Intonation of left dislocated topics in Modern Greek

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Abstract

We present in this paper the results of a production experiment testing the effects of the discourse activation state on the intonation of left-dislocated topics in Modern Greek. The activation states of the topics (active, inactive and semi-active) were examined in three different sentence types, namely declaratives, WH-questions and yes-no questions. Results show that the tunes are not affected by activation state but by sentence type. This supports the idea that the intonation of these topics is rather governed by phonological process, probably grounded on perceptually oriented principles.

Index Terms: intonation, information structure, topics, Greek

1. Previous analyses of the intonation of left dislocated topics

In Greek, like other languages including French and Catalan, NPs can be dislocated from their initial position to the right or to the left of the sentence, coupled with a clitic doubling. From an informational point of view, dislocated elements are parts of the background. Right-dislocated elements correspond to the given and shared information of the sentence. The left dislocated elements express generally the "aboutness" of a sentence, that is, "what is being talked about", and serves as the "the point of departure of the message" ([11]), regardless of the term we associate with this entity (topic, theme, link).

Several authors ([4], [6], [13]) have studied the intonation of dislocated elements: the general ideal that comes up is that tunes seem to depend on their position before or after the Nuclear Pitch Accent (NPA).

In the intonation of Modern Greek, what bears the NPA depends on the sentence type. Thus, in declaratives (DEC), the NPA is an H* tone associated with the focal element of the sentence; In yes-no questions (YNQ), the NPA is an L* tone associated with the verb or the sentential focus.

[6] and [13] show that there is a general phonological rule in Greek intonation where anything that follows the NPA does not bear any pitch accents and is deaccented, no matter its informational status. As a consequence to this rule, in declaratives, the right dislocated elements are low and flat, and the sentence ends with a final boundary tone L-L%. In YNQs, because they come after the NPA, the right dislocated elements bear no pitch accents and are deaccented; the sentence ends with a phrasal tone H- and a boundary L%.

The same phonological process is also found for negation in Modern Greek ([5]) where negation has the same tune as an YNQ, deaccenting what follows even though it is informationally a new element.

If we turn now to left dislocated topics (LDTs), they appear before the NPA of the sentence and therefore do not follow the deaccenting rule. LDTs generally form a separate prosodic phrase with either a combination of an L* tone as a NPA and an H edge tone, that can be H% ([6]) or H- (see [5]), or an H* as a NPA and an L% boundary tone ([6]). Following the authors, these tunes

depend on the sentence type: LDTs in declaratives have the following melody (L*H) L* H%/H-, while the pattern is *inverted* in YNQs, that is (L*H) H* L%. Note that the (L*H) tune is the default prenuclear accent that occurs on the non last words of the LDTs.

More precisely, [6] suggest that the inverted melodic patterns $[H^* L\%]_{LDT} L^*_{NPA}$ realized in YNQ are triggered by the presence of the phrasal tone H- : this H phrasal tone *inverts* not only the NPA, changing H*s to L*s, but also the LDTs' tunes. The explanation given by [6] for this inversion has a functional form: the aim is probably to "enhance the contrast between of the focus word to the H phrase accent" ([6] p.1306).

This functional explanation is likely to be applied for the inverted patterns found on the pitch accents of LDTs and the NPA ($H^*_{LDT} \sim L^*_{NPA}$ in YNQ and $L^*_{LDT} \sim H^*_{NPA}$ in DECs), even though they do not explicitly mention that.

[13] found similar results in a study comparing the intonation of French and Modern Greek. The authors adopt a more phonological perspective and propose an intonation structure where dominance relationships are expressed by a phonological rule of tone inversion. In Greek, [14] proposed that the tone corresponding to the L- and H- in [7]'s terms is the "dominant" tone of the sentence (the "pivot tone"). These tones invert the pitch accent of the focus in declarative sentences and of the question word in YNQs, triggering respectively an H* and an L* tone. As for LDTs, their boundary tone (H% and L%) are inverted by the dominant tone of the sentence, triggering an L% or an H% tone as well; moreover the boundary tone H% or L% dominates and inverts the L* and H* linked to the accented syllable of the LDTs.

