The prosodic expression of focus, contrast and givenness: A production study of Hungarian

Susanne Genzel, Shinichiro Ishihara and Balázs Surányi

Version 3.0 July 8, 2014

Email addresses
susonne7@googlemail.com (S. Genzel)
s_i@alum.mit.edu (S. Ishihara)
suranyi@nytud.hu (B. Surányi)

Abstract
This paper reports the results of a production experiment that explores the prosodic realization of focus in Hungarian, a language that is characterized by obligatory syntactic focus marking. Our study investigates narrow focus in sentences in which focus is unambiguously marked by syntactic means, comparing it to broad focus sentences. Potential independent effects of the salience (textual givenness) of the background of the narrow focus and the contrastiveness of the focus are controlled for and are also examined.

The results show that both continuous phonetic measures and categorical factors such as the distribution of contour types are affected by the focus-related factors, despite the presence of syntactic focus marking. The phonetic effects found are mostly parallel to those of typical prosodic focus marking languages like English. The prosodic prominence required of focus is realized through changes to the scaling and slope of F0 targets and contours. The asymmetric prominence relation between the focus and the background can be expressed not only by the phonetic marking of the prominence of the focused element, but also by the phonetic marking of the reduced prominence of the background. Furthermore, contrastiveness of focus and (textual) givenness of the background show independent phonetic effects, both of them affecting the realization of the background. These results are argued to shed light on alternative approaches to the information structural notion of contrastive focus and the relation between the notions of focus and givenness.

Keywords
Hungarian; prosody; focus; background; givenness; contrast

1. Introduction

There is a growing body of theoretical and experimental research on the prosodic expression of information structure (IS) in linguistic utterances (or sentence-level pragmatic meaning, in the sense of Ladd 2008), as well as its variation across languages. Perhaps the best studied information structural status that can affect the prosodic realization of sentences in systematic ways is focus. *Prosodic focus marking* is characterized by rich variation across languages, including marking by tonal means (like pitch scaling, and tonal alignment), by accent type, by prosodic phrasing (such as

the insertion or deletion of prosodic boundaries, and concomitantly, accents), or various combinations of these. Typically, prosodic marking serves to render the focus prosodically prominent (Büring 2009). But cross-linguistic variation is not limited to the prosodic *means* used to mark focus status. The property of the obligatoriness, or the possibility, of prosodic focus marking seems to be parametric (see e.g., Kügler and Genzel 2012 and Zerbian, Genzel and Kügler 2010 for a brief overview of selected African languages). Another aspect of variation concerns the role of word order. Many languages, especially those with relatively flexible word order, may use, often as an alternative to prosodic marking, syntactic reordering in order to mark focus (call this phenomenon *syntactic focus marking*) (for relevant discussion, see Büring 2009). Syntactic focus marking and prosodic focus marking may in principle either be complementary alternatives within a language, or they may be able to co-occur. (See Calhoun, this volume, on Samoan, for a case study of the latter type.) A relevant parameter within syntactic focus marking languages is whether syntactic focus marking is optional or it is obligatory. Call the latter type *obligatory syntactic focus marking* languages. While the prosody of focus has been widely studied in languages that optionally utilize word order in the marking of focus (including Germanic and Romance), relatively little experimental work has concentrated on prosodic focus-marking strategies in obligatory syntactic focus marking languages.

This paper addresses this paucity by reporting on a production experiment carried out to explore the prosodic realization of focus in Hungarian, an obligatory syntactic focus marking language. Our study investigates narrow focus in sentences in which focus is unambiguously marked by syntactic means, comparing it to broad focus sentences. In order to control for the potential independent effect of the salience of the background of the narrow focus, target sentences are inserted in two kinds of contexts: contexts in which the background part of the sentence is salient (textually given), and contexts in which it is not. Further, in order to explore any prosodic effects exerted by the contrastiveness of narrow focus, both non-contrastive and contrastive narrow foci are employed.

The results show that both continuous phonetic measures and categorical factors such as the distribution of contour types are affected by the focus-related factors, despite the presence of syntactic focus marking. The phonetic effects found are mostly parallel to those of typical prosodic focus marking languages like English. The prosodic prominence required of focus is realized through changes to the scaling and slope of F0 targets and contours. The asymmetric prominence relation between the focus and the background can be expressed not only by the phonetic marking of the prominence of the focused element, but also by the phonetic marking of the reduced prominence of the background. Furthermore, contrastiveness of focus and (textual) givenness of the background show independent phonetic effects, both of them affecting the realization of the background. These results are argued to shed light on alternative approaches to the information structural notion of contrastive focus and the relation between the notions of focus and givenness.

The structure of the paper is as follows. Section 2 starts by delineating the key notions of information structure that we adopt for the purposes of the paper. This is followed by a brief overview of aspects of the syntax and prosody of Hungarian that are of crucial relevance to the production experiment we present. Section 3 explicates the research questions the experiment is designed to address. Section 4 lays out the design, the method, the materials used for the production experiment, and provides a summary of the processing and analysis of the data that were obtained. Results are presented in

two parts. Section 5 reviews the results obtained for the focused element and a pre-focal topic phrase, while Section 6 presents the results for the post-focal region. In Section 7 we discuss what prosodic structures may match the outcomes, and how the findings bear on current alternative views of the information structural notions of 'contrast' in contrastive focus, and givenness of the background. The main conclusions are summed up in Section 8.

2. Background

Notions of information structure (IS) are notorious for having been conceptualized and defined in many different ways. In order to embed our research questions in the context of sufficiently well-defined information structural concepts, we begin by providing formulations of the particular notions of IS at the center of our investigation.

2.1. Information focus, contrastive focus, background and givenness

Although focus is a multi-faceted notion that has been approached in diverging ways, most accounts agree that the focused part of a sentence is associated with some type of pragmatic prominence. Here we follow a common view held by formal pragmatic approaches that focus indicates the presence of (contextually restricted) alternatives to the focused element with which alternative propositions can be formed that are relevant to the interpretation of the current sentence (Rooth 1985, 1996); call these *focus-alternatives*. In the case of *information focus*, these alternatives correspond to alternative propositions in the meaning of the (explicit or implicit) question that the sentence containing the focus answers (called the *question under discussion*, QUD, Roberts 1996, or the *current question*, Beaver and Clark 2008). For instance, in a sentence like (1a), in which JOHN is the information focus, the focus-alternatives to John are relevant individuals in the discourse context (say, Bill and Mary), and the QUD corresponds to the meaning of (1b).[1]

(1) a. JOHN cut the grass.
    b. Who (if anyone) cut the grass?

All the cases of narrow focus that are employed in our study are information foci (henceforth referred to simply as *focus*).

In the sense that the alternatives to the focus are necessarily distinct from the focus (as well as from each other), information focus always involves implicit contrast. A more restricted notion of contrastiveness would require an adversative inference, relevant to the current context, according to which there is at least one alternative in a given context of which the background does not hold (e.g., Mary, or the plural individual consisting of Mary and Bill, in the case of (1)). The term 'contrastive focus' is predominantly used to designate this use of focus (note that contrastive focus may or may not exclude all other alternatives, i.e., it may or may not be exhaustive, see É. Kiss 1998). In the experiment to be reported in this paper we will be using a special case of contrastive focus, one in which the contrast between the element in focus and the

[1] This concept of information focus is distinct from the notion of information focus based on 'newness', such as Halliday's (1967), which requires focus to be discourse-new (see Krifka 2008 for a lucid overview).

excluded alternative is made explicit. This is illustrated in (2), where John represents the contrastive focus and Mary the excluded alternative.[2]

(2) a. JOHN cut the grass, not MARY.
b. A: Who cut the grass? Mary?
B: No! JOHN cut the grass.

The *background* of an information focus is taken to be that part of the sentence that is invariable within each alternative proposition in the QUD (e.g., *cut the grass* in (1a)) Clearly, background and focus are complementary notions. Three aspects of this complementarity are relevant to our present purposes. We point these out in turn.

First, the narrower the background is in the sentence, the wider the focus will be. When the background part is zero, the whole sentence belongs to the focus. We will refer to this case as *broad focus.* Cases in which only some phrase within the sentence is focused will be referred to as cases of *narrow focus*. Second, given the complementarity of focus and background, when focus is sentence-medial, the background may be syntactically discontinuous, with parts extending both to the left and to the right of the focus. Third, as opposed to the focus, which is pragmatically prominent, the background is generally considered to be pragmatically non-prominent. In fact, the prominence of focus is a relative property: the focus is more prominent than elements of the background (cf. Truckenbrodt's 1995 and Büring's 2013 notion of focus *domain*).

The last information structural status we draw on is a particular notion of *givenness*. The notion of givenness assumed in this paper is discourse-salience, which in turn corresponds to activation or accessibility in consciousness (see Chafe 1976, 1994).[3] This notion is distinct from being part of the background of a narrow focus (see Schwarzschild 1999, cf. also Wagner's 2006 notion of 'relative givenness' and the related discussion in Baumann and Riester 2012, and Riester and Piontek, this volume). It is also distinct from being existentially presupposed, another property that the background is often claimed to be associated with, either generally (Geurts and van der Sandt 2004), or perhaps only in clefts or cleft-like focus constructions (Percus 1997, Rooth 1999).[4] Importantly, the background of an information focus, including that in clefts and cleft-like constructions (Prince 1978, Hedberg 1990), may or may not be given in the sense of discourse-salience. One way in which givenness may be triggered is by recent previous mention (*cut the grass* in A's utterance in (2b.)). This is the givenness trigger we will rely on in our experiment.

Having delineated the particular notions of information structure our work draws on, we now move on to provide some relevant background on the syntax and prosody of Hungarian.

[2] For different notions of contrastive focus, see e.g., Krifka (2008), Repp (2009). See also Burdin et al., this volume, for typological discussion of contrastive focus.

[3] For a discussion of various notions of givenness, including discourse-anaphoricity and familiarity, see Halliday (1967), Prince (1981, 1992), Givón (1983, 1990), Ariel (1990), Vallduví (1992), Gundel et al. (1993), Lambrecht (1994), van Deemter (1994, 1999), Schwarzschild (1999), Sauerland (2005), a.o.

[4] For (1a), the relevant presupposition would be that there is someone who cut the grass, viz. the proposition resulting from the existential closure of the background in which the variable corresponding to the focus is existentially bound. It is debated whether the background of all information foci is associated with an existential presupposition (see for instance, the commentaries on Geurts and van der Sandt's 2004 target paper in Theoretical Linguistics 30.1).

2.2. Background on Hungarian

2.2.1 Syntax

Hungarian is an obligatory syntactic focus-marking language: it must employ a syntactically marked word order to highlight narrow focus (É. Kiss 2002, among many others). The overall word order used for this purpose is special in that it does not exist independently of focus-marking. A narrow focus word order unambiguously identifies the immediately pre-verbal constituent as the focus phrase (in the sense of Krifka 2006); see section 4.1 for further details.

The displacement of the focus to the immediately pre-verbal position is standardly analyzed as being due to a movement operation raising the focus out of its original syntactic position to a left peripheral position of the clause (É. Kiss 2002). The fronted focus is immediately followed by the (finite) verb, which is analyzed as being the result of verb movement to a position to the immediate right of the fronted narrow focus.[5] See the simplified constituent structure representation in (3a), where t_i and t_j mark the pre-movement positions of the co-indexed elements. The fronting of the verb can be easily detected in word order if the verb has a verbal particle (PRT), or some modifier with the same distribution. These modifiers and the verbal particle together are called *Verbal Modifiers* (*VM*; cf. É. Kiss 2002). In broad focus sentences the VM immediately precedes the verb, as in (3b), while in narrow focus sentences the verb (immediately or not immediately) precedes the VM as in (3c).[6] The presence of a VM (PRT or a relevant modifier) in the post-verbal domain, therefore, is an unambiguous syntactic cue to the presence of a narrow pre-verbal focus. The examples in (4a–c) correspond to the structures in (3a–c), respectively.

