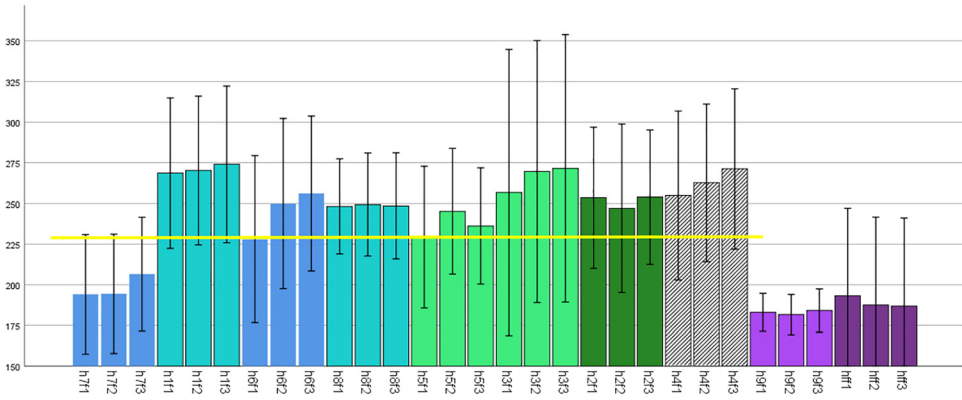


Fig. 4. Differences of pitch data [Hz] concerning *hát* (bar charts with 95% confidence intervals).<sup>6</sup>

[<sub>Dist</sub> Minden muzsikust ] [<sub>VMod</sub> fel-] [<sub>V</sub> -küldtek ] [<sub>PostV</sub> a padlászobába].  
 every musician.ACC up sent.3PL the attic.ILL  
 ‘They sent every musician up to the attic.’  
 ‘Minden ‘muzsikust ‘felküldtek a \padlászobába. |  
 ‘Minden ‘muzsikust | ‘felküldtek a \padlászobába. |

Fig. 5. Varga’s (2016, 59, ex. 17) two analyses for a sentence containing a quantifier

explicit meaning and a broader implicit set, due to the relevant-set based operators.<sup>7</sup> Furthermore, they indicate the new or correcting information in a topic–comment dimension, which belongs to the broader construction of the discourse. In this section the theoretical background of the experiment will be briefly discussed, concentrating on the topic–comment aspect of the

<sup>6</sup>The f0 values were detected at the beginning, at the midpoint and at the end of the given vowels.

<sup>7</sup>É. Kiss (2002, 77–78) explains the concept of a relevant set as follows. Semantically, the (identificational) focus is more than merely non-presupposed information; it expresses exhaustive identification from among a set of alternatives. Consider (1a’); this sentence is used in a situation or context in which it can potentially be true of a set of persons, including Csaba, that they have come. It expresses that, of this set, it is Csaba and no-one else for whom it holds that he has come. The identificational focus thus operates on a set of alternative individuals for whom the VP can potentially hold, exhaustively identifying the subset for which the VP does hold, excluding the complementary subset. The latter two disjoint subsets, whose union is the relevant set, can be called the *positive* and the *negative* subset of the relevant set. These concepts can be extended to quantifiers as well. In the case of an *each*-quantifier (1b), the positive subset coincides with the whole relevant set, with an empty negative set. In the case of an *also*-quantifier, see also (1b), it is claimed that *there is* (∃) at least one (implicit) member of the relevant set for whom the VP (also) holds, in addition to the participants explicitly claimed in the given sentence to be such that the VP is true of them. It is due to this existential factor (relative to the entire relevant set) that *also*-quantifiers are logically distinguished from *each*-quantifiers by means of the *existential/universal* dichotomy in (3–4). This differentiation is not in conflict with the fact that, if the corresponding positive set is considered, both types of quantifier in question function in a distributive universal way: even an *also*-quantifier expresses that the VP holds (separately) for each participant in the positive set.



phrases rather than the logico-pragmatic one (but see [Szeteli & Alberti 2018b](#)). Then the set-up and the analyzed data of the experiment will be presented.