[13] show that the tone inversion rule is also at work in French, but Greek and French undergo different intonation phrasing rules: In Greek, the focus or question word and the background items form a unique intonation constituent, while French splits them into different prosodic constituents.

In sum, previous analyses suggest that the intonation patterns of dislocated elements have no proper intonation markers but can be derived by phonological processes such as the de-accentuation rule whenever a dislocated element follows the NPA, and a rule of tone inversion for LDTs.

This inversion rule can be seen as a general principle since it is applied also to the elements of lists and parentheses ([6]): Depending on the sentence type, tunes are different; we can argue that they are not associated with a particular meaning but arise from a principle of phonological contrast. Moreover, this inversion can be grounded in a more general and fundamental perception-oriented motivation: the tonal contrast helps the listener to determine whether the utterance she is processing is a declarative or a question.

However, if the de-accentuation rule seems to be firmly established for Greek, the tone inversion rule for LDTs needs to be corroborated by further evidence. The aim of this paper is to examine different variables that can play a role in the intonation of LDTs: other sentence types such as WH-questions and the activation state of discourse referents.

2. WH-questions and the activation state of discourse referents (DRs)

2.1 WH-questions (WHQs)

In most of the studies on the intonation of LDTs, we generally find a parallelism between DECs and YNQs. It should thus be interesting to see what happens in WH-questions in order to test the phonological hypothesis.

For WHQs in Greek, [3] propose the following intonation structure: L*+H L- !H%, where L*+H is associated with the question word, the L- with the accented syllable of the verb and !H% is the final boundary tone of the sentence.

If the hypothesis that the H- tone triggers the reversal of the tones in LDTs is true, then we can expect that every time that the tone H- appears, then inversion should take place and inversely, if there is no H- tone, then no inversion should be found on the LDTs.

Since no phrasal H- tone is postulated for WHQ in Greek (only L-), we expect no tonal inversion (i.e. H*L%) on LDTs but an L*H%/H- sequence.

2.2 The activation state of DRs

It has been broadly accepted that information structure is not limited to a simple topic/focus dichotomy, but needs to integrate, among other parameters, the activation state of discourse referents (DRs), referring to the different degrees of activation of DRs in the listener's consciousness ([9] and [12]). Thus, according to [12] (p.93-100) and [9], the DRs can be at least defined following three information states:

- A DR is active (and therefore "given") if it is "currently lit up" in the speech participants' consciousness;
- A DR is semi-active and becomes accessible if it is not currently lit up in the listener's consciousness but has been active before or the context (text, situation) is clear enough to easily set the DR in the center of attention;
- A DR is inactive (and therefore "new") if it is discourse new but belongs to the speaker's knowledge.

In languages such as English and German, it is commonly assumed that the status of new or given information is correlated to the type of pitch accents or deaccentuation. For instance, [14] propose for English an H* tone for a referent which is new, while a given referent is associated with a L* or no accent. Accessible referents bear an !H* or H+!H* pitch accent. For German, [7] found strong correlations between accent type of accents and degrees of activation: an H* tone is associated with new referents (inactive DR); an L* tone for accessible referents while given referents bear no accent at all. In a study on French, [10] have shown that intonational realization of topics and LDTs also depend on the active state of the DR: they claim that there is an opposition between an H% boundary tone when the DR is [+active], and H(L)% when it is [-active, + accessible].

If we turn back now to Greek, the relation between the activation state of the DRs and intonation is not systematically taken into account in the previous works. Either the questions and/or the answers are produced out of the blue ([6], [13]), or when the tested sentences are in dialogues, the studies do not concern the intonation of LDTs ([5]).

When sentences do not appear in a specific context and are pronounced "out of the blue", the activation state of DRs seems to be interpreted differently in YNQ and DEC, and this may cause differences in the intonation of LDTs.