(3) a. [focus_i [verb_j [. . . t_j . . . t_i . . .]]] (narrow focus)
b. [VM_i [verb_j [. . . t_j . . . t_i . . .]]] (broad focus)
c. [focus_i [verb_j [. . . VM . . . t_j . . . t_i . . .]]] (narrow focus)

(4) a. KÉT FILMET hozott nekem Mari (narrow focus)
two film.ACC brought I.DAT Mary
b. Be hozott két filmet nekem Mari (broad focus)
in brought two film.ACC I.DAT Mary
c. KÉT FILMET hozott be nekem Mari (narrow focus)
two film.ACC brought in I.DAT Mary
'Mary brought (in) two films for me.'

Pre-verbal focus may be either contrastive (i.e., may involve the exclusion of some alternative) or non-contrastive (i.e., may involve only implicit contrast, without the exclusion) (see É. Kiss 1998). In terms of its interpretation, syntactic focusing yields a

[5] This is a simplification of the analytical possibilities; see É.Kiss (2002: 84–86) for specific syntactic proposals. The choice between competing proposals is immaterial for the purposes of this paper.

[6] Once again, (3b) is a simplified structure that is compatible with various syntactic structures proposed in the literature (see Surányi 2009 for a review). The exact labels of the functional projections are irrelevant to the current study. The element functioning as the VM remains post-verbal not only in the presence of pre-verbal focus, as in (3c), but also in negated and imperative sentences, as well as in certain aspectually marked (progressive and experiential perfective) clauses (É.Kiss 2002: 63, Varga 2002: 144).

cleft-like construction, in which the background is associated with an existential presupposition (Kenesei 1986, Szabolcsi 1994; see footnote 4).

Hungarian is not only focus-prominent, but it is also topic-prominent (É. Kiss 1995): the topic-comment division is marked by routinely fronting aboutness topics, if any, to the left of the comment part of the sentence. The examples in (4) do not contain a topic: they are all-comment (or thetic) sentences, with the focus or the VM being the leftmost element of the comment. In these sentences, for instance, either the dative or the nominative argument (or both) will be fronted to the left of the comment if they function as an aboutness topic (5a). If the sentence contains a narrow focus, then both the topic and the post-focal part of the sentence will be part of the (discontinuous) background of the focus (5b):

(5) a. Mari be hozott két filmet nekem cf. (4b)
Mary in brought two film.ACC I.DAT
b. [$_{\text{Background}}$ Mari] [$_{\text{Focus}}$ KÉT FILMET] [$_{\text{Background}}$ hozott be nekem] cf. (4c)
Mary two film.ACC brought in I.DAT

The target sentences in our experiment will involve this type of discontinuous background.

It is important to note that topics in Hungarian do not need to be given: they can be aboutness-shift topics (see Frascarelli and Hinterhölzl's 2007 study of topic types), and can even be as "new" as non-specific indefinites (Gécseg and Kiefer 2009). Further, the topic may or may not be contrastive in the sense of Büring (1997). Our discussion in this paper is limited to non-contrastive topics.

2.2.2 Prosody

Sentence-level prosody in Hungarian is relatively understudied, especially experimentally. In this subsection we provide a brief review of some of the claims in the literature that are of relevance to the present work. The generalizations (limited here to the declarative sentence type) are formulated in terms of a mainstream version of the prosodic hierarchy that includes prosodic words (ω), phonological phrases (φ) and intonational phrases (ι) (Selkirk 1984, 1986, Nespor and Vogel 1986).

It is relatively uncontroversial that prosodic words are left-headed in Hungarian (Varga 2002), since word stress in Hungarian is always assigned to the initial syllable. The phonological phrase, assumed by definition to contain exactly one pitch accented syllable (Ladd 2008, Féry and Samek-Lodovici 2006), has also been described as being left-headed (Szendrői 2003; cf. Varga 2002).[7]

Although there are significant differences among authors assuming some version of the prosodic hierarchy, at least partial convergence emerges as to the default prosody of a simple sentence (i.e., the prosody associated with broad focus sentences as a default). In the comment part of a declarative sentence (or in topicless declaratives), it has been shown that pitch movements are predominantly of a falling type (e.g. Varga 1975, Rosenthall 1992, Hunyadi 2002, Surányi, Ishihara and Schubö 2012). Following Rosenthall (1992) and Surányi, Ishihara and Schubö (2012), we will refer to this falling movement as a H*+L bitonal accent. As for pre-verbal topics, Rosenthall (1992) claims

[7] There is disagreement with respect to whether or not higher-level prosodic categories such as φ's or ι's are headed, or indeed with regard to which prosodic categories are relevant to the description of the prosody of Hungarian (see Varga 2002 for some relevant discussion).

(based on exemplars of recorded speech from one speaker) that topics are characterized by a H* accent, possibly preceded by a L% boundary tone at the beginning of the sentence, and followed by a L- phrase accent associated with the right edge of multi-word topics (the L- is claimed to be absent from single-word topics; cf. Kornai and Kálmán 1988). While Surányi, Ishihara and Schubö (2012) confirm the existence of this pattern, they also report on more variation concerning the accent type of the topic. Other options include high plateaus and high gradual rises (which the authors take to be H* followed by interpolation). The latter are sometimes preceded by an early rise, which the authors take to be either %L (as in Rosenthall 1992) or part of a bitonal L+H* accent. (L+)H* accents can be followed by a L boundary tone (possibly a phrase boundary tone L-), again corresponding to Rosenthall's (1992) suggestion, but this is not obligatory. L* accents are also found, with rising interpolation to the H*+L in the first element of the comment.[8] Significantly, as Surányi et al. point out, despite this variation, the default H*+L accent of comment elements has not been shown to also occur in the topic.[9]

As far as phrasing is concerned, there is again only partial agreement among researchers. Kenesei and Vogel (1998) argue that in the unmarked case the VM+verb sequence, as well as each post-verbal argument or adjunct phrase constitutes a φ of its own.[10] Varga (1998, 2001) proposes that in terms of an intonational phrase (ι)-based analysis, the whole comment forms a single ι, a view also shared by Hunyadi (2002) and Szendrői (2003). Consonant with this view is Varga's (1975) suggestion that each falling accent in the comment is downstepped from the previous one.

As for the phrasing of topics, Vogel and Kenesei (1987), Kenesei and Vogel (1989), Varga (1998, 2001), and Hunyadi (1999: 86, 2002: 107) take each topic to be mapped to an ι, separate from the comment. In a sentence that contains a topic followed by a comment, such as (5a) above, this would give rise to a structure like (6a) (TOP=topic, YP/ZP = post-verbal argument or adjunct phrases). An alternative view, represented by Varga (1983, 1988) and É. Kiss (1988, 1994, 2002), holds that alongside (6a), the structure in (6b), where the topic does not form an ι of its own, is also available. But while É. Kiss (1998, 1994, 2002) assumes that (6b) is available if and only if the topic is unaccented, Varga (1983), on the other hand, suggests that (6b) is unavailable if either the topic or the comment contains more than one accent.[11] A third structure is advocated by Szendrői (2003), according to whom topics are prosodically adjoined to the ι of the comment, as in (6c), creating recursive ι categories.

(6) a. $(\text{TOP})_{\iota}\ (\text{VM V YP ZP})_{\iota}$
b. $(\text{TOP}\quad \text{VM V YP ZP})_{\iota}$
c. $(\text{TOP}\quad (\text{VM V YP ZP})_{\iota})_{\iota}$

[8] Gyuris and Mády (to appear) also find some variation regarding the contour realized on non-contrastive given aboutness topics. In their data, the typical contour involves a late peak accent, followed by a plateau.
[9] Perhaps a note on terminology is in order, prompted by a question raised by an anonymous reviewer. Surányi et al.'s (2012) generalization is that topics in their data set did not admit a bitonal H*+L accent, even though they frequently exhibited a falling contour. They suggest that the latter is better analyzed in ToBI terms as a monotonal H* accent followed by a (possibly φ-level) L edge tone. This tonal structure is different from H*+L in having the L tonal target at the end of the topic phrase, rather than in the syllable directly following H*.
[10] Vogel and Kenesei (1987) and Kenesei and Vogel (1989) took φ's to be ι's.
[11] This condition could be restated as requiring the ι corresponding to the topic+comment unit to be maximally binary branching (while not requiring the same of ι in the language in general).

Rosenthall (1992), who acknowledges the option of an unaccented topic, finds no indication that would support (6a). Noting that the topic is followed by downstep (catathesis in his terminology), he adopts a structure like (6b). Sneed (2004) also points out the downstep relation between the topic and the element following it.[12]

According to one of two main views regarding nuclear sentence-level prominence, there is no single main prominence in broad focus sentences: each accent is equally prominent (Varga 1983, 1996, 1998; Kálmán and Nádasdy 1994; Fónagy 1998). The alternative approach holds that in broad focus sentences such as (4b) or (5a) the nuclear prominence is assigned by default to the immediately pre-verbal VM element (É. Kiss 1988, 1994, 2002).[13]

Turning to the prosodic marking of narrow focus, Vogel and Kenesei (1987) and Kenesei and Vogel (1989) assume that it may induce prosodic 'restructuring'. Transposed to Kenesei and Vogel's (1998) terms, the effect of a narrow focus is the merging of the separate φ's in the comment into a single φ. In principle, this should result in *post-focal deaccenting*.[14] Post-focal deaccenting is claimed to be a property of narrow focus by Kálmán (1985), who suggests that the accent of at least the first accented word after a narrow focus must be removed, though deaccenting may extend up to the end of the background.

Recordings conducted by Rosenthall's (1992) and Sneed's (2004) confirm that narrow focus is realized with a H*+L bitonal accent. Rosenthall claims that the F0-peak of the narrow focus is downstepped from the preceding (non-given) topic. Sneed (2004) observes that a given topic is realized with a rising pitch movement, which she analyzes as a L*+H accent. Further, she points out that when the topic is not given, it is realized with a falling contour.[15]

Let us take stock of what may be considered a common view of the IS-prosody relation in Hungarian. (i) The default accent type in the comment is falling, and has been analysed by some as H*+L.[16] The accent types appearing in the topic are much more varied, including H* and L*, optionally combined with various (φ- and/or ι-level) edge tones. (ii) As far as phrasing is concerned, in simple broad focus sentences all of the comment is subsumed under one ι. Views diverge with respect to whether or not there is a unique main prominence at the sentence level. On the approach that assumes a nuclear accent, it falls in simple broad focus sentences on the pre-verbal VM element. (iii) There is no agreement as to whether a topic preceding this comment forms one ι with it (6b, 6c) or not (6a), or whether more than one option is available. (iv) Similarly to broad focus sentences, a comment beginning with a narrow focus element also forms a single ι. The main effect of narrow focusing is claimed to be deaccenting in the post-focal domain.

---

[12] Though Sneed recorded 10 sentences in 3 different contexts, her study also involves only one native speaker, and no statistical analysis of the data is presented.

[13] If the sentence does not contain a VM element, nuclear prominence is assigned to V.

[14] This is due to the assumption that each prosodic category should contain exactly one prosodic head, which in the case of φ is realized by a pitch accent. The lack of accents does not preclude the retention of lexical stresses. Varga (1975) considers any post-focal prominences 'secondary stresses.'

[15] Sneed (2004) compares non-contrastive and contrastive focus, but sentences containing them systematically differ with respect to another factor as well, viz. the contrastiveness of the preceding topic.

[16] The scope of this claim, like that of all other generalizations discussed in this section, is limited to declarative sentences. In polar questions, for example, the leftmost pitch accent in the comment part is normally L*, followed at the end of the intonation phrase by a combination of H and L edge tones (Ladd 2008: 81–84; cf. also Varga 1983, 2002, Gósy & Terken 1994).