The noun phrases in question are modified by the universal determiner *mind(en)* ‘every’ and the clitic *is* ‘also’, thus [É. Kiss \(2002\)](#) calls them quantified noun phrases. In contrast to general Hungarian noun phrases (1a–a’), they are only compatible with the *verbal prefix – verb stem* word order (1b–b’). In this respect, they mirror expressions modified with *csak* ‘only’ or *nemcsak* ‘not only’ (2a), which only tolerate the *verbal prefix – verb stem* word order ([Szeteli & Alberti 2018b](#)).

(1) Verbal modifier – verb stem order asymmetry

- a. Csaba el-jött.  
Csaba VM-come.PAST.3SG  
‘Csaba has come.’
- a’. Csaba jött el.  
Csaba come.PAST.3SG VM  
‘It was Csaba who has come.’
- b. *Mindhárom* barát-om / Csaba is el-jött.  
all\_three friend.POSS.1SG / Csaba also VM-come.PAST.3SG  
‘all three of my friends have come.’ [Out of the relevant set deducible pragmatically (my friends), all have come].  
‘Also Csaba has come.’ [Out of the relevant set, in addition to those whose coming you have been aware of, Csaba has come, too].
- b’. \**Mindhárom* barát-om / Csaba is jött el.  
all\_three friend.POSS.1SG / Csaba also come.PAST.3SG VM

(2) Inverse verbal modifier – verb stem order

- a. \**Csak/Nemcsak* Csaba el-jött.  
only/not\_only Csaba VM-come.PAST.3SG
- b. *Csak/Nemcsak* Csaba Jött el.  
only/not\_only Csaba come.PAST.3SG VM  
‘Only/Not only Csaba has come.’

Nevertheless, the quantifiers which never evoke the other possible *verbal prefix – verb stem* order presented in (1b) and (2a), both can have both a topic (3) and a predicate/comment function (4) from a prosodic and pragmasemantic point of view. As mentioned in Section 1, [Varga \(2016\)](#), following the Hungarian generative literature, does not consider (non-contrastive) topic-like quantifiers (3b, d) at all; [Szeteli & Alberti \(2018b\)](#) have pointed out their existence by means of the radically different contexts presented below: it is to be investigated how these expressions work in a broader world of the discourse in a basically [Büiringian \(1997a, b\)](#) style (cf. [Gécseg 2013](#); [Szűcs 2017](#)). Note that it has already been raised in the Hungarian generative literature that *each-*quantifiers can be characterized by a topic-like behavior ([Surányi et al. 2012](#), 64; [Surányi & Madarász 2017](#), 44–46), besides their comment-internal function as the “orthodox” view. Even [Varga \(2016\)](#) provides a puzzling analysis:



The first pitch tier belongs to the construal according to which the intonation structure of the given sentence consists of a single Comment IP, with the quantified expression occupying the default Half Fall intonation contour at the beginning of the comment. The second pitch tier is claimed to have been formed by replacing the Half Fall with a Rise, which is an IP-closing contour, and thereby a structure that consists of two intonation phrases emerges. Instead of claiming that in this case there are two Comment IPs, it is at least as plausible to say that there is an interpretation (with the usual Topic IP and Comment IP) according to which referring to the musicians serves the purpose of collecting the participants of whom it is predicated that they were sent up to the attic. Note that the first pitch tier with a single Comment IP containing two Half Fall intonation contours can be derived from a pitch tier in which the Comment IP consists of a single Full Fall (Varga 2016, 62).

A read-aloud-experiment with the participation of 41 non-linguist native Hungarian subjects was established to investigate the question empirically as to which pre-V part of the sentence *each*-quantifiers and *also*-quantifiers belong to, in Hungarian. The hypothesis was that both *each*-quantifiers and *also*-quantifiers can also serve as a focus/comment and non-contrastive topic based on a two-dimension operator model. The one dimension captures the topic-comment features, mentioned above, and the other captures how these expressions also divide the logical space considering the implicit set of other participants (cf. Szeteli & Alberti 2018b, 163–166).