Let us consider the pair of dialogues in (1). The target sentence is the last one of the dialogue, where the LDT is underlined.

(1)a. A. já su níko. ti néa? – B. kalá. kséris ti émaθa?
   hello Niko. What news?   Fine. know.2S what learned.1S?

   ti katerína tin padrévunme énan γálo.
   the Katerína her marry.3P with a French man

   A. "Hello Niko? What's up? – B. Fine. Do you know what I learned? , they are marrying her to a French man".

(1)b. A. já su níko. ti néa? – B. já pés mu
   hello Niko. What news?   for tell.2S to me

   ti katerína tin padrévun me énan γálo teliká?
   the Katerina her marry.3P with a French man finally?

   A. "Hello Niko? What's up? – B. Tell me, Katerina, are they marring her to a French man finally"?

The difference between (1a) and (1b) lies on the sentence type, the context allowing the LDT to be inactive in both sentences.

The dialogue is judged more natural when it is a question (1b) rather than a statement (1a). In other words, in questions, an LDT can be inactive in a natural way, and this could explain why an H* tone, corresponding to the pitch accent of discourse new referents in English or in German, is found on the LDTs of YNQs in Greek (hence in previous studies).

When the sentence is a declarative however such as in (1a), the same construction is less natural because such declaratives normally appear as an answer to a question where the LDT was already mentioned, and therefore has an active state. Thus, when uttered out of the blue, the LDT of such declaratives would be more naturally associated with an L*, corresponding to a given DR in English and German.

In order to determine whether the intonation of LDTs in Greek is due to tonal inversion or to the activation state of DRs, we designed a production experiment that systematically takes into account the activation states of DRs coupled with three sentence types, DECs, YNQs and WHQ. In the next section, we present the method and the results of the experiment.

3. The experiment on LDTs

3.1 Corpus and methodology

The corpus groups 24 mini-dialogues where each token is preceded by a lead-in context (see examples in (1)).

Two main variables were taken into account when building the corpus: First, the active, inactive or semi-active (thus accessible) state of the discourse referents (following [12]'s terms) and second, the sentence type, distinguishing declaratives (DEC), yes-no questions (YNQ) and WH-questions (WHQ). The lead-in context allowed triggering the expected activation state of the DRs as clearly as possible. The tokens sentences have similar syntactic constructions and length.

For each possible activation state, we had a minimum of two different mini-dialogues, where the main word of the LDT varied in terms of word stress (thus we examined proparoxytones (words stressed on the prepenultimate syllable) and paroxytones (words stressed on the penultimate syllable)). The corpus, a slide show of a total of 72 slides (24 mini dialogues * 3 times) was presented in a random order to 4 speakers of Athenian Greek in their thirties (two male and two female). Their task was to read the presented mini-dialogues as naturally as possible during the allocated time (25 minutes). The slide show was timed, leaving enough time for the speakers to restart a slide when an error was made during the

reading. In this study, we report the results of only 18 mini dialogues out of 24 that were examined.

The recording took place in a quiet room, and was done using the computer's sound card (44kHz 16bits) directly. The acoustic analysis of duration and fundamental frequency (f0) were done using the Praat software package (www.praat.org).

3.2 Results

3.2.1 Tunes

The following five different tunes were observed in the corpus of our experiment: L+H*L-L%, L+H*L-, L+H* LH-, L*+H H-H% and L*H-. In the two tunes L+H*L-L% and L+H*L- (Figure 1a/b.), the f0 peak found on the stressed syllable is preceded by an L tone while L- or L% tones are associated with the last syllable of the LDT: the L% reaches the speaker's lowest speech range values, while the fall of the phrasal L- reaches higher and more variable pitch values than the L% tone; the L% may be followed by a long pause, while pauses after an L- phrase accent are rare and very short.