With this background in place, we proceed to formulate the specific questions our prosodic experiment was designed to address.

3. Research questions

The central empirical issue the experiment seeks to explore is the prosodic marking of (narrow) focus in Hungarian. The issue is of special interest, because, as we have seen, Hungarian is not only an obligatory syntactic focus-marking language, but one in which syntactic focus-marking is characteristically unambiguous: it is achieved by the fronting of narrow focus to a(n immediately pre-verbal) syntactic position dedicated to focus, and is accompanied by verb-inversion. Given this unambiguous syntactic marking, although not precluded, a deviation from default sentence prosody would apparently be functionally redundant.[17] Another reason why the lack of prosodic focus marking would not be unexpected is that in its immediately pre-verbal syntactic position the narrow focus element occupies a prosodic position that is assigned default nuclear prominence, at least according to É. Kiss (1988, 2002). It has been proposed that this is in fact the very motivation for the syntactic fronting itself: as a result of fronting, narrow focus comes to be assigned nuclear prominence in a default prosodic structure (Szendrői 2003).

The main question then is whether and how the prominence of narrow focus is prosodically marked, in comparison to the default sentence prosody that can be observed in a broad focus context. This question can be divided into two parts, as in (Q1a) and (Q1b). (Q1a) first asks whether narrow focus is phonetically realized differently from broad focus, and if it is, what the relevant phonetic cues are. Provided that narrow focus is found to be prosodically marked, (Q1a) can be supplemented by (Q1b): under the assumption that the prominence requirement of focus is relativized to that of the background that the focus is associated with (see section 2.1), the prosodic marking of reduced prominence within the background part of the sentence may contribute to rendering—or may even be sufficient to render—narrow focus (relatively) prominent.

(Q1) a. Is narrow focus marked in Hungarian prosodically in addition to its syntactic marking? If so, by what prosodic means?
b. Does prosodic marking of narrow focus affect the narrow focus itself, or its background, or both?

We complement the agenda defined by (Q1) with two further research questions. The first question is related to the type of narrow focus, more specifically, the contrastiveness of narrow focus. Provided that the answer to (Q1a) is found to be affirmative, we can also ask whether both contrastive and non-contrastive narrow focus are phonetically marked (Q2a), and if they are, whether their realizations differ or not (Q2b). (Q2) is motivated in view of the fact that it has been argued in recent work that the prosodic realization of contrastive focus differs in some languages from that of non-

[17] Based on this consideration, the language may be expected to have relatively rigid sentence-level prosodic structure. Interestingly some indication of the prevalence of the default syntax-prosody mapping was found even in a construction where syntactic focus marking is precluded for independent syntactic reasons (Surányi, Ishihara and Schubö 2012).

contrastive focus (see Frota 2000, Selkirk 2002, Gussenhoven 2008, Calhoun 2010, Breen et al. 2010; contra, e.g., Ladd 2008). Contrastive focus has sometimes been found to be phonetically more prominent than non-contrastive focus.

(Q2) a. Are both contrastive and non-contrastive foci marked prosodically?
b. If so, does the prosodic realization of contrastive focus differ from that of non-contrastive focus?

A second set of questions we add to complement (Q1) is related to the salience of the background of narrow focus. If it is found that the prosodic realization of narrow focus affects the background (cf. (Q1b)), it is important to tease this marking apart from the prosodic marking of givenness (discourse-salience). As pointed out in Section 2.1, the background of a narrow focus may or may not be given. Givenness tends to be associated with non-prominence. If the background is given and the focus is not, the prominence of focus is 'automatically' guaranteed, because narrow focus is required to be prominent relative to its background, and the givenness of the background ensures its reduced prominence. The same is not true if the background is non-given (or new). It is in this latter case that the prosodic marking of narrow focus is best studied. If it is found, in response to (Q1b), that the background part in Hungarian is prosodically marked, then it is necessary to establish whether this marking is indeed due to its status of being the background of a narrow focus, or simply due to its status of being given (Q3a). In case givenness can be shown to have an independent additional effect on the prosodic realization of the background, then the prosodic marking of being backgrounded cannot be simply due to givenness. Furthermore, in parallel to (Q1b), we should also ask whether givenness of the background has any prosodic effect on the realization of the focus (Q3b), since it may well be the case that the givenness of the background affects the realization of the focus.

(Q3) a. Does the salience of the background (i.e., whether it is given or not) have an independent effect on the prosodic realization of the background itself?
b. Does the salience of the background affect the realization of the focus?

Although givenness is often taken to involve a binary opposition between given and non-given, there is evidence that the different degrees of givenness are mapped to different prosodic realizations.[18] For instance, drawing on Pierrehumbert and Hirschberg's (1990) proposals for English, Baumann (2006) examines this question in German, using a variety of research methods (see also Gussenhoven 2004, Baumann and Grice 2006). It is established that different degrees of givenness, such as textual givenness, situational givenness, and discourse-anaphoricity, correspond to differences in accent type, deaccenting and prominence of accents. Therefore, in formulating and implementing (Q3), one needs to keep to one specific type of givenness. In our experiment we employ a straightforward type of givenness for the purposes of (Q3), namely, textual givenness.

[18] This is consonant with the fact that givenness as a pragmatic concept has been described as gradient, i.e., varying either along a continuum (Givón 1983, Ariel 1990) or in terms of different distinct degrees (Prince 1981, 1992, Gundel et al. 1993, Lambrecht 1994).

4. The experiment

In this section we lay out our experiment that is conducted to answer the questions in (Q1–Q3). After a summary of the materials and the method used, the procedure of the data analysis is presented.

4.1. Materials and method

We conducted a production experiment in which target sentences were placed in different contexts that would affect their information structure. Contexts triggered either a broad focus reading, or four kinds of narrow focus readings. The four types of narrow focus readings differed along two independent factors in a 2×2 factorial design. The narrow focus was either contrastive or non-contrastive, and the background was either given or non-given. Contrastiveness of focus was ensured by explicit contrast between the focus and some other element in the context. Givenness (salience) of the background was triggered by recent previous mention, i.e., textual givenness. In broad focus contexts, the entire sentence was non-given.

All narrow focus sentences with the same lexicalization were identical, and contained a topic (TOP) to the left of the focus, and an argument phrase and an adjunct phrase to the right of the verbal particle (YP and ZP, respectively). The narrow focus interpretation of the pre-verbal element was guaranteed not only by the context, but also by a syntactic cue as well, namely, a (monosyllabic) verbal particle in a post-verbal position of the sentence (PRT in (7) below).[19] As explained in section 2.2.1, the post-verbal placement of the particle unambiguously identifies the verb as being inverted and the immediately pre-verbal element as a narrow focus. Sentences in the broad focus condition did not contain a verbal particle in a post-verbal position or elsewhere in the sentence, see (8). Normally, the immediately pre-verbal element cannot be the same in a narrow focus sentence and its broad focus counterpart. This is because usually the narrow focus comes to occupy the immediately pre-verbal position, which in the broad focus counterpart is filled by a Verbal Modifier (or is simply unfilled, if the verb has no VM). A notable exception to this generalization is the scenario in which it is the VM element itself that functions as a narrow focus. Since the default, broad focus position of the VM is immediately pre-verbal (as illustrated in (3b/4b) and (5a) above), the syntactic marking of the VM as a narrow focus does not introduce a change in word order in comparison to the order in the broad focus sentence.

(7) Narrow focus: TOP **VM** V PRT YP ZP

(8) Broad focus: TOP VM V YP ZP

By using a VM element as the narrow focus, it is possible to make the broad focus and narrow focus conditions string-identical, except for the presence of a post-verbal verbal particle in narrow focus sentences, which was used as a syntactic cue to the narrow focus interpretation of the pre-verbal VM. Without a verbal particle, there would be a strong syntactic bias in favour of the broad focus interpretation, because the VM–V order is typically used to express a neutral (i.e., broad focus) reading in Hungarian, and

[19] As explained in section 2.2.1, PRT is also a kind of VM. For the sake of exposition, we indicate the two types of verbal modifiers, non-particle modifier (VM) and particle (PRT), separately.

is rarely used for a narrow focus reading. The presence or absence of the verbal particle after the verb is not expected to create any significant prosodic differences, since it is a monosyllabic particle prosodically encliticised onto the verb, and usually remains unaccented.

The five information structures that were employed as conditions in the experiment are summarized in (9a–e) below.

(9) Broad focus condition:
   a. sentence-wide broad focus
   Narrow focus conditions:
   b. non-contrastive focus, non-given background (–C, –G)
   c. non-contrastive focus, given background (–C, +G)
   d. contrastive focus, non-given background (+C, –G)
   e. contrastive focus, given background (+C, +G)

The narrow focus conditions are schematized in (10). The topic which is part of the background was either given or non-given, as well as the post-focal background. The VM following the topic was either contrastive or non-contrastive.

(10) [$_{\textbf{Background}}$ TOP] [$_{\textbf{Focus}}$ VM] [$_{\textbf{Background}}$ V YP ZP]
   (+/–Given) (+/–Contrastive) (+/–Given)

(11) serves to illustrate target sentences, and (12a–e) exemplify different types of contexts summarized in (9a–e).[20]

(11) TOP	VM	V	(PRT)	YP	ZP	= [TARGET]
Ilona	lábon	lövi	(meg)	Adélt	a film végén.	
Ilona	on.the.leg	shoots	PRT	Adel.ACC	the film end.at	

'Ilona shoots Ádel in the leg at the end of the movie.'

(12) a. Broad focus
   [TARGET (without PRT *meg*)] She doesn't do it on purpose, the weapon fires in her hand by accident.
   b. –Contrastive focus, –Given background:
   I think that something is not right in the story. [TARGET], despite the fact that in the beginning of the movie she was introduced as a sharpshooter and a pro hit man. She should have been able to kill her victim with one shot.
   c. –Contrastive focus, +Given background:
   A: Where does Ilona shoot Adel?
   B: [TARGET]
   d. +Contrastive focus, –Given background:
   [TARGET]…, and not in the head, as was the case in the book. So it is possible that the movie will have a sequel.

[20] One reviewer asked if there is a difference between (12d) and (12e) in terms of focus types: contrastive focus in (12d) and corrective focus in (12e). Our assumption here is that they are both instances of contrastive focus, in the sense that the contrast between the focus and the excluded alternative is made explicit, and the difference between the two conditions is that in (12e), the background is textually given. See section 2.1 for our theoretical assumptions regarding focus types.

e. +Contrastive focus, +Given background:
A: Ilona shoots Adel in the head at the end of the movie right?
B: No! [TARGET]

Two sets of test items were used; see Appendix A for the other test item. An equal number of filler items were added to the test items to create the set of stimuli to be recorded. Test items were presented in Hungarian and contained the target sentences along with their context.

The whole set of stimuli were presented to participants four times in different pseudo-randomized orders. The recording took place in a quiet room. The items were presented on a computer screen, one at a time. Participants were instructed to read the item through carefully, and then read it out for recording. Each participant read all items, including the fillers. The 4 repetitions of the 2 test items of the 5 conditions were read by 8 speakers (male 6, female 2), which yielded a total set of 320 target sentences. Participants were all monolingual speakers of Hungarian, and all university students.

4.2. Data pre-processing and measurements

To explore whether the experimental conditions affect F0 movement (accent type) and accentedness, each target sentence was annotated for pitch accents (accentedness and accent types). Since there is no standardized ToBI system for Hungarian, annotators were allowed to use all the combinations of contour types (H, L, H+L, L+H, and 0 for unaccented word) and the location of the stressed syllable (e.g., H*+L and H+L*).[21] Uncertain cases are marked with a diacritic "?" (both for the presence/absence of tones and their types). Three native speakers were involved in the task. Each sentence was checked by at least two annotators, and modifications were made if the judgments between the annotators were different.

