

# Prosodic Realization of Topics

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**Abstract.** This paper presents the results of a pilot study aiming to investigate the prosodic realization of topichood in Greek, focusing particularly on the realization of different types of topics. Topic-less sentences, “simple”, contrastive and corrective topics were compared through controlled data collection on the basis of both phonological and phonetic criteria. Analysis showed that only corrective topics bear distinct phonological (L+H\* pitch accent) and phonetic (increased F0, duration and intensity) correlates. Having ascribed this distinct prosodic marking to a contrast feature operating within the topic rather than the topic itself, we consider the above results as evidence supporting the claim that topichood is not reflected on prosody at least with regards to pitch accent type and the phonetic parameters assessed.

**Keywords:** sentence topics, contrast, correction, prosody, information structure

## 1. Introduction

Information Structure (IS) may be marked by devices such as morphemes, word order and prosodic prominence. Furthermore, different languages may employ different means in order to encode IS components, such as topics or foci. This paper presents an empirical study of the prosodic correlates of topics in Modern Greek, focusing on the prosodic realization of different types of topics, namely “simple” non-contrastive topics, contrastive topics and corrective topics (often subsumed under contrastive topics). In the following sections we first briefly present the various notions of topichood found in the literature and explain the topic types examined here along with the motivation behind this study. We then present the experimental setup, outline the results and finally discuss major findings in light of the theoretical issues set out in the introductory section.

### 1.1 Topichood

Topichood is considered to be one of the main components of the Information Structure (IS) of the utterance. Depending on the theoretical approach, it has been associated with notions such as aboutness, contextual anchoring and boundness, presupposition and low informativeness. Accordingly, different terminologies have been used to denote a similar yet not identical perception of topichood. In particular, topic (or theme or ground, depending on the approach) has been informally defined as “what the sentence is about” (Halliday 1967; Mathesius 1975; Gundel 1989), “a presupposed open proposition” (Lambrecht 1996; Chomsky 1971; Jackendoff 1972), “the part of the utterance which connects it to the previous discourse reflecting the context” (Steedman 2000), “the sentence element carrying the lowest degree of communicative dynamism” (Firbas 1964), “a vehicular frame for the informative

focus ... indicating to the hearer where and how the information must be entered” (Vallduvi 1992; Reinhart’s (1982) file card metaphor). What’s common in all the above approaches is that the utterance part associated with topichood stands in relational contrast with a more informative part, that part being for example the focus, theme or comment.

Several researchers (Büring 1997; Jacobs 2001; Frascarelli & Hinterhölzl 2006) went on to propose different types of topics as well. In this paper the following main types are addressed: simple, contrastive and corrective topics. Examples 1a – 1c are examples of each type respectively.

- (1a) What did the Italian tourist want?  
[The Italian tourist]<sub>ST</sub> wanted to rent a car [Simple Topic]
- (1b) What did the tourists want?  
The British tourist wanted to rent a room, [the ITALIAN tourist]<sub>ConT</sub> wanted to rent a car [Contrastive Topic]
- (1c) What did the British tourist want?  
[The ITALIAN tourist]<sub>CorT</sub> wanted to rent a car [Corrective Topic]

All three types of topics display differences with respect to a) their information status within the discourse and b) topic progression<sup>1</sup>, i.e. topic continuity vs. topic shift. In particular, simple topics prototypically constitute expressions that have already been mentioned in the previous discourse. Following Prince’s (1981) taxonomy, they refer to discourse old and hearer old, evoked entities, already present and activated in the discourse model. Contrastive topics, on the other hand, may refer to entities either evoked or inferable. Therefore, even if they haven’t been previously mentioned (discourse new), they are somehow related to a previously mentioned entity and can be inferred from prior context. To be more precise – following a more general definition of contrast – they are members of an already established closed set of entities. Accordingly, in Example 1b the new contrastive topic “Italian tourist” stands in a set membership relationship with the word “tourists”. As such it introduces a partial topic shift forming a subset of the previous established topic. On the contrary, corrective topics result in a complete topic shift. They correct a misconception on the part of the hearer replacing an existing piece of knowledge in his knowledge store and introducing a completely new topic. They prototypically refer to inferable entities. It should be made clear, however, that referential status may serve only as an indication for the identification of different topic types<sup>2</sup>.