The appropriate readings of the *each*- and *also*-quantifiers were embedded into text situations, shown in (3) and (4), and their relevant sequences ((3b), (3d) and (4b), (4c)) were cut out and analyzed by Praat.

- (3) Test situation with quantifier expressions functioning as a topic
- a. Köszönöm érdeklődő kérdéseted! Úgy jellemezném a barátaimat, hogy Anti imádja a teniszt, Béci szeret sakkozni és pingpongozni,  
'Thank you for your inquiring question! I can characterize my friends as follows: Anti likes tennis, Béci gladly plays chess and table tennis.'
  - b. Csaba is szeret pingpongoz-ni, Top<sub>∃</sub>✓  
Csaba also like.3SG tabletennis.INF  
'Csaba also gladly plays table tennis.'
  - c. Anti és Csaba lelkes komolyzene-rajongó, Béci és Csaba gyakran sörözik  
'Anti and Csaba are great fans of classical music, Béci and Csaba often drink beer'
  - d. és *mindhárom* barát-om oda-van Scarlett Johansson-ért. Top<sub>∨</sub>✓  
and all\_three friend.POSS.1SG VM-be.3SG Scarlett Johansson.CAU  
'and all three of my friends are crazy about Scarlett Johansson.'
- (4) Test situation with quantifier expressions functioning as part of Comment
- a. Azt gondolod, hogy csak Béci szeret pingpongozni, és csak Anti van oda Scarlett Johanssonért?  
'Do you think that it is only Béci who gladly plays table tennis, and it is only Anti who is crazy about Scarlett Johansson?'



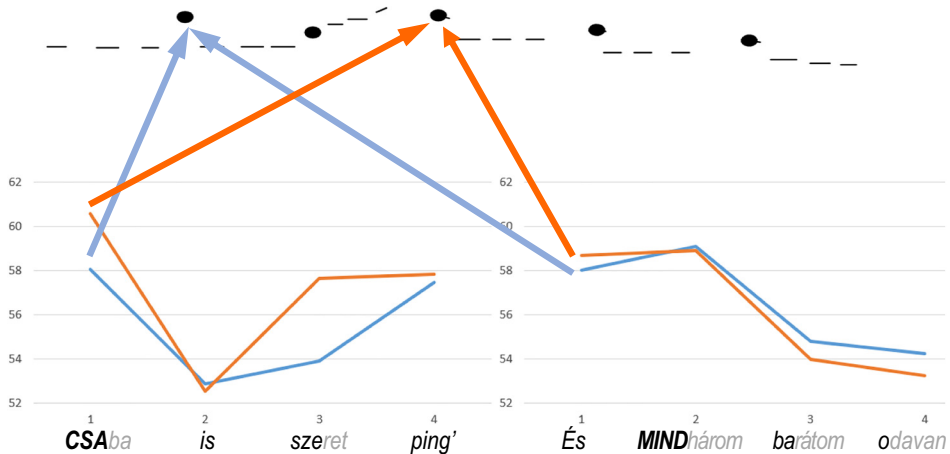


- b. \CSAba is Szeret pingpongozni, Comm<sub>∃</sub>✓  
 Csaba also like.3SG tabletennis.INF  
 ‘Csaba also gladly plays table tennis.’
- c. és \MINDhárom barátom odavan Scarlett Johanssonért. Comm<sub>✓</sub>✓  
 and all\_three friend.POSS.1SG VM-be.3SG Scarlett Johansson.CAU  
 ‘and all three of my friends are crazy about Scarlett Johansson.’

The participants told the conductor of the experiment that they are prepared for reading out after studying the dialogues for 1 or 2 min. They were asked to speak naturally since the goal of the research was imitating spontaneous speech as truly as possible. The instructions were shown above the test situations, namely (i) reading out every single word in the given word order as precisely as possible (ii) playing the role by using a tone which is not monotonous, considering the given context and (iii) also considering that the punctuation is not completely given (dots and question marks have been used, but every element of punctuation referring to additional tonal features was avoided) to force the participants to read out the sentences following their individual intuition. We summarized some information in a table, relevant to the methodology (see Appendix) of both experiments in Sections 3 and 4. The duration values of the phrases and the pitch values of the vowels of the first syllables were measured to find out if the phrases containing a quantifier were stressed in the comment but less stressed in the topic reading.