Good agreement was achieved for the annotation of VM, see table 1. Most of the VM's were annotated as falling. In a few cases, however, VM's were annotated with ?*, which means that the annotators perceived some kind of prosodic prominence auditorily, but could not categorize the pitch movement, either by auditory or visual inspection of the contour. In four cases, the annotators recognized a rising accent and six cases have been judged as deaccented (see footnote 24). It should be noted that the accent assignment is not related to the experimental manipulation.

Accent type	Uncertain (?*)	High (H*)	Falling (H*+L/H+L*)	Rising (L*+H/L+H*)	Deaccented (0 & ??)
Frequency	12/320	0/320	298/320	4/320	6/320

Table 1: Number of different accent types on VM.

Just like VM, TOP was judged as accented in the annotation in almost all the data (only 2 out of 320 cases were judged as deaccented); see table 2. However, although most of the annotators judged TOP to be high, the annotation of TOP was more difficult. The annotators showed some inconsistencies and disagreements and more uncertain cases (LH?/?*, 40 times), compared to the annotation of VM, occurred.

[21] There was no restriction on the annotators to assign a label in the limits of the word. Hence, early or late peaks and valleys were permitted. Phrase accent symbols L- and H- were not part of the annotation inventory. Bitonal realizations of topics (each consisting of two syllables) were not distinguished from potential realizations with a monotonal accent followed by a phrase accent (compare footnote 9).

Accent type	Uncertain (LH?/?*)	High (H*)	Low (L*)	Falling (H*+L/H+L*)	Rising (L*+H/L+H*)	Deaccented (0 & ??)
Frequency	40/320	202/320	1/320	25/320	50/320	2/320

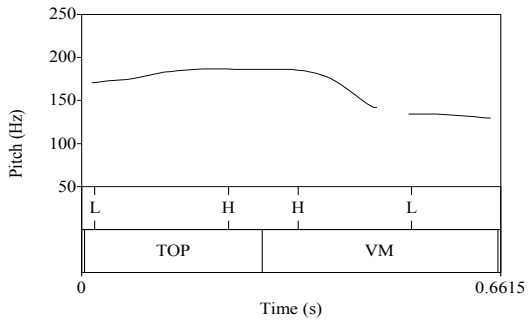
Table 2: Number of different accent types on TOP.

Therefore, we decided to base the classification of the accent types on more replicable, phonetically measurable criteria and to use the neutral term "contour types" to refer to these different types of realizations, since no statement about the phonological status of the types of pitch accents on TOP is intended. Thresholds for three contour types presented in (13) were stipulated whose perceptual distinguishability was randomly checked with a native speaker (BS).

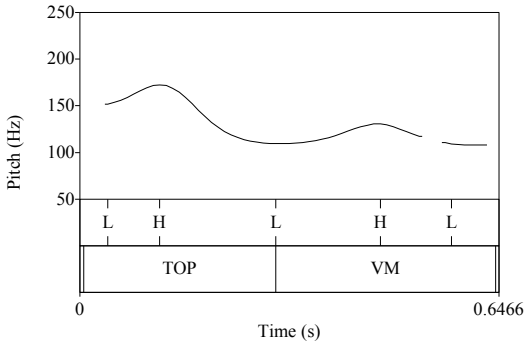
(13) Contour types
   i. Rising TOP
   ii. Falling TOP
   iii. Flat TOP

The threshold for a rising movement on TOP was set at 1 semitone (st), i.e., if the difference between the F0 maximum and the F0 minimum preceding it was ≥ 1 st it was labeled as rising; see below for details on the labeling of F0 minima and maxima. An example illustrating the rising TOP is presented in figure 1(a). The F0 movement on TOP was labeled as falling if the difference between the F0 maximum and F0 minimum following it was ≥ 1 st, see figure 1(b). Instances which met neither of the two criteria were classified as having a flat F0 on TOP, as shown in figure 1(c).

(a) Rising TOP



(b) Falling TOP



(c) Flat TOP

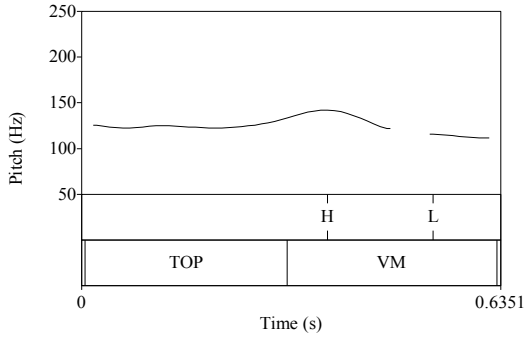


Figure 1: F0 of TOP and VM of the Hungarian sentence: *Ilona lábon lövi Adelt meg a film vegen*. (11) uttered under broad focus; (a) rising TOP and falling VM uttered by a male speaker (A), (b) falling

TOP and falling VM uttered by a male speaker (B) and (c) flat TOP and falling VM uttered by a male speaker (C).

Apart from classification of contour type, several phonetic measurements were used for analysis. Word boundaries and perceivable pauses were labeled by hand in Praat (Boersma & Weenink, 2013) based on visual evaluation of the spectrogram and listening to the sound file. Standard cues for segmental labeling were used (Turk et al., 2006). Further, F0 turning points were labeled for each word. A label was set automatically at the maximum (max) and preceding and/or following minimum (min) F0 of TOP, VM, V and Post-V (YP in (11)).[22] They were checked and manually corrected if necessary. Additionally, the low turning point of the elbow, as in e.g. Hanssen et al., (2008) of the VM, following H, was labeled manually. The F0 analysis was based on a Hanning window of 0.4 seconds length with a default 10 msec analysis frame. Every pitch object was visually checked for octave jumps and algorithm faults, which were manually corrected. The corresponding F0 values were extracted in semitones (st) using the reference value 100Hz with the help of a Praat script. To approach our research questions (Q1a), (Q2a & b) and (Q3b), which are all related to the realization of VM only, we additionally calculated the variables presented in (14).

(14) Variables
   i. Steepness of the fall on the VM in st/sec was calculated using the following formula: rate = (F0max(st)–F0min(st))/(F0max_time(sec)–F0min_time(sec)) based on Hanssen et al. (2008).
   ii. Scaling relation between F0 maximum of TOP (H1) and F0 maximum of VM (H2) was calculated using the following formula: upstep or downstep = H2(st) – H1(st). (A positive value indicates upstep, and a negative value downstep.)
   iii. Word duration in msec.

4.3. Statistical analysis

Table 3 shows the variables for each constituent that will be used for the statistical analysis. Additionally, the difference between the F0 maximum of VM and TOP will serve as a variable. The statistical analysis was performed in the environment R (R Development Core Team, 2014).

constituent/ variables	TOP	VM	V	YP
discrete variables	contour types		accentedness	accentedness
continuous variables	F0 max.	F0 max., min. steepness duration		

Table 3: Variables obtained for each constituent.

[22] We did not analyze obtained F0 values for V, YP and ZP because they were regularly uttered in a compressed pitch range accompanied by creakiness. Furthermore, ZP was not designed for any comparison and hence contains a different number of words in different items. Furthermore, ZP exhibits a continuation rise if it appears as discourse initial, as in (12d), whereas it is characterized by a falling intonation if it appears as discourse final, as in e.g. (12e).

Chi-square tests were used to calculate the significance of frequencies in the distribution of the discrete variables between the experimental conditions. A *p*-value < 0.05 is taken to signal significance. Differences in the continuous variables between conditions were analyzed using linear mixed-effects regression models (Lmer) from the lme4 package (Bates et al., 2012). The optimal model was chosen by comparing the maximal model (Barr et al., 2013) to the simpler one in a step-down fashion (Baayen et al., 2008) using likelihood-ratio tests between models excluding by-speaker, by-item and by-repetition random slopes; $p < 0.05$ was taken as cut-off point.[23] Repetition, item and speaker are treated as random intercepts, unless noted otherwise. A *t*-value > 1.96 is taken to signal significance.

To see whether the presence of a narrow focus on VM affects its prosodic realization (Q1), we performed linear mixed models with condition and contour type as fixed effects with interaction term. Broad focus (9a) was compared to two of the four narrow focus conditions: the non-contrastive focus, –given background condition (9b) and the contrastive focus, –given background condition (9d.). These minimal comparisons were chosen since it is possible that the salience of the background might affect the prosodic realization independently (Sneed, 2004 for Hungarian; Katz & Selkirk, 2011 for English, see also section 3 above).

For the questions whether contrastive and non-contrastive focus differ (Q2) and whether the status of being given has an independent effect on the prosodic realization of the focus and/or background (Q3), givenness (conditions 9b+d versus 9c+e), contrast (conditions 9b+c versus 9d+e) and contour type were used as fixed effects (with interaction term).

5. Results: Topic and Verbal Modifier

In section 5.1 the distribution and frequency of the contour types of TOP introduced in (13) will be discussed in relation to the experimental conditions. After presenting the distribution of TOP contour types in section 5.1, sections 5.2 and 5.3 are concerned with the effects of the experimental manipulations on the realization of TOP and VM, respectively. Section 5.4 discusses the scaling relation between TOP and VM. Generally, the results for the comparison of the broad and the narrow focus –given background conditions will be presented first. Following that, non-contrastive focus will be compared to contrastive focus and the impact of the salience of the background on the prosodic realization of TOP and VM will be examined.

5.1. Contour types of TOP

Table 4 illustrates the frequency and percentage of the contour types on TOP in the five experimental conditions. Rising and falling contours are relatively equally distributed over the neutral, broad focus condition (a), whereas, flat realizations are rare. The presence of a non-contrastive narrow focus on the following VM (condition b) does not affect the frequencies in the distribution of contour types of TOP; $\chi^2 = 2.102$, df= 2, *p*=

[23] Some realisations exhibited a steep fall on TOP followed by a flat F0 on VM, which was judged as unnatural by a native speaker (BS). These 6 instances (1 in the broad focus condition realized by a male speaker, 1 in the +G, +C condition by a male speaker and 4 in the +G, –C condition by a female speaker) were discarded from the statistical analysis, as well as from the result presentation of the TOP and VM part.

0.3496. However, fewer falling contours occur if TOP is followed by a contrastive narrow focus (condition d) than under broad focus; χ^2= 7.667, df= 2, p< 0.05.

Condition	Rising	Falling	Flat
Broad focus a	31/64 (48.4%)	28/64 (43.8%)	4/64 (6.3%)
Narrow focus b (–C, –G)	30/64 (46.9%)	25/64 (39.1%)	9/64 (14.1%)
c (–C, +G)	50/64 (78.1%)	6/64 (9.4%)	8/64 (12.5%)
d (+C, –G)	39/64 (60.9%)	13/64 (20.3%)	8/64 (12.5%)
e (+C, +G)	50/64 (78.1%)	4/64 (6.3%)	9/64 (14.1%)

Table 4: Frequency and percentage of contour types of TOP split by condition.

Turning to the results for within the narrow focus conditions (b-e), the frequencies in the distribution of contour types of TOP do not differ as a function of contrastiveness of the following narrow focus on VM (conditions b+d vs. c+e); χ^2= 4.465, df= 2, p= 0.11. On the contrary, the givenness of the TOP itself affects the frequencies in the distribution. Fewer falling TOP's are realized if TOP is part of a +given background (conditions c+e) than if is part of a –given background (conditions b+d); χ^2= 21.987, df= 2, p< 0.0001.

In sum, the distribution of contour types on TOP is basically affected by its own salience. A rising contour is preferred over a falling contour if TOP is given. Additionally, fewer falling contours occur if the focus on the following VM is contrastive, however, only in comparison to the broad focus and not to the non-contrastive narrow focus.

In what follows, the results obtained for the continuous variables of TOP and VM will be presented in relation to the contour types of TOP presented here. The presentation will concentrate on rising and falling types only, because the number of realizations of flat topics is small.