Whilst the definition of topics in general involves a horizontal, syntagmatic contrast between parts of the utterance (e.g. theme vs. rheme), the definition of different types of topics involves a vertical, paradigmatic contrast among discourse entities (or other topics). This opposition has been made explicit in the works of Gundel (2003), Vallduvi & Vilkuna (1998), Steedman (2000) and Büring (2007) among others. The last three identify a common contrast feature functioning both

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<sup>1</sup> Topic progression here primarily refers to a topic – subtopic relation in the sense of Büring’s (2003) Question Under Discussion (QUD) approach.

<sup>2</sup> In contrast, different topics could be distinguished with greater consistency on the basis of a more “informational” approach, such as Vallduvi’s (1992) information packaging, whereas contrastive topics can be thought of as links sharing instructions as to how the new information (focus) should be added to the hearer’s knowledge store, while corrective topics involve replacing a piece of knowledge already added to the hearer’s knowledge store.

within the topic (or theme) and comment (or focus or rheme) of the utterance, which is essentially responsible for marking both parts as contrastive (cf. Example 2).

(2) What did the tourists want?

The British tourist wanted to rent the blue car. [The ITALIAN<sub>C</sub> tourist]<sub>TOPIC</sub>  
[wanted to rent the RED<sub>C</sub> car]<sub>COMMENT</sub>.

### *1.2 Interaction between Topichood and Prosody*

It is generally acknowledged that there is an interaction between Information Structure (IS) and Prosody. Topichood, in particular, is claimed to associate with phrasing and accent type. It has been proposed, for example, that topic phrases correspond to phonological phrases (Büring 2003; Steedman 2000) and that different accents reflect themhood or rhemehood (Steedman 2000). This association, however, primarily refers to contrastive topics. It is the contrastive topics that are most commonly associated in the literature with particular contours (Jackendoff 1972; Ladd 1980; Liberman & Sag 1974; Büring 2003). Furthermore, the location of the Nuclear Pitch Accent (NPA) within the topic phrase is claimed to be determined by a low-level mechanism associated again with some notion of contrast (cf. Section 1.1). Simple topics, on the other hand, are often found prosodically unmarked. It is often that they are grammaticalized in ways not “relevant” to the prosodic module. For example, they can be pronominalized, and as pronouns they typically remain unaccented, cannot form phonological phrases on their own, and in pro-drop languages, such as Greek, may surface as phonetically null elements.

Therefore, given that a) simple topics often have no distinct prosodic correlates, and b) several theoretical frameworks (Steedman 2002; Büring 2007; Vallduvi & Vilkuña 1998; Krifka 2007) identify a common contrast feature which operates within both topic and focus in a similar manner, determining the location – at least – of the Nuclear Pitch Accent (NPA) within each IS component, a question is ultimately posed whether there is a distinct, clear representation of topichood in the prosody of the utterance.

To address this question the following hypothesis was tested: If topichood is reflected through phrasing and/or pitch accent type and location, then topic-less, all new sentences should display different prosodic patterns compared to sentences with topics. Furthermore, contrastive and corrective topics should be conveyed through different NPA types compared to contrastive or corrective foci. If the same NPA type is used instead, then it is merely a reflection of the same low level contrast feature.

On a final note, corrective topics and foci are often subsumed under contrastive topics and foci respectively, as they both share the property of contrasting to a salient limited set of alternatives. It has been argued, though, that for some languages at least, only corrective foci are contrastively marked. Gussenhoven (2007) presents examples from English, Efik and Basque, whereas corrective focus – as opposed to contrastive/narrow focus – is expressed differently than simple informational focus. Similarly, Krifka (2007) primarily associates the structurally marked notion of contrast to the notion of correction. Thus, this study distinguishes contrastive from corrective topic in an attempt to examine what is clearly – i.e. structurally encoded as – contrastive in Modern Greek.

## **2. Method – Experimental Design**

Four pragmatic conditions were tested: No Topic (i.e. all new sentences), Simple Topic, Contrastive Topic and Corrective Topic. Test material consisted of 7 utterances

per condition. Each utterance was produced twice once following a narration and once following a Q/A disambiguating context. All utterances were produced by 9 speakers of Athenian Greek resulting in 504 (4x7x2x9) tokens in total. Speakers read the materials in random order. Topics were sentence-initial, one and two content-word phrases. To avoid topic accommodation in all new sentences, a generic version of the utterances was used for the no topic condition; that is an indefinite noun phrase was used instead of a definite one, as definitiveness is often assumed to signal knowledge already present in the hearer’s knowledge store.