#### 4.1. A “static” hypothesis

In Fig. 6, the pitch tier model presented in Fig. 1 in Section 1 is repeated with its relation to the tested sentences. On the left-hand side it is shown how the pitch characteristics change during



**Fig. 6.** Differences in the pitch characteristics of the first syllables of the words in the phrases containing the *is*-quantifier (on the left) and the *mind*-quantifier (on the right) in topic (marked with blue) and comment reading (marked with orange)



the sentences containing the is-quantified noun phrases in both readings. On the right-hand side, those features of the other sentences containing a *mind*-quantifier are visualized.

The pitch data on syllable CSA-in Fig. 6 – the vowel of the first syllable of the quantified noun phrase is remarkably higher pitched in the comment reading – strengthen our following plausible global hypothesis on the division of labor between pitch and duration in Hungarian declarative sentences. If, and only if, segmentally identical expressions belong to different zones of Varga's pitch-tier model, their acoustic differentiation is primarily due to their difference in pitch.

For the statistical tests also a smaller subgroup ( $n = 31$ ) of the participants ( $n = 41$ ) was investigated. The excluded outliers did not pronounce all elements of the relevant fragments or the identification of pitch values was difficult due to their irregular voicing (see McGlone 1967; Blomgren et al. 1988 cited by Markó 2013, 19). The pairs were tested with Friedman's Two-Way ANOVA combined with the Wilcoxon post hoc test. The differences proved to be significant for the pitch values of the *is*-quantifier ( $P = 0.000$  by  $n = 41$ , and also by  $n = 31$ ); let us formulate this significant difference in this way:  $CSA_{Top} \ll CSA_{Com}$ .

In the case of the universal quantifier, however, it is not true that the vowel of the first syllable of the quantified noun phrase (*MIND*-) is significantly higher pitched in the comment reading: the hypothesized [ $MIND_{Top} \ll MIND_{Com}$ ] relation could not be verified. This result is not surprising on the basis of the visual impression provided by the relevant curve in Fig. 6.<sup>8</sup> Theoretical syntacticians' stance according to which the first accented syllable of the comment zone is some kind of *peak* of the sentence expresses an idealized "functional" situation,<sup>9</sup> in whose formal background there is presumably a complex division of labor among pitch, duration and intensity with a high level of freedom in realization. What Varga's selected pitch tier suggests is also only that there tend to occur no significantly higher pitched syllables than the first syllable of the comment zone. It is somewhat puzzling that 'the bottom pitch of the speaker's normal voice' is considered as a usual benchmark in Varga's (2016) model while there is no analogous 'top pitch' applied. The pitch tier in Fig. 1 suggests that both the first accented syllable of the Topic IP and the first accented syllable of the Comment IP might be identified with a constant top pitch typical of the speaker.

All in all, the facts [ $CSA_{Top} \ll CSA_{Com}$  and  $MIND_{Top} > MIND_{Com}$ ] does not support the strong hypothesis that a quantifier is significantly 'more accented' (in the above defined sense) in the Comment IP than in the Topic IP ( $X_{Top} \ll X_{Com}$ ). Only an – undoubtedly unsatisfactorily weak – hypothesis can be retained: [ $X_{Top} \gg X_{Com}$ ] never occurs.

## 4.2. A "dynamic" hypothesis

If the accented syllable of a Half or Full Fall intonation contour can be realized on the speaker's top-pitch level in not only the Comment IP but also the Topic IP, then we should give up

<sup>8</sup>Moreover, it happens to be true that  $MIND_{Top} > MIND_{Com}$  (but [ $MIND_{Top} \gg MIND_{Com}$ ] is false). The curve in Fig. 6 suggests that the "accident" (what qualifies to be an accident from the point of view of the strong version of our hypothesis) is to be attributed to the sentence-initial connective *ÉS*, which takes the role of the indication of the targeted relation from the first syllable of the quantifier:  $\acute{E}S_{Top} < \acute{E}S_{Com}$ .