5.2. Prosodic effects on TOP

The mean values and standard deviations (SD) of the F0 maximum (H) of TOP are presented in table 5. TOPs that are realized with a falling contour exhibit a higher mean value than TOPs with a rising contour under broad focus.

	Rising TOP	Falling TOP
condition	H (st)	H (st)
Broad focus a	9.33 (2.48)	10.92 (5.76)
Narrow focus b (–C, –G)	9.76 (2.84)	9.57 (5.45)
c (–C, +G)	8.62 (3.94)	5.00 (0.75)
d (+C, –G)	8.57 (1.86)	9.37 (4.75)
e (+C, +G)	8.69 (3.60)	7.54 (3.57)

Table 5: Means & SD of the F0 maximum (H) of TOP, split by conditions and contour types (rising & falling), collapsed over speakers, items and repetitions.

The H on TOP does not differ systematically, either as a function of the non-contrastive focus on VM (t= 1.422), or as a function of the contrastive focus on VM (t= 1.184), in comparison to the broad focus. Neither of the comparisons yielded a significant interaction with contour type (condition a vs. b; t= 1.283 and condition a vs. c; t= 0.492).

Exclusion of by-speaker and by-item random slopes for the effect of contour type significantly reduced the fit of the model.

Within the narrow focus conditions, contrastiveness of the VM does not affect H of TOP significantly (t= 0.199), however, the salience of TOP does. H is realized by about 1.41 st (estimate) ± 0.66 (standard errors) lower if TOP is part of a +given background than if it is part of a –given background; t= 2.139. None of the interactions yields a significant result (givenness with contrast; t= 0.948, givenness with contour type; t= 0.289, contrast with contour type; t= 0.123 and givenness with contrast with contour type; t= 1.478). Exclusion of by-speaker random slopes for the effect of contrast significantly reduced the fit of the model.

5.3. Prosodic effects on VM

Table 6 shows the means and SD for the F0 maximum (H), the following F0 minimum (L), and the steepness of the fall in st/sec obtained for VM split by conditions and contour types, collapsed over speakers, items and repetitions. First of all, it is noteworthy that there are realizational differences of the falling F0 movement on VM in relation to the contour type of TOP. Under broad focus, the H on VM following a rising TOP is overall higher and the L is lower than if it follows a falling TOP. Consequently, the pitch range on VM following a rising TOP is greater. Furthermore, the fall on VM is realized much steeper if VM is preceded by a rising contour on TOP than if it is preceded by a falling contour.

	Rising TOP			Falling TOP		
condition	H (st)	L (st)	Steepness (st/sec)	H (st)	L (st)	Steepness (st/sec)
Broad focus a	9.35 (3.34)	2.65 (3.77)	59.01 (35.00)	7.50 (4.06)	4.42 (4.80)	25.25 (9.13)
Narrow focus b (–C, –G)	11.82 (3.05)	3.05 (4.66)	73.67 (41.39)	8.32 (4.33)	3.80 (4.34)	35.37 (16.39)
c (–C, +G)	10.08 (4.27)	3.58 (4.20)	50.49 (24.72)	4.63 (1.06)	0.76 (0.96)	33.59 (10.25)
d (+C, –G)	9.90 (2.66)	2.86 (2.94)	61.08 (29.84)	9.54 (4.87)	4.53 (4.60)	40.08 (16.12)
e (+C, +G)	10.63 (3.60)	3.16 (4.52)	58.99 (28.82)	7.98 (4.65)	3.22 (4.81)	40.02 (13.10)

Table 6: Means & SD of the F0 maximum (H), F0 minimum (L), and steepness of VM, split by conditions and contour types (rising & falling), collapsed over speakers, items and repetitions.

Turning to the impact of the experimental manipulations on the continuous variables, the data shows that the presence of a narrow focus on VM affects the F0 realization in various ways. First of all, the comparisons between the broad focus baseline (a) and the narrow focus conditions (b, d) revealed that the H is by about 1.46 st ± 0.45 higher, if VM is non-contrastively focused (t= 3.243) and by about 2.58 st ± 0.55 higher, if it is uttered under contrastive focus (t= 4.710). The latter effect is, however, not independent of the contour type of TOP. There is a significant interaction between contour type and broad vs. narrow contrastive focus (t= 2.541) but not for contour type and broad vs. narrow non-contrastive focus (t= 0.716). The H's following the rising

TOP's did not show any significant rising effect under contrastive narrow focus (condition d). Exclusion of by-speaker random slopes for the effect of contour type significantly reduced the fit of the model.

The L of VM under broad focus is not systematically different from that under non-contrastive narrow focus (t= 0.321) and from that under contrastive narrow focus (t= 1.742), none of the interactions is significant (conditions a vs. b with contour type; t= 0.411 and conditions a vs. d with contour type; t= 0.707).

The fall on VM is by about 10.02 st/sec ± 4.3 steeper under narrow non-contrastive focus (t= 2.338) and by about 13.63 st/sec ± 5.2 steeper under narrow contrastive focus (t= 2.606) than under broad focus, respectively. Neither of the comparisons yielded a significant interaction with contour type (conditions a vs. b; t= 0.354 and conditions a vs. d; t= 1.513). Exclusion of by-speaker random slopes for the effect of contour type significantly reduced the fit of the model.

The comparisons within the narrow focus conditions (b–e) revealed a main effect of contrastiveness of the focus on the H of VM; t= 2.001. However, the result has to be taken cautiously, since contrast interacts with contour type; t= 2.927. Contrast does not affect the height of H if VM is preceded by a rising TOP, whereas it is raised under contrastive focus (d+e) in comparison to the non-contrastive focus conditions (b+c) if VM is preceded by a falling TOP. Moreover, the results show that the salience of the background has no significant main effect (t= 0.074) on the H of VM. However, givenness also interacts with contour type of TOP; t= 2.212. H is lower if VM is preceded by a falling TOP but not if VM is preceded by a rising TOP. Consequently, there is a significant (t= 3.054) three way interaction between contrast, givenness and contour type. Givenness and contrast do not interact (t= 1.568).

The L is not systematically affected by the contrastiveness of the focus (t= 1.820). Givenness does not affect the L significantly, either (t= 0.122). Furthermore, none of the interactions yields a significant result (givenness with contrast; t= 1.822, givenness with contour type; t= 0.873, contrast with contour type; t= 0.989 and givenness with contrast with contour type; t= 1.456).

The steepness of the fall on VM is not systematically affected by the contrastiveness of the focus (t= 0.542). The salience of the background does not have a systematic impact on the steepness, either (t= 0.668). However, givenness and contour type interact; t= 2.529. The fall is less steep in the +given than in the –given background conditions if VM is preceded by a rising TOP, whereas the steepness does not change as a function of the salience of the background if VM is preceded by a falling TOP. None of the other interactions yields a significant result (givenness with contrast; t= 0.175, contrast with contour type; t= 1.633 and givenness with contrast with contour type; t= 1.539). Since the duration of VM was not systematically affected by the experimental manipulations, it will not be explored further.

Summarizing the results, the data have shown that the prosodic realization of VM depends on the contour type of TOP. The pitch excursion is smaller overall if VM is preceded by a falling TOP. Furthermore, narrow non-contrastive focus is realized prosodically differently from broad focus. The main strategy is raising of the H and steepening of the fall of VM. Similar effects have been detected for the contrastive narrow focus in comparison to the broad focus. However, the raising of H only applies to VM's that follow falling TOP's. Within the narrow focus conditions, the data have shown that the prosodic realization of contrastive focus differs from that of non-contrastive focus only marginally. L is lower under contrastive than under non-contrastive focus. Again, the height of H differs as a function of contrastiveness only if

VM is preceded by a falling TOP. In those cases H is raised under contrastive focus in comparison to the non-contrastive focus. Furthermore, we have seen that the salience of the background affects the realization of the focused VM. However, the observed effects depend on the contour type of TOP. H on VM is realized lower if the background is given if VM is preceded by a falling TOP. The fall on VM is less steep if the background is given if VM is preceded by a rising TOP.

5.4. The scaling relation between TOP and VM

Before moving to the discussion of the post-focal area, this section is concerned with the scaling relation between TOP and VM. Table 8 repeats the means and SD for H on TOP (H1) and those for H on VM (H2) already presented in the previous sections, and additionally provides the difference between the two split by conditions and contour types, collapsed over speakers, items and repetitions. As illustrated in figure 1a, the Hs on TOP and VM form a plateau under broad focus, which is substantiated by the difference near zero. In contrast, the H of the falling TOP and the H of VM stand in a downstep relation, as illustrated in figure 1b and by the negative difference in table 7.

The scaling relation of TOP and VM is systematically affected by the non-contrastive focus on VM; t= 2.406. Additionally, the interaction with contour type is significant; t= 3.173. The absolute difference increases for the rising TOP (0.02 → 2.06), whereas it decreases for the falling TOP (–3.41 → –1.26). Note however, that the latter effect originates only from the negative difference in the broad focus condition. H2 is raised under non-contrastive narrow focus for both contour types.

The comparison of broad and narrow contrastive focus is also significant; t= 2.406. Again, the interaction with contour type is significant (t= 3.091), because the absolute difference behaves opposite for both contour types, as explained above. Exclusion of by-item random slopes for the effect of contour type significantly reduced the fit of the model.

	Rising TOP			Falling TOP		
condition	H2 (st)	H1 (st)	H2 – H1 (st)	H2 (st)	H1 (st)	H2 – H1 (st)
Broad focus a	9.35 (3.34)	9.33 (2.48)	0.02 (1.87)	7.50 (4.06)	10.92 (5.76)	–3.41 (2.60)
Narrow focus b (–C, –G)	11.82 (3.05)	9.76 (2.84)	2.06 (2.03)	8.32 (4.33)	9.57 (5.45)	–1.26 (2.97)
c (–C, +G)	10.08 (4.27)	8.62 (3.94)	1.46 (1.74)	4.63 (1.06)	5.00 (0.75)	–0.37 (1.01)
d (+C, –G)	9.90 (2.66)	8.57 (1.86)	1.34 (2.03)	9.54 (4.87)	9.37 (4.75)	0.17 (2.70)
e (+C, +G)	10.63 (3.60)	8.69 (3.60)	1.93 (1.97)	7.98 (4.65)	7.54 (3.57)	0.44 (1.25)

Table 7: Means & SD of H on TOP (H1), H on VM (H2) and the difference between the two, split by conditions and contour types (rising & falling), collapsed over speakers, items and repetitions.

Within the narrow focus conditions, none of the comparisons yields a significant result (the contrastiveness of the focus; t= 1.433 and the salience of the background; t= 1.147). Furthermore, none of the calculated interactions is significant (contrast with contour type; t= 0.055; givenness with contrast; t= 0.307, givenness with contour type; t= 0.302,

and givenness with contrast with contour type; t= 1.280). Exclusion of by-speaker random slopes for the effect of contour type significantly reduced the fit of the model.

6. Results: V and Post-V

In this section, the characteristics of the domain following TOP and VM will be examined. Unlike most cases of TOP and VM, the pitch movement in the post-VM region is generally rather flat. As a result, continuous variables did not show any significant effects of the experimental manipulations most of the cases, and hence will not be presented below. Nonetheless, the annotations of accentedness yielded some interesting results. Sections 6.1 and 6.2 concentrate on accent types and accentedness of V and Post-V, respectively.

6.1. V

As shown in table 8, most of the verbs were annotated as deaccented. A few cases, however, were perceived as accented without perceivable pitch movement (?*)[24].

Accent type	Uncertain (?*)	High (H*)	Falling (H*+L/H+L*)	Rising (L*+H/L+H*)	Deaccented (0/??)
Frequency	41/320	0/320	1/320	0/320	278/320

Table 8: Number of different accent types on V.