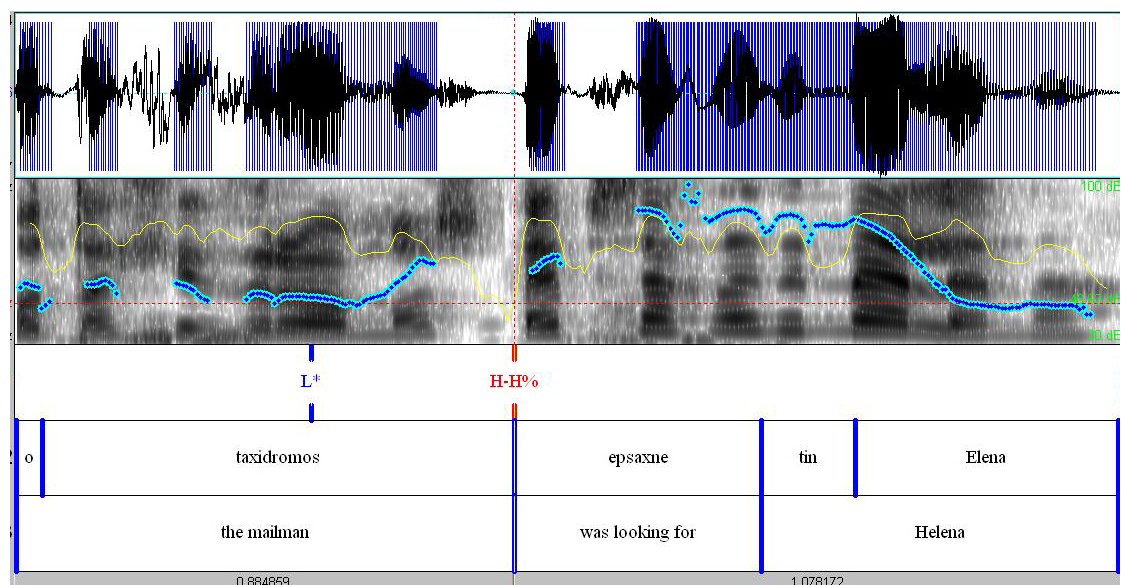
The four pragmatic conditions were compared on the basis of both phonological and phonetic criteria. In the first case, utterances were annotated for pitch accent type, boundary/phrase tone type and boundary strength (1, 2 and 3 break indices corresponding to prosodic words, intermediate phrases and intonation phrases respectively). Annotation was based on GRTToBI (Arvaniti & Baltazani 2005). In the second case, measurements were taken of mean F0 (vowel), F0 at vowel peak, vowel duration, mean intensity (vowel) and pre-boundary lengthening (duration from the onset of the last accented syllable until the end of the topic phrase). Pre-boundary lengthening was used as a more objective measurement of phrasing, likely to produce finer distinctions than a ToBI categorization.