<sup>9</sup>The given "peak" is claimed to serve by É. Kiss (2002, 11) as "the heaviest grammatical stress in the sentence". The somewhat enigmatic attribute 'grammatical' and the associated footnote 8, according to which "by 'grammatical stress' I mean stress not affected by pragmatic factors," can be regarded as disavowing any responsibility that would be implied by committing to an explicit, measurable version of the interpretation of 'heaviest stress'.



**Table 2.** Correlation between duration (d), pitch (p) and intensity (i) values associated with the syllable CSA and the difference between the corresponding values of CSA and IS (see examples (3–4)) if these syllables are assumed to be in a Topic IP (3b)/Comment IP (4b)

		CSA			CSA - IS		
		d	P	i	d	p	i
CSA	d	-	0.1/0.1	0.3*/0.3*			
	p		-	0.1/0.1			
	i			-			
CSA - IS	d				-	0.1/-	0.1/0.1
	p					-	0.3*/0.3*
	i						-

attempting to base the pointing out of *significant* differences between the two intonation phrases on syntacticians' 'heaviest stress' (É. Kiss 2002, 11) impression. What offers a promising alternative – a similar one to Genzel et al. (2015: 196) observation – is IP-internal dynamism of acoustic values, that is, to seek significant difference in the speed values of falling in Half/Full Fall intonation contours.

First of all, however, the relation between the three types of acoustic features should be clarified. The correlation analysis (executed by SPSS) provides an explanation for the fact that the concept of *accent* is not defined purely on the basis of voice frequency, that is, pitch; see Figs 2 and 3. We provide the correlation values among the three acoustic features associated with the types of occurrence of the accented syllables CSA (Fig. 2) and MIND (Fig. 3) and the changes in the three acoustic features within their intonation contours. That is, in the latter case, the difference between the corresponding acoustic features was considered as a basis of the calculation of correlation in the case of the pairs ⟨CSA, IS⟩ and ⟨MIND, ROM⟩, in order to capture what is referred to as 'speed' above (Table 2).

As can be seen in Figs 2 and 3, the correlation is uniformly positive (there does not appear even weak negative correlation), in each combination investigated. Thus, higher pitch, greater intensity and longer pronunciation – in the case of both the accented syllables and the (two times two) speed values under investigation – come together, pulling each other to the same direction.<sup>10</sup> The correlation-strength values vary from very weak (but still positive) ('0.0') through weak ('0.1') to medium ('0.3'). This means that pitch, intensity and duration in part express other factors (e.g. attitudinally relevant factors or speaker/context-dependent characteristics) than 'accent' (see Section 2) but in part they do express the characteristics of the pitch tier widely assumed to decode syntactic/information-structural information. Listeners thus can detect accent and falling speed on the basis of any of the three acoustic features, or rather, by considering their co-operative activity. It is postponed to future research to detect which

<sup>10</sup> '3\*' refers to the fact that in the correlation matrix provided by SPSS the corresponding value (e.g., 0.411) is to be evaluated as a significant (95%) medium level Pearson correlation. The asterisk marks the given level of significance. '.1' conveys 'weak correlation'.