Table 9 provides an overview of the frequency and the percentage of the accented and deaccented verbs in the five conditions. The presence of a non-contrastive narrow focus does not have a significant effect on the accentedness of the verb (χ^2= 0.05, df= 1, p= 0.82), nor does the presence of a contrastive focus on VM (χ^2= 0.477, df= 1, p= 0.49).

Condition	Accented	Deaccented
Broad focus a	13/64 (20.3%)	51/64 (79.7%)
Narrow focus b (–C, –G)	12/64 (18.6%)	52/64 (81.3%)
c (–C, +G)	1/64 (1.6%)	63/64 (98.4%)
d (+C, –G)	10/64 (15.6%)	54/64 (84.4%)
e (+C, +G)	3/64 (4.7%)	60/64 (93.8%)

Table 9: Frequency and percentage of accented/deaccented V split by condition.

Within the narrow focus conditions, the contrastiveness of the focus does not show a significant effect on the accentedness of the verb (χ^2= 0.001, df= 1, p= 0.97). However, the salience of the background significantly affects the accentedness of the verb (χ^2= 13.72, df= 1, $p < 0.001$). The number of deaccented cases increases if the verb is part of a +given background.

[24] It is possible that the annotators perceived some kind of prominence which was triggered by intensity and/or by the presence of stress. We cannot make any statement about which acoustic sensation led the annotators to choose a certain category. It was not part of their task to make any judgment on this, however, this is an interesting topic for further research.

6.2. Post-V

Table 10 shows that more of the Post-V words were perceived as accented. However, most of them were annotated as ?*. Given the distribution, only accentedness and its relation to the experimental conditions will be examined further.

Accent types	Uncertain (?*)	High (H*)	Falling (H*+L/H+L*)	Rising (L*+H/L+H*)	Deaccented (0/??)
Frequency	125/320	7/320	24/320	10/320	154/320

Table 10: Number of different accent types on Post-V.

Table 11 illustrates the frequency and percentage of the accented and deaccented Post-V in the five conditions. The presence of a non-contrastive focus earlier in the sentence significantly affects the accentedness of Post-V; χ^2= 5.918, df= 1, p< 0.05. Less instances of deaccenting occur.[25] The distribution does not differ systematically between the contrastive, –given condition and the broad focus (χ^2= 0.502, df= 1, p= 0.48).

Condition	Accented	Deaccented
Broad focus a	36/64 (56.3%)	28/64 (43.8%)
Narrow focus b (–C, –G)	49/64 (76.6%)	15/64 (23.4%)
c (–C, +G)	27/64 (42.2%)	37/64 (57.8%)
d (+C, –G)	32/64 (50.0%)	32/64 (50.0%)
e (+C, +G)	22/64 (34.4%)	42/64 (65.6%)

Table 11: Frequency and percentage of accented/deaccented Post-V split by condition.

Within the narrow focus conditions, the contrastiveness of the focus shows a significant effect on the accentedness of Post-V (χ^2= 6.8923, df= 1, p< 0.01). Post-V is more often deaccented following a contrastive focus than following a –contrastive focus. Moreover, the givenness of the background has a significant effect on the accentedness of Post-V (χ^2= 15.0193, df= 1, p< 0.001). The number of deaccented cases increases if Post-V is part of a +given background.

7. Discussion

We set out to explore the prosodic effects of (narrow) focus, as well as the contrastiveness of focus and the givenness of the background, in the obligatory syntactic focus-marking language Hungarian. Prosodic effects were investigated from two angles: first, descriptively in terms of contour types, accentedness and their distribution, and second, by the measurement of the continuous variables F0 maximum (H), F0 minimum (L), the scaling of two adjacent H targets, and the steepness of the fall and the duration of the immediately pre-verbal word. Here we will discuss the empirical and theoretical consequences of our findings.

[25] This result was contrary to our expectation, given our assumption that deaccenting is an indication of lower prominence. At this point, it is unclear whether this is something peculiar to our data set, or a general tendency. We leave this question for future research.

7.1. Answers to the research questions

Our basic research question, (Q1), was whether the prosodic realization of (either non-contrastive or contrastive) narrow focus differs from that of broad focus (Q1a), and if it does, whether prosodic marking of narrow focus is realized on the narrow focus itself, or its background, or both (Q1b). The answer is affirmative to (Q1a). Regarding (Q1b), our results show that narrow focus affects the realization of focus itself, but not so much that of its background.

In particular, several phonetic parameters of F0 were affected by narrow focusing. The effects we found are those that are familiar from other prosodic focus-marking languages, i.e. higher F0 and steeper fall on the narrow focus. In these regards, both contrastive and non-contrastive narrow focus exhibit significant differences from broad focus. It is, however, worth noting that narrow focusing of VM does not change its accent type (including peak alignment within the bitonal accent). It is almost always realized with a falling accent (H*+L), supporting the observations by Rosenthall (1992), Sneed (2004) and Surányi, Ishihara and Schubö (2012).

Turning to (Q1b), in the literature the main effect of narrow focusing has been claimed to be deaccenting in the post-focal domain (see section 2.2.2). Our results do not support this view. Instead, we found that the narrow focus is made phonetically prominent by manipulating the phonetic properties of the focused element itself. (The realization of the background was found to be affected by the contrastiveness of the narrow focus as well as its own discourse salience; see below). As for the realization of the pre-focal part of the background, i.e., TOP, the distribution of its contour type is partially affected by the presence of narrow focus, while its maximal F0-height is not affected, suggesting that TOP is also not consistently affected by the presence of narrow focus.

A second question, (Q2), probed the effect of the contrastiveness of focus in narrow focus sentences. We have found that the observed phonetic focus effects were not enhanced by the contrastiveness of the focus on the focused VM itself. Instead, the background part following the focus was made less prominent, as reflected in an increase in the count of deaccented Post-V elements. The results also provide indirect evidence that the pre-focal background element, i.e., TOP, is made less prominent as well. In particular, more rising and flat realizations, and fewer falling contours occurred if TOP was followed by a contrastive focus. Based on the fact that givenness had a similar effect on the realization of TOP, we assume that the higher frequency of flat and/or rising realizations of TOP, and a concomitant lower occurrence rate of falling contours, is indicative of its decreased prosodic prominence.

Our third question, (Q3), was directed at the effect of givenness on the realization of the background and the narrow focus. First, the data show that the status of being given has an independent effect on the prosodic realization of the background. In the background of a narrow focus, given TOPs are more often realized with a rising movement (as also suggested by Sneed 2004) and less often realized with a falling contour than non-given TOPs. In addition to the difference in contour type, given TOPs were made additionally less prominent by a systematic lowering of their F0 peak. In the post-focal domain, givenness of the background leads to more frequent deaccenting. It can be concluded from this that the prosodic marking of (narrow) focus and givenness are independent of each other.

7.2. Prosodic phrasing and the location of nuclear accent

Our data also have some implications for the discussion of the default prosodic phrasing in Hungarian, discussed in section 2.2.2. The three main options that have been suggested are repeated below.

(6) a. (TOP)$_{\iota}$ (VM V YP ZP)$_{\iota}$
b. (TOP VM V YP ZP)$_{\iota}$
c. (TOP (VM V YP ZP)$_{\iota}$)$_{\iota}$

The data of the scaling relation between the F0 maxima of TOP and that of VM (section 5.2.3) suggest that the typical phrasing in broad focus is (6b), with the topic and the comment forming a single intonational phrase. This is because in broad focus contexts the F0-peak of VM is typically downstepped from the F0-peak of the TOP (in the "falling TOP" contour type). Taking downstep to indicate the lack of an intonational phrase boundary, we conclude that broad focus sentences in our data most frequently form a single intonational phrase.[26]

If correct, this means that the results go against the suggestion made by many researchers (Vogel and Kenesei 1987, Kenesei and Vogel 1989, Varga 1998, 2001, and Hunyadi 1999) that the topic always forms a separate ι. Varga's (1983) claim that (6b) is unavailable if either the topic or the comment contains more than one accent, was also not supported by our data, given that broad focus sentences were often realized as a single ι with TOP, VM and Post-V all accented in our data. Furthermore, É. Kiss' (1998, 1994, 2002) assumption that topic and comment form a single ι if and only if topic is unaccented was also disconfirmed, because we found many cases of the falling TOP contour followed by a downstepped falling contour on the VM, which indicates the accentedness of both TOP and VM within a single ι. The other contour type, rising TOP, also does not speak against one single ι, because TOP and VM form a plateau, which signals prosodic coherence between the two. This result apparently contrasts Hungarian with languages that have been claimed to realize the topic as forming a separate intonational phrase, with a closing ι-boundary following it (see e.g., Frascarelli 2000, Féry 2006, Feldhausen 2010).[27]

Furthermore, the above consequences for phrasing also bear on the issue of the position of the nuclear pitch accent in Hungarian. As noted in section 2.2.2, according to one prominent view, whether or not a sentence contains an overt topic, the nuclear prominence is assigned by default to the immediately pre-verbal VM element (É. Kiss 1988, 1994, 2002, Szendrői 2003). But, assuming that this alignment of the nuclear stress is modeled as left-headedness of intonational phrases, in cases in which the topic and the comment form a single intonational phrase as in (6b), the nuclear stress is

[26] The falling contour with downstep in a broad focus context from TOP to VM is parallel to what Rosenthall (1992) and Sneed (2004) observed. On the other hand, contrary to Rosenthall (1992), who observed a downstep from the preceding (non-given) TOP to the following narrowly focused element, the scaling relation between TOP and a focused VM is characterized by pitch reset (or often even upstep), which is brought about by an increase of the prosodic prominence of VM. This reset pattern is parallel to what Surányi, Ishihara and Schubö (2012) report for non-VM foci.

[27] Various constraints have been proposed to give rise to this effect, including Frascarelli's (2000) Topic Prosodic Domain constraint and Féry's (2011) TOPIC constraint (requiring the topic to be minimally and exhaustively contained in a separate intonational phrase).

predicted to be realized on the topic constituent, rather than on the constituent in the immediately pre-verbal position.[28]

7.3. Implications for theories of contrast and givenness

Finally, our results have potential repercussions for theories of contrast and givenness. As pointed out in section 2.1, it is a controversial question what notion of contrast is relevant to contrastive focus and how it is best modelled by the theory of information structure. We found that while the (non-)contrastiveness of narrow focus does not have a systematic prosodic effect on the realization of the focused element, it affects the realization of the background, whose prominence decreases if the narrow focus is contrastive. This fact supports approaches to contrastive focus according to which contrastiveness presupposes the presence of other propositions in the Common Ground that are focus-alternatives to the current proposition (namely, propositions that differ from it only with respect to the element that is contrastively focused) (Krifka 2008). According to É. Kiss (1998: 267-268), contrastiveness in addition requires that these alternative propositions be clearly identifiable and known to the interlocutors. Zimmermann (2008), on the other hand, suggests that when focus is contrastive, some of the alternative propositions are more expected than the proposition containing the focused element. Given that focusing itself already presupposes the relevance of alternative propositions to the interpretation of the current sentence (see section 2.1), either of these accounts will have the consequence that the background is more salient if the focus is contrastive than when it is non-contrastive. This in turn explains why the contrastiveness of the focus can be marked by reducing the prominence of the background: this marks the relative salience of the background.

A second implication concerns the relation of focus and givenness. Our study clearly suggests that salience (givenness) is independent of being in the background of focus: givenness had an independent effect on the realization of the background. This finding lends support to the view that focus on the one hand and salience/givenness (or related notions such as anaphoricity) on the other are independent information statuses, having independent effects (e.g., Reinhart 2006, Féry & Samek-Lodovici 2006, Selkirk 2008). Under the alternative view, according to which focus status is viewed as being "non-given" (e.g., Schwarzschild 1999; cf. also Wagner 2012 for a unified account of focus and givenness), this prosodic finding would be difficult to explain.