### 3. Results

#### 3.1 Phonological Properties

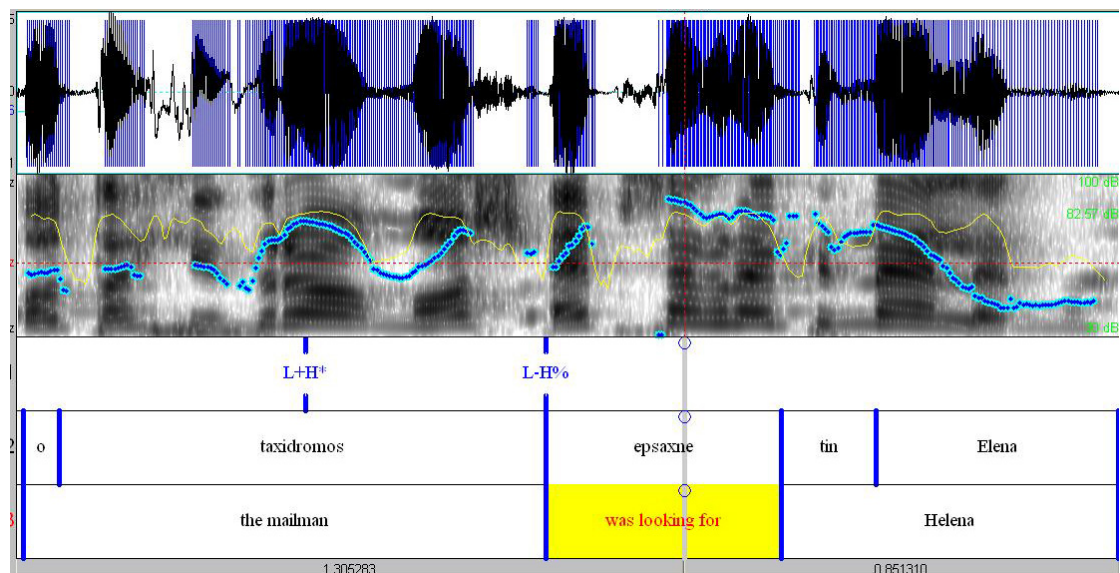
L\* / L\*+H (H-)H% was the typical contour for all new phrases, simple topics and contrastive topics, whilst L+H\* L-H% / L-L% was the typical contour for corrective topics. Figures 1 and 2 illustrate the different contours. In Figure 1 there is a low plateau corresponding to an L\* accent on “mailman”, whilst in Figure 2 there is a dip at the beginning of the accented syllable rising to a peak in the middle of the vowel, corresponding to an L+H\* accent in Greek.

Figure 1. Contrastive topic rendition (Context: “Two people came by today looking for your friends. The insurance guy was looking for Manos...”). Same contour was typically used for simple topics and all new sentences as well.

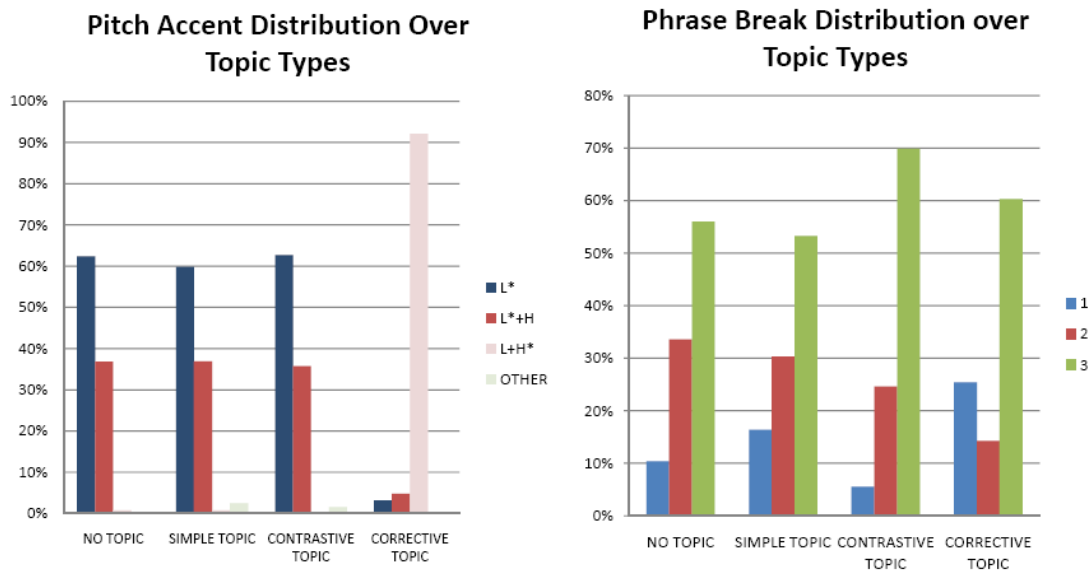


Graph 1 shows the distribution of pitch accent types and phrase breaks over the four pragmatic conditions examined. With regards to pitch accent type, corrective topic is clearly distinguished from the rest, since in over 90% of the cases an L+H\* accent is used instead of an L\* or L\*+H. Accent distribution proved to be statistically significant ( $p < 0.0001$  for all speakers). Phrase Break distribution, on the other hand, showed no statistically significant effect of pragmatic condition (P ranging from  $p < 0,07$  to  $p < 0,626$  depending on speaker). It should be noted here that the relatively high percentage of type 1 phrase break in the case of corrective topics is due to the fact that two speakers – in contrast to what was expected – dephrased and deaccented the rest of the utterance, giving utterance prominence to the topic rather than the focus phrase. There was still some emphasis on the focus word but it was uttered within a compressed pitch range resembling cases of second occurrence foci (Beaver et al. 2004).