**Table 3.** Correlation between duration (d), pitch (p) and intensity (i) values associated with the syllable MIND and the difference between the corresponding values of MIND and ROM (see examples (3-4)) if these syllables are assumed to be in a Topic IP (3d)/Comment IP (4c)

		MIND			MIND - ROM		
		d	P	i	d	p	i
MIND	d	-	0.3*/0.1	0.1/-			
	p		-	0.3*/0.1			
	i			-			
MIND - ROM	d				-	-/0.1	0.1/-
	p					-	0.3*/-
	i						-

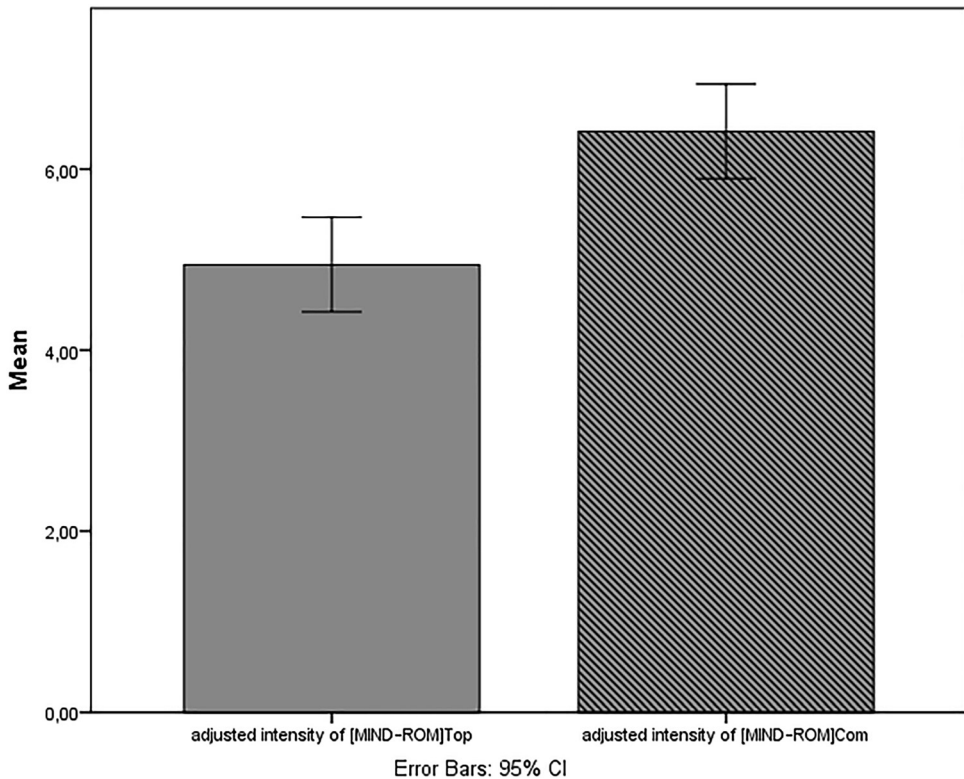
**Table 4.** Simple ('<' or '>') and significant ('<<', '<<<', '>>' and '>>>') relations between duration (d), intensity (i) and pitch (p) values associated with certain syllables appearing in examples (3-4) and certain differences among them if these syllables are assumed to be in a Topic IP/Comment IP<sup>11</sup>

	CSA	IS	SZE	PING	MIND	ROM	BA	O
d	<	>	>>	>>>	<	<	>	>
i	<<	<<	<<	<<	>	>>	>>	>>
p	<<	>	<	<	>	>	>	>
d	-	<	<	>>>	-	<	<	<
i	-	<	<<<	>	-	<<	<<	<<
p	-	<<<	<<<	<	-	<	<<	<
	-	CSA-IS	CSA-SZE	CSA-PING	-	MIND-ROM	MIND-BA	MIND-O

acoustic variable serves as the leading influence in the background of the other two. As can be seen, the distribution of correlation values in the submatrices of accented syllables CSA (in Fig. 2) and IS (in Fig. 3) does not provide a uniform picture. In the case of the falling-speed values (see the submatrices that belong to CSA-IS and MIND-ROM), however, there are less vague tendencies: there is a prominent co-operation between pitch and intensity values, scarcely followed by duration values. This suggests the following hypothesis: the well-known Hungarian post-focus stress elimination/deaccentuation (É. Kiss 2002, 77; Varga 2016, 61-62) and, generally, the falling speed of Half/Full Fall intonation contours are acoustically marked by highly correlating pitch and intensity values, with negligible influence of duration (Table 3).