7.4. Some questions for further research

Before concluding it may be useful to point out some empirical questions related to central concerns of this paper that our experiment was not intended to address, but which would be worth investigating in future research. These questions are of course taken to be additional to the general issue that our production study naturally triggers, namely that of the perceptual relevance of the findings we report.

We did not take a position with regard to whether and how narrow focus may alter prosodic phrasing (see, among others, Féry 2011 for related discussion). At present, too little is known empirically about phonetic or phonological cues of either intonational or phonological phrase boundaries. In this regard, the interpretation of the reset we observed in narrow focus conditions greatly depends on one's assumptions

[28] This, in turn, is apparently at odds with the assumption that topics are 'extrametrical' in Hungarian, and with the conception that syntactic focus-fronting is triggered in order to bring the focus to the position of default nuclear stress (Szendrői 2003).

concerning the relation of reset and phrasing. One possibility is that it indicates the presence of an intonational phrase boundary immediately preceding the narrow focus. In accord with this assumption, a pause occurred more often before VM in our data set when VM was a narrow focus than in broad focus sentences. However, the relative frequencies are too low for meaningful statistical analysis. Clearly, more needs to be established about reflexes of prosodic phrasing in Hungarian before any strong claims can be formulated regarding the possible effects of narrow focusing on prosodic phrasing.

Depending on one's theoretical premises, prosodic phrase structure has close ties to deaccenting (assuming that each phonological phrase contains exactly one pitch accented syllable, see Ladd 2008, Féry and Samek-Lodovici 2006) and downstep (assuming that either phonological or intonational phrases, or both, are domains of downstep). With regard to the former, a particularly thorny empirical issue is how to reliably differentiate, using acoustic measurements, occurrences of pitch accents from prosodic word level stress. This task is especially challenging in the post-verbal domain (given the relatively high rate of creakiness in this region), and even more so in a post-focal context, where compression takes place. In principle, downstep itself may reveal the presence of pitch accents (cf. Kügler & Féry 2014). Needless to say, finding out about post-verbal, and particularly, post-focal, downstep requires transcending the same difficulties that we have just noted in relation to deaccenting.

The variation found in the realization of (non-contrastive) topics is another potential target for empirical research. Some of this variation may turn out to stem from inter- or even intra-speaker differences in evaluating the relation of target sentences to discourse structure. It seems likely that the prosody of topics is affected also by the prosodic context supplied by the preceding and the following material within the same sentence. Here we examined one type of such potential effects, namely the effect of prosodic changes due to narrow (contrastive or non-contrastive) focusing immediately following the topic. The prosody of the topic may be affected more radically if the focus that it is followed by (be it verum focus or term focus) bears an L* accent, as in polar questions, rather than the H*+L accent characteristic of declarative sentences (cf. footnote 16).

A very different aspect of the prosodic context that is likely to bear on the prosodic realization of the topic is its prosodic length, and especially, its syntactic and prosodic complexity. Our target sentences involved short, one-word topics only. It remains an open question whether and how those effects of (contrastive and non-contrastive) narrow focusing on the preceding topic that have been identified in the present paper carry over to topics comprising several phonological phrases. It can potentially shed more light on the prosodic structure of topics and topicalization if it can be ascertained whether any such influences may affect the entire topic phrase, or only its last phonological phrase.

8. Conclusion

Summing up, in this paper we explored various phonological and phonetic aspects of focus realization in Hungarian, an obligatory syntactic focus marking language. The results of our experiment show that various phonetic measures as well as categorical factors such as the distribution of contour types are affected by the focus-related factors. The phonetic effects found are mostly parallel to those in typical prosodic focus-

marking languages like English. The relative prominence of the focus compared to the background is realized by extending the prosodic prominence of the focus (in terms of F0-peak and steepness of fall), and to some extent, by reducing the prominence of the background.

Contrastiveness of the narrow focus has no effect on the prominence of the narrowly focused element itself, instead, it reduces the prominence of the background more than non-contrastive narrow focus does. Givenness (discourse-salience) of the background reduces the prominence of the background, without concomitantly reducing the phonetic prominence of the narrow focus. The prosodic marking of givenness is therefore distinct from the marking of background status, and it is not simply the flip side of marking another, non-given element as the focus.

Appendix A. Material

(15)	TOP	VM	V	(PRT)	YP	ZP = [TARGET]
	Imre	New Yorkba	helyezte	(át)	Linát	képviselönek.
	Imre	New York.to	reassigned	PRT	Linát.ACC	representative.as.a.

'Imre reassigned Lina to New York as a representative.'

(16) a. Broad focus
Our company was present in the States for some time now, but we haven't really been able to grow. In last October there was finally some change. [TARGET (without PRT "át")] Since she has been out there, we get a lot more orders form the US.

b. –Contrastive focus, –Given background:
An unexpected thing happened. [TARGET] We thought that the management wanted Lina to work in expanding the markets in the far east, because of this we were surprised about the decision.

c. –Contrastive focus, +Given background:
A: Where did Imre reassign Lina as a representative?
B: [TARGET]

d. +Contrastive focus, –Given background:
[TARGET]..., and not to Washington. Even though this is not what he promised her.

e. +Contrastive focus, +Given background:
A: Did Imre reassign Lina as a representative to Washington?
B: No! [TARGET]

Acknowledgements

We would like to thank Andrea Deme, Ádám Szalontai and Gergő Turi for their help with various stages of the experiment and the annotation. We would also like to thank the audiences at TIE 5 (Oxford), DGfS 35 (Potsdam), the Phonology-Syntax Circle at ZAS (Berlin) for their remarks, as well as the editors of this special issue and three anonymous reviewers for their helpful comments on the previous versions of this paper. All remaining errors are ours. The support of Momentum grant no. 2011-013 of the

Hungarian Academy of Sciences, HSRF grant no. NF-84217, and MÖB-DAAD researchers' exchange grant no. 39933 is gratefully acknowledged.

References

Ariel, M. 1990. Accessing Noun-phrase Antecedents. London: Routledge.

Barr, D. J., Levy, R., Scheepers, C., Tilly, H. J. 2013. Random effects structure for confirmatory hypothesis testing: Keep it maximal. Journal of Memory and Language, 68, 255–278.

Baayen, R. H. 2008. Analyzing Linguistic Data: A Practical Introduction to Statistics using R. Cambridge University Press.

Bates, D. M., Maechler, M., Bolker, B. 2012. lme4: Linear mixed-effects models using S4 classes.

Baumann, S. 2006. The Intonation of Givenness. Niemeyer, Tübingen.

Baumann, S., Grice, M. 2006. The intonation of accessibility. Journal of Pragmatics 38(10), 1636–1657.

Baumann, S., Riester, A. 2012. Referential and Lexical Givenness: Semantic, Prosodic and Cognitive Aspects. In: Elordieta, G., Prieto, P. (Eds.), Prosody and Meaning, Interface Explorations vol. 25. Mouton De Gruyter, Berlin/New York, pp. 119–162.

Boersma, P., Weenink, D. 2013. Praat: doing phonetics by computers. http://www.praat.org.

Beaver, D. I., Clark, B. Z. 2008. Sense and Sensitivity: How focus determines meaning. Blackwell, Oxford.

Breen, M., Fedorenko, E., Wagner, M., Gibson, E. 2010. Acoustic correlates of information structure. Language and Cognitive Processes 25(7–9), 1044–1098.

Burdin, R. S., Phillips-Bourass, S., Turnbull, R., Yasavul, M., Clopper, C. G., Tonhauser, J. This volume. Variation in the prosody of contrastive focus in head- and edge-marking languages. Ms., Ohio State University.

Büring, D. 1997. 59th street bridge accent on the meaning of topic & focus. Routledge, London.

Büring, D. 2009. Towards a typology of focus realization. In: Zimmermann, M., Féry, C. (Eds.), Information Structure: Theoretical, Typological, and Experimental Perspectives. Oxford University Press, Oxford, pp. 177–205.

Büring, D. 2013. A theory of second occurrence focus. Language and Cognitive Processes. DOI 10.1080/01690965.2013.835433.

Calhoun, S. 2010. The centrality of metrical structure in signaling information structure: A probabilistic perspective. Language 86(1), pp. 1–42.

Calhoun, S. This volume. The interaction of prosody and syntax in Samoan focus marking. Ms., Victoria University of Wellington.

Chafe, W. L. 1976. Givenness, contrastiveness, definiteness, subjects, topics and point of view. In: Charles N. Li (Ed.), Subject and Topic, Academic Press, New York, pp. 27–55.

Chafe, W. L. 1994. Discourse, Consciousness, and Time: The Flow and Displacement of Conscious Experience in Speaking and Writing. University of Chicago Press, Chicago.

van Deemter, K. 1994. What's new? A semantic perspective on sentence accent. Journal of Semantics 11, pp. 1–31.

van Deemter, K. 1999. Contrastive stress, contrariety, and focus. In: Peter Bosch and Rob van der Sandt (Eds.), Focus: Linguistic, Cognitive, and Computational Perspectives. Cambridge University Press, Cambridge, UK, pp. 3–17.
É. Kiss, K. 1988. Még egyszer a mondat intonációjáról és hangsúlyozásáról. [Revisiting the intonation and stressing of the sentence.] Nyelvtudományi Közlemények 89, pp. 1–52.
É. Kiss, K. 1994. Sentence structure and word order. In: Kiefer, F., É. Kiss, K. (Eds.), Syntax and Semantics: The Syntactic Structure of Hungarian. Academic Press, New York, pp. 1–90.
É. Kiss, K. 1995. Introduction. In: É. Kiss, K. (Ed), Discourse Configurational Languages. Oxford University Press, Oxford, pp. 3–28.
É. Kiss, K. 1998. Identification focus and information focus. Language 74, pp. 245–341.
É. Kiss, K. 2002. The Syntax of Hungarian. Cambridge University Press, Cambridge, UK.
Feldhausen, I. 2010. Sentential Form and Prosodic Structure of Catalan. Amsterdam: John Benjamins.
Féry, C. 2006. The prosodic basis of topicalization. In: Schwabe, K., Winkler, S. (Eds.), On Information Structure, Meaning and Form. Benjamins: Amsterdam/ Philadelphia, pp. 69-86.
Féry, C. 2011. German sentence accents and embedded prosodic phrases. Lingua 121(13), pp. 1906-1922.
Féry, C. 2013. Focus as prosodic alignment. Natural Language and Linguistic Theory 31(3), 683–734. DOI: 10.1007/s11049-013-9195-7.
Féry, C., Samek-Lodovici, V. 2006. Focus Projection and Prosodic Prominence in Nested Foci. Language 82(1), 131–150.
Fónagy, I. 1998. Intonation in Hungarian. In: Hirst, D., Di Cristo, A. (Eds.), Intonation systems: A survey of twenty languages. Cambridge University Press, Cambridge, UK. pp. 328–344.
Frascarelli, M. 2000. The Syntax-Phonology Interface in Focus and Topic Constructions in Italian. Kluwer: Dordrecht.
Frascarelli, M., Hinterhölzl, R. 2007. Types of topics in German and Italian. In: Winkler, S., Schwabe, K. (Eds.), On Information Structure, Meaning and Form. John Benjamins, Amsterdam/ Philadelphia. pp. 87–116.
Frota, S. 2000. Prosody and focus in European Portugese. Phonological phrasing and intonation. Garland Publishers, New York.
Gécseg, Z., Kiefer, F. 2009. A new look at information structure in Hungarian. Natural Language and Linguistic Theory 27, 583–622.
Geurts, B., van der Sandt, R. 2004. Interpreting focus. Theoretical Linguistics 30: 1–44.
Givón, T. 1983. Topic continuity in discourse: an introduction. In: Givón, T. (Ed.), Topic continuity in discourse: A quantitative cross-language study. John Benjamins, Amsterdam/Philadelphia. pp. 1–42.
Givón, T., 1990. Syntax: A Functional-Typological Introduction. Vol. 2, Benjamins, Amsterdam.
Gósy, M., Terken, J. 1994. Question marking in Hungarian: Timing and height of pitch peaks. Journal of Phonetics 22(3), 269–281.
Gundel, J., Hedberg, N., Zacharski, R. 1993. Cognitive status and the form of referring expressions in discourse. Language 69, 274–307.
Gussenhoven, C. 2004. The Phonology of Tone and Intonation. Cambridge University Press, Cambridge, UK.