Figure 2. Corrective topic rendition (Context: “Who was the insurance guy looking for?”).



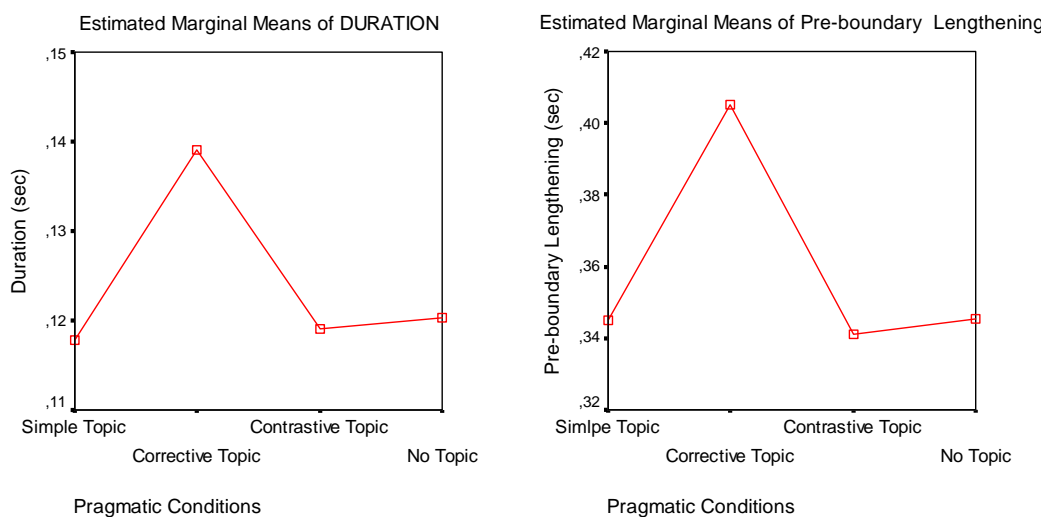
Graph 1. Pitch Accent and Phrase Break Distribution

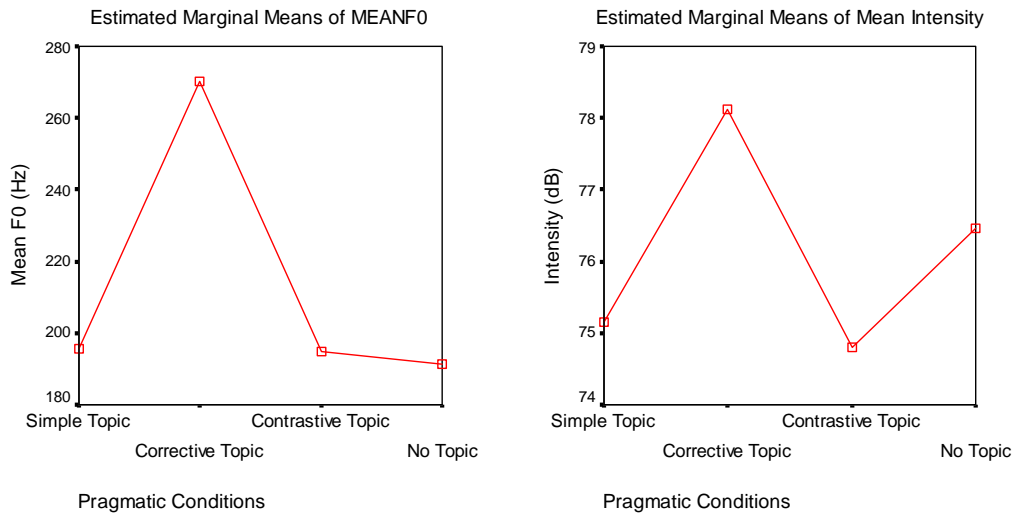


### 3.2 Phonetic Properties

Corrective topics were uttered with increased intensity, duration and preboundary lengthening (cf. Graph 2). There was also an increase in F0, which is to be expected, given the accent type that was most commonly used for each pragmatic condition. All dependent variables showed statistically significant effect ( $[F(3)=47,825, p<0,0001]$ ,  $[F(3)=23,505, p<0,0001]$ ,  $[F(3)=30,671, p<0,0001]$ ,  $[F(3)=417,944, p<0,0001]$ ,  $[F(3)=395,255, p<0,0001]$  for mean intensity, duration, pre-boundary lengthening, mean F0 and F0 at peak respectively). Post hoc Turkey and Bonferroni tests revealed that only corrective topics significantly differed in pairwise comparisons, except for the case of intensity, whereas topic-less phrases also differed.