<sup>11</sup>The level of significance is always 95%. The difference between relations '<<' and '<<<' is that in the former case the significance of the given difference can only be verified by Loftus & Masson's (2014) complex method while in the latter case the significance of the given difference can directly indicated by confidence intervals.





**Fig. 7.**  $[\text{MIND-ROM}]_{\text{Top}} \ll [\text{MIND-ROM}]_{\text{Com}}$  in the intensity acoustic dimension: the significant difference between the two intonation contours (that belong to the same segment *mindhárom*) is verified by the non-overlapping error bars drawn by SPSS by the application of Loftus & Masson's (2014) method of calculating confidence intervals in within-subject designs

With all this in mind, let us consider Table 4 below, in which we provide the results of numerous pairwise comparisons, such ones as those presented in Figs 7 and 8 as an illustration of our comprehensive statistical analysis (Fig. 9).

The data in the upper  $3 \times 8$  subpart of Table 4, and especially the comparison between the columns of CSA and ROM, corroborate the conclusion drawn in 4.1: “static” comparisons between the hypothesized Topic IPs and Comment IPs provide no satisfactory generalizations on their acoustic differences. The falling-speed data in the lower  $3 \times 8$  subpart of the table, however, provides a highly uniform picture if it is accepted that it can be attributed to statistical “noise” (e.g. such differences in context as the cliticization of an *ÉS* ‘and’ to one of the quantifiers,<sup>12</sup> besides attitudinal and speaker-dependent differences) that the otherwise highly correlating pitch and intensity values produce significant differences at different points.

<sup>12</sup>In the intensity dimension, for instance  $\acute{E}S_{\text{Top}} \ll \acute{E}S_{\text{Com}}$ . It has also been observed by Genzel et al. (2015: 196–197) that it is not always the first element of the comment that provides the highest pitch value.



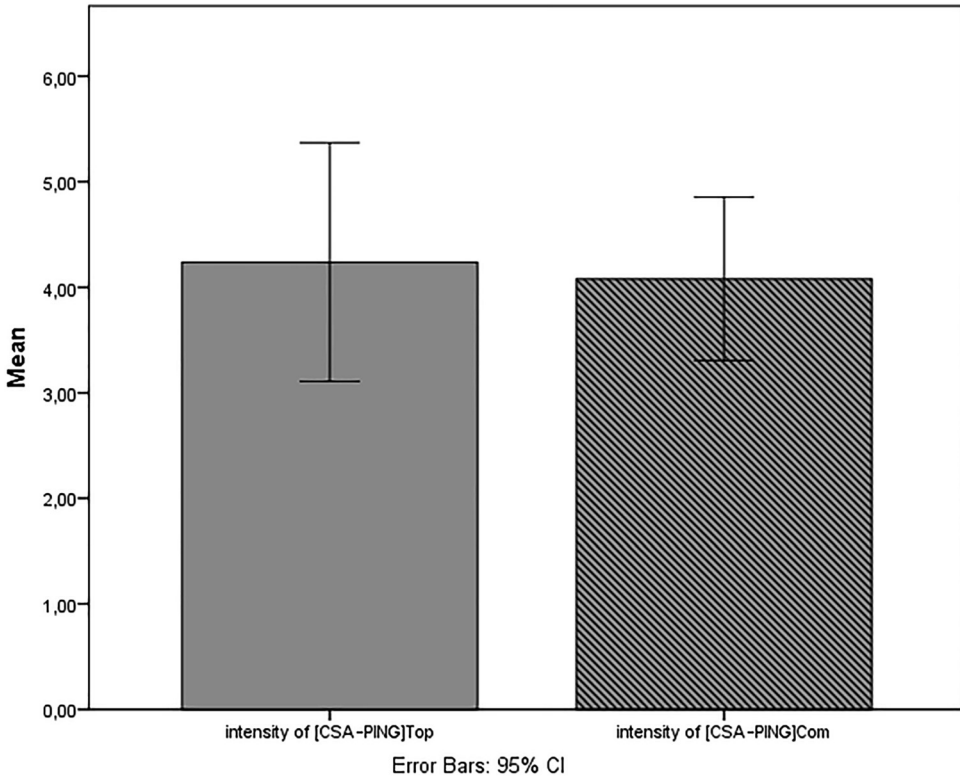


Fig. 8.  $[CSA-PING]_{Top} > [CSA-PING]_{Com}$  in the intensity acoustic dimension (here the overlapping error bars indicate no significant difference)