Gussenhoven, C. 2008. Types of Focus in English. In: Lee, C., Gordon, M., Büring, D. (Eds.), Topic and Focus: Cross-linguistic Perspectives on Meaning and Intonation. Springer, Heidelberg, New York, London, pp. 83–100.
Gyuris, B. Mády, K. To appear. Contrastive topics between syntax and pragmatics in Hungarian: an experimental analysis. In: Proceedings from the Annual Meetings of the Chicago Linguistics Society 46 (CLS 46). Chicago Linguistic Society, Chicago, IL.
Halliday, M. 1967. Notes on transitivity and theme in English, Part II. Journal of Linguistics 3, 199–244.
Hedberg, N. 1990. Discourse Pragmatics and Cleft Sentences in English. PhD dissertation, University of Minnesota.
Hanssen, J., Peters, J., Gussenhoven, C. 2008. Prosodic Effects of Focus in Dutch Declaratives. In: Proceedings of Speech Prosody 2008, Campiñas, Brazil, pp. 609–612.
Hunyadi, L. 1999. The outlines of a metrical syntax of Hungarian. Acta Linguistica Hungarica 46(1–2), 69–93.
Hunyadi, L. 2002. Hungarian Sentence Prosody and Universal Grammar. Peter Lang, Frankfurt am Main.
Kálmán, L. 1985. Word Order in Neutral Sentences, Word Order in Non-Neutral Sentences. In: Kenesei, I. (Ed.), Approaches to Hungarian 1. JATE, Szeged, pp. 11–38.
Kálmán, L., Nádasdy, A. 1994. A hangsúly. [Stress] In: Kiefer, F. (Ed.), Strukturális Magyar Nyelvtan Vol. 2. Fonológia. Akadémiai, Budapest, pp. 393–467.
Katz, J. & E. Selkirk. 2011. Contrastive focus vs. discourse-new: Evidence from phonetic prominence in English. *Language* 87(4), 771–816.
Kenesei, I. 1986. On the logic of word order in Hungarian. In: Abraham, W., de Meij, S. (Eds.), Topic, Focus, and Configurationality. John Benjamins, Amsterdam, pp. 143–159.
Kenesei, I., Vogel, I. 1989. Prosodic phonology in Hungarian. Acta Linguistica Hungarica 39, 149–193.
Kenesei, I., Vogel, I. 1998. A fókusz fonológiai szerkezete [The phonological structure of focus]. In: Péter, M. (Ed.), Általános Nelvészeti Tanulmányok XIX, Budapest, pp. 79–119.
Kornai, A., Kálmán, L. 1988. Hungarian sentence intonation. In: van der Hulst, H., Smith, N. (Eds.), Autosegmental Autosegmental studies on pitch accent. Foris, Dordrecht, pp. 183–195.
Krifka, M. 2006. Association with focus phrases. In: Molnár, V., Winkler, S. (Eds.), The architecture of focus. Mouton de Gruyter, Berlin, pp. 105–36
Krifka, M. 2008. Basic Notions of Information Structure. Acta Linguistica Hungarica 55, 243–276.
Kügler, F., Féry, C. 2014. Post-focal downstep in German. Unpublished ms., University of Potsdam and Goethe University Frankfurt.
Kügler, F., Genzel, S. 2012. On the prosodic expression of pragmatic prominence: the case of pitch register lowering in Akan. Language and Speech, 55, 331–359.
Ladd, D. R. 1980. The Structure of Intonational Meaning: Evidence from English. Indiana University Press, Bloomington.
Ladd, D.R. 2008. Intonational Phonology (second edition). Cambridge University Press, Cambridge.
Lambrecht, K. 1994. Information Structure and Sentence Form. Cambridge University Press, Cambridge, UK.

Nespor, M., Vogel, I. 1986. Prosodic Phonology. Foris Publications, Dordrecht.
Percus, O. 1997. Prying open the cleft. In: Proceedings of the North East Linguistic Society 27 (NELS 27). GLSA, University of Massachusetts, Amherst, Amherst, Massachusetts, pp. 337–352.
Pierrehumbert, J., Hirschberg, J. 1990. The meaning of intonational contours in the interpretation of discourse. In: Cohen, P., Morgan, J., Pollack, M. E. (Eds.), Intentions in Communication, Chapter 14. MIT Press, Cambridge, MA, pp. 271–311.
Prince, E. F. 1978. A comparison of wh-clefts and it-clefts in discourse. Language 54, 883–906.
Prince, E. F. 1981. Toward a taxonomy of Given-New information. In: Cole P. (Ed.), Radical Pragmatics. Academic Press, New York, pp. 223–256.
Prince, E. F. 1992. ZPG letter: Subjects, definiteness, and information-status. In: Thompson, S. and Mann, W. (Eds.), Discourse description: diverse analyses of a fund raising text. John Benjamins, Philadelphia/Amsterdam, pp. 294–325.
Reinhart, Tanya. 2006. Interface strategies: Optimal and costly computations. MIT Press: Cambridge, MA.
Remijsen, B., van Heuven, V. J. 2005. Stress, tone, and discourse prominence in the Curaçao dialect of Papiamentu. Phonology, 22(2), 205–235.
Repp, S. 2009. Defining 'contrast' as an information-structural notion in grammar. Lingua 120, 1333-1345.
Riester, A. Piontek, J. This volume. Anarchy in the NP: When new nouns get deaccented and given nouns don't. Ms, University of Stuttgart and University of Göttingen.
Roberts, C. 1996. Information Structure in Discourse: Towards an Integrated Formal Theory of Pragmatics. In: Yoon, J.-H., Kathol, A. (Eds.), OSU Working Papers in Linguistics No. 49: Papers in Semantics. The Ohio State University, pp. 91–136.
R Development Core Team. 2014. R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria, URL http://www.R-project.org, ISBN 3-900051-07-0.
Rooth, M. 1985. Association with Focus. Ph. D. thesis, University of Massachusetts, Amherst.
Rooth, M. 1996. On the interface principle for intonational focus. In: Galloway, T., Spence, J. (Eds.), The Proceedings of SALT 6. CLC Publications, Cornell University, Ithaca, NY, pp. 202–226.
Rooth, M. 1999. Association with focus or association with presupposition? In: Bosch, P., van der Sandt, R. (Eds.), Focus: Linguistic, Cognitive, and Computational Perspective, Chapter 12. Cambridge University Press, Cambridge, UK, pp. 232–244.
Rosenthall, S. 1992. The intonation of simple sentences in Hungarian. In: L. S. S. et al. (Ed.), Proceedings of the Third Formal Linguistics Society of Midamerica 3. UILS, Bloomington, Indiana, pp. 297–310.
Sauerland, U. 2005. Don't interpret focus: Why a presuppositional account of focus fails, and how a presuppositional account of givenness works. In: Proceedings of Sinn und Bedeutung 9. University of Nijmegen. pp. 370–384.
Schwarzschild, R. 1999. Givenness, AvoidF and other constraints on the placement of accent. Natural Language Semantics 7, 141–177.
Selkirk, E. 1984. Phonology and Syntax: The Relation between Sound and Structure. MIT Press, Cambridge, Mass.
Selkirk, E. 1986. On derived domains in sentence prosody. Phonology Yearbook 3, 371–405.

Selkirk, E. 2002. Contrastive FOCUS vs. presentational focus: Prosodic evidence from right node raising in English. In: B. Bel and I. Marlien (Eds.), Speech Prosody 2002, Aix-en-Provence, France, pp. 643–646.
Selkirk, E. 2008. Contrastive focus, givenness and the unmarked status of "discourse-new". Acta Linguistica Hungarica 55, 331–346.
Sneed, E. 2004. Structural focus and prosodic focus in Hungarian. In: CLS, Volume 40, Chicago, IL. Chicago Linguistic Society.
Surányi, B. 2009. Verbal particles inside and outside *v*P. Acta Linguistica Hungarica 56, 201–249.
Surányi, B., Ishihara, S. Schubö, F. 2012. Syntax–prosody mapping, topic–comment structure and stress–focus correspondence in Hungarian. In: Elordieta Alcibar, G. Prieto, P. (Eds.) Prosody and Meaning. Mouton de Gruyter, Berlin, pp. 35–72. DOI: 10.1515/9783110261790.35.
Szabolcsi, A. 1994. All quantifiers are not equal: The case of focus. Acta Linguistica Hungarica 42, 171–187.
Szendrői, K. 2003. A stress-based approach to the syntax of Hungarian focus. The Linguistic Review 20, 37–78.
Truckenbrodt, H. 1995. Phonological Phrases: Their Relation to Syntax, Focus, and Prominence. Ph. D. thesis, Massachusetts Institute of Technology.
Turk, A., Nakai, S., Sugahara, M. 2006. Acoustic segment durations in prosodic research: A practical guide. In: Sudhoff, S., Lenertová, D., Meyer, R., Pappert, S., Augurzky, P., Mleinek, I., Richter, N., Schließer, J. (Eds.), Methods in empirical prosody research. Mouton de Gruyter, Berlin, pp. 1–27.
Vallduví, E. 1992. The Informational Component. Garland, New York.
Varga, L. 1975. A contrastive analysis of English and Hungarian sentence prosody. The Hungarian – English Contrastive Linguistics Project, Budapest.
Varga, L. 1983. Hungarian sentence prosody: An outline. Folia Linguistica XVII, pp. 117–151.
Varga, L. 1988. Hozzászólás egy hangsúlytanulmányhoz. [A note on a study of stress.] Nyeltudományi Közlemények 89, pp. 53–66.
Varga, L. 1996. Hungarian intonation contours. In: The Even Yearbook 2. ELTE SEAS Working Papers in Linguistics. ELTE, Budapest. pp. 111–144.
Varga, L. 1998. The intonational phrase and secondary intonational phrase formation in Hungarian. In: The Even Yearbook 2. ELTE SEAS Working Papers in Linguistics. ELTE, Budapest, pp. 251–263.
Varga, L. 2001. A magyar intonációs frázis és annak kettébontása. [Splitting the Hungarian intonational phrase.] Újabb tanulmányok a strukturális magyar nyelvtan és a nyelvtörténet köréből. Kiefer Ferenc tiszteletére barátai és tanítványai. Osiris, Budapest, pp. 304–323.
Varga, L. 2002. Intonation and Stress: Evidence from Hungarian. Palgrave Macmillan, London.
Vogel, I., Kenesei, I. 1987. The interface between phonology and other components of grammar: The case of Hungarian. Phonology Yearbook 4, 243–263.
Wagner, M. 2006. Givenness and Locality. In: M. Gibson & J. Howell (Eds.), Proceedings of SALT XVI. Ithaca, CLC Publications, New York. pp. 295–312.
Wagner, M. 2012. Focus and Givenness: A unified approach. In: Kucerová, I., A. Neeleman, A. (Eds.), Information Structure: Contrasts and Positions, Cambridge University Press, Cambridge.

Zerbian, S., Genzel, S., Kügler, F. 2010. Experimental work on prosodically-marked information structure in selected African languages (Afroasiatic and Niger-Congo). In: Proceedings of Speech Prosody 2010, Chicago.
Zimmermann, M. 2008. Contrastive Focus and Emphasis. Acta Linguistica Hungarica 55, pp. 347-360.