Graph 2. Mean Duration, Pre-boundary Lengthening, F0 and Intensity





#### 4. Discussion

The results of the experiment presented here show that prosodic cues cannot clearly disambiguate among topic-less phrases, simple and contrastive topics. Only corrective topics are clearly and consistently distinguished from the other three cases on the basis of both phonological (L+H\* pitch accent) and phonetic (increased intensity, duration, F0) properties. Given that the L+H\* accent used in the case of corrective topics is also used to signal narrow focus (Arvaniti & Baltazani 2005) – that is to signal contrast within the focus rather than the topic part of the utterance – one could argue that it is not corrective topic per se that is expressed differently, but that the difference is due to a low-level contrast feature that functions within both topic and focus (cf. Steedman 2000; Büring 2007 among others), and that therefore the prosodic effect of corrective topics is actually a case of limited contrast/focus projection. The above argument is corroborated by the fact that in some languages, only corrective focus – as opposed to other types of foci – has distinct phonological correlates, and is therefore structurally contrastive<sup>3</sup> (Gussenhoven 2007). Greek only seems to mark correction, with regards to intonation at least. In short, if in the case of Greek, corrective is contrastive, and both contrastive topic and focus display similar behavior, then it is most likely that this similarity is due to the contrast feature they have in common.

Furthermore, analysis showed that the types of Nuclear Pitch Accent (NPA) and Boundary Tone used for all new phrases were the same for simple and contrastive topics, further supporting the claim that it is not topichood that is conveyed through pitch accent type. Besides, previous work (Baltazani & Jun 1999) has shown that, for Greek, the tonal pattern for topic in declaratives is the same as the tonal pattern for focus in interrogatives and vice versa, suggesting that it is the boundary tone that “selects” NPA type, ultimately associating the latter to the discourse role of the former. A similar high correlation between NPA type and Boundary Tone type has been shown by Dainora (2002).

The current study also revealed no statistical significance with regards to phrasing. The rendition, however, of all new utterances as well as topic phrases was rather marked, as subject phrases formed a separate Intonational Phrase in over 50% of all cases. This may be due to the experimental conditions involving read speech.

<sup>3</sup> This does not come as a surprise, as correction is a more cognitively loaded procedure, involving subtraction as well as addition of information to the hearer’s knowledge store.

Spontaneous speech, on the other hand, typically affects speech rate, which has been shown to affect phrasing (Jun 2003), and thus may exhibit differences in phrasing among the pragmatic conditions attested. Topics, in particular, would be more likely to pose a phrase break at their end (association of topics with phrasing has been noted, as topicalized objects triggering clitic doubling in Greek, typically form a separate phonological phrase as well). Examination of spontaneous speech could also provide insight to the role of ellipsis in signaling Information Structure, as topics – simple topics precisely – naturally constitute elidable material. Finally, even if in Greek, topichood is not expressed through prosody, at least with regards to the phonological and phonetic properties of accented words, as suggested in this study, there are still other devices made available through syntax or morphology serving that purpose, clitic doubling being one of them (Tsimpli 1995). The exact mapping between IS elements and other levels of the grammar has after all been an open research topic for linguists for over three decades.