In the case of the *mind*-quantifier, it is justified to consider not only the intonation contour of the determiner itself (MIND-*ROM*) but also the intonation-contour sequence that belongs to the entire quantified noun phrase (MIND-*BA*, from the constituent *mindhárom barátom* ‘all three of my friends’). The six concerned relations, with three instances of significance, show perfectly consistently that Comment IPs can be characterized by a higher speed of falling in the relevant Fall intonation contours. The same holds for the case of the *is*-quantifier. In this case, the CSA-*IS* values provide the acoustic characterization of the entire quantified noun phrase, and they

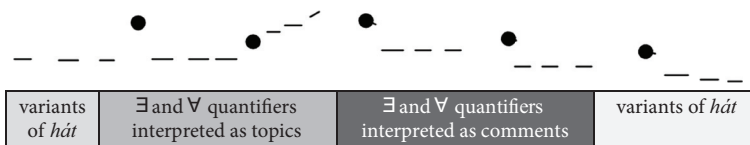


Fig. 9. Segmentally identical expression types in different parts of the schematized basic pitch tier of positive declarative sentences



excellently corroborate the ‘quicker falling in Comment’ hypothesis. The subsequent intonation contour, that of CSA–SZE (from *szeret* ‘like’) shows a surprisingly similar character, with the column of CSA–PING showing the radical shift expected earlier on the basis of the fact that *szeret* and *pingpongozni* are already VP-internal elements. This delay in shift of the acoustic pattern can be explained as follows: the new piece of information is not ‘like’ but the ‘to play table tennis’ choice, relative to the previous conjunction ‘to play chess and table tennis’.

To sum up Section 4, the crucial difference between Topic and Comment IPs can primarily be pointed out not on the basis of certain acoustic differences between the allegedly ‘heaviest stress’ in Comment and the peak of the Topic zone but falling speed values in Half/FullFall intonation contours. The former factor is more prone to accidental influences than the latter one.

## 5. CONCLUSION

On the basis of our earlier findings, we have formulated the plausible hypothesis that if, and only if, segmentally identical expressions belong to different parts of the pitch-tier model presented in Section 2, their acoustic differentiation is primarily due to their difference in pitch:

The *hát*-variants in the sentence-initial preparatory contour, discussed in Section 3, have been correctly predicted to primarily differ in duration (and not in pitch values). In harmony with the hypothesis, too, *is*-quantifiers in different pitch-tier parts (Section 4) proved to be distinguishable on the basis of pitch values; namely, the pitch values associated with the (stressed) first syllables of the given quantifier expressions. The acoustic data set which has characterized the *mind*-quantifiers in our experiments (Section 4), however, suggests that our global hypothesis on the labor between pitch and duration cannot be retained in this simple form. The investigation should be extended to the triplet of pitch, duration and intensity values as well as falling-speed data in Half/Full Fall intonation contours (4.2). Highly correlating pitch and intensity values produce significant differences between certain intonation contours of segmentally identical quantified expressions used as topics/comments.

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## APPENDIX

**Table A1.** Circumstances of the experiments

	Quantified Noun Phrases	Discourse Marker <i>hát</i>
Recorded in	2017	2018
n	41	53
Female:male ratio	35:6	28:25
Subjects	non-linguist, native Hungarian subjects, participating voluntarily (they were not paid), mostly first-year students of the University of Pécs	
Recording	recorded by a dictaphone (44,1 kHz/16 bit)	
Phonetic analysis	PRAAT 6.0.24	
Statistical analysis	SPSS 23	

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