## References

- Arvaniti A. & M. Baltazani (2005). "Intonational Analysis and Prosodic Annotation of Greek Spoken Corpora". In S-A. Jun (ed.), *Prosodic Typology: The Phonology of Intonation and Phrasing*. Oxford: Oxford University Press, 84-117.
- Baltazani M. & S-A. Jun. (1999). "Focus and topic intonation in Greek". *Proceedings of the XIVth International Congress of Phonetic Sciences* 2:1305-1308.
- Beaver D., C. Brady, E. Flemming, F. Jaeger & M. Wolters (2004). *When semantics meets phonetics: Acoustical studies of second occurrence focus*. Ms. Stanford University.
- Büring D. (2007). "Semantics, Intonation and Information Structure". In G. Ramchand and C. Reiss (eds), *The Oxford Handbook of Linguistic Interfaces*. Oxford University Press.
- Büring D. (2003). "On D-Trees, Beans, and B-Accents". *Linguistics & Philosophy* 26(5): 511–545.
- Büring D. (1997). *The Meaning of Topic and Focus-The 59th Street Bridge Accent*. London: Routledge.
- Chomsky N. (1971). "Deep Structure, Surface Structure, and Semantic Interpretation." In D. Steinberg and L. Jakobovits (eds), *Semantics*. Cambridge: Cambridge University Press, 183–216.
- Dainora A. (2002). "Does intonational meaning come from tones or tunes? Evidence against a compositional approach". *Speech Prosody-2002*: 235-238.
- Firbas J. (1964). "On Defining the Theme in Functional Sentence Analysis". *Travaux Linguistiques de Prague* 1: 267–280.
- Frascarelli M. & R. Hinterhölzl (2006). "Types of topics in German and Italian". In S. Winkler and K. Schwabe (eds), *On Information Structure, Meaning and Form*. Amsterdam & Philadelphia: John Benjamins, 87–116.
- Gundel J. (2003). "Information Structure and Referential Givenness/Newness: How Much Belongs in the Grammar?". *Proceedings of the HPSG03 Conference Michigan State University*. East Lansing. CSLI Publications.
- Gundel J. (1989). *The Role of Topic and Comment in Linguistic Theory*. Garland.
- Gussenhoven C. (2007). "Types of Focus in English". In C. Lee, M. Gordon, and D. Büring (eds), *Topic and Focus: Cross-linguistic Perspectives on Meaning and Intonation*. Heidelberg, New York, London: Springer, 83-100.
- Halliday M.A.K. (1967). "Notes on Transitivity and Theme in English, Part II". *Journal of Linguistics* 3:199–244.
- Jackendoff R. (1972). *Semantic Interpretation in Generative Grammar*. Cambridge, MA: MIT Press.
- Jacobs J. (2001). "The dimensions of topic-comment". *Linguistics* 39-4: 641 – 681.
- Jun S-A. (2003). "The effect of phrase length and speech rate on prosodic phrasing". *Proceedings of the ICPHS*, August 2-9.
- Krifka M. (2007). "Basic notions of information structure". In C. Fery and M. Krifka (eds), *Interdisciplinary Studies of Information Structure* 6. Potsdam.
- Ladd D. (1980). *The structure of intonational meaning: evidence from English*. Indiana University Press, Bloomington.
- Lambrecht K. (1996). *Information structure and sentence form: topic, focus, and the mental representations of discourse referents*. Cambridge: Cambridge University Press.
- Liberman M. and I. Sag (1974). "Prosodic form and discourse function". *Chicago Linguistics Society* 10: 416-427.



- Mathesius V. (1975). *A Functional Analysis of Present Day English on a General Linguistic Basis*. The Hague: Mouton.
- Prince E. (1981). "Towards a Taxonomy of Given-New Information." In P. Cole (ed.), *Radical Pragmatics*. New York: Academic Press, 223–256.
- Reinhart T. (1982). "Pragmatics and linguistics: an analysis of sentence topics". *Philosophica* 27:53–94.
- Steedman M. (2000). "Information structure and the syntax-phonology interface". *Linguistic Inquiry* 31: 649-689.
- Steedman M. (2002). "Information-Structural Semantics of English Intonation". In M. Gordon, D. Büring and C. Lee (eds), *LSA Summer Institute Workshop on Topic and Focus 2001*. Kluwer Academic, Dordrecht, 245–264.
- Tsimpli M.I. (1995). "Focusing in Modern Greek". In K.E. Kiss (ed.), *Discourse configurational languages*. Oxford: Oxford University Press, 176–206.
- Vallduví E. (1992). *The Informational Component*. New York: Garland Publishers.
- Vallduví E. & M. Vilkuna (1998). "On Rheme and Kontrast". In P. Culicover and M. Wagner (eds), *Givenness and Locality. The Limits of Syntax*. San Diego: Academic Press, 79-108.