In fact, L+H*L- can be analyzed as the "truncated" realization of an underlying L+H*L-L% for at least two reasons: 1) L+H*L- is more often observed with paroxytones (13 out of 48 utterances with L- in paroxytones 5 out of 48 in proparoxytones, in YNQ and WHQ inactive and active states); 2) L+H*L- tends to be realized when the LDT is uttered with a more rapid speech rate.
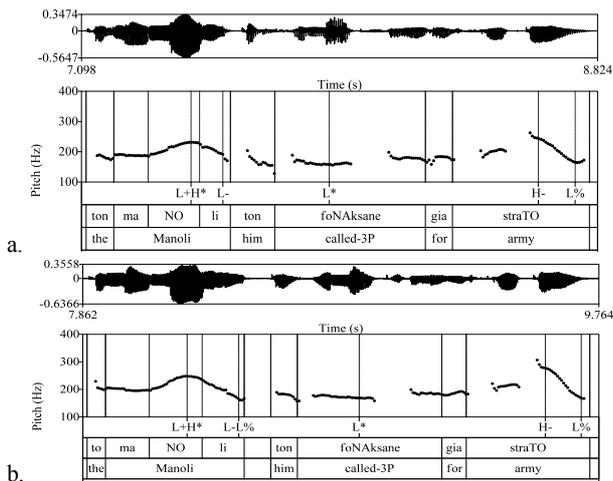

Figure 1: *Waveforms and f0 contours of two different realizations of an active YNQ "Manolis, they called him for army"[1]. In a., the LDT is pronounced with an L+H*L- and in b., with an L+H*L-L%.*

The tune L+H*LH- is marked by a fall after the peak on the stressed syllable, followed by a final H- tone.

The tune L*H- is realized with an L tone on the stressed syllable followed by a phrase H- tone (Figure 2).

The stressed syllable of the tune L*+H H-H% is realized with an L*+H accent, a gradual rise, where as observed by [1] and [2], the L of L*+H is aligned to the very beginning of the onset of the accented syllable, and the H to the beginning of the first post-accentual vowel (Figure 3). This accent is followed by a sharp rise reaching the top f0 values of the speaker's range and appears very often (13/19) with a very long pause, longer than pauses found after the L%.
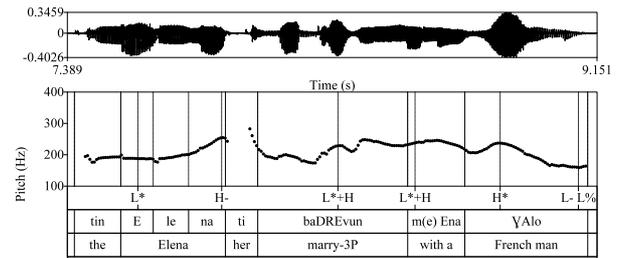

Figure 2: *Waveforms and f0 contours of an active declarative "Elena, they are marrying her to a French man" where the LDT pronounced with an L*H- tune.*
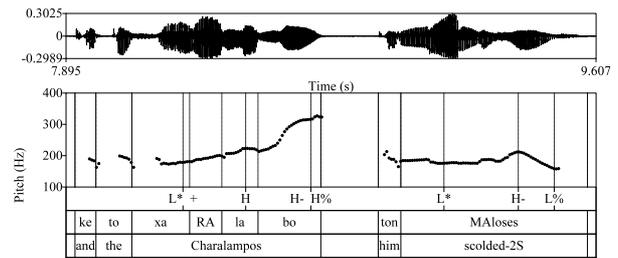

Figure 3: *Waveforms and f0 contours of semi-active YNQ "Charalampos, did you scold him?" where the LDT pronounced with an L*+H H-H% tune.*

Finally, the LDT can be realized with the simple L*+H accent. In some cases, it was unclear if there was an edge tone (L- or H-) or not, especially when the word of the LDT is proparoxytone. For the present analysis this possible edge tone was not taken into account.

3.2.2 Distribution of the tunes

The results presented in Table 1 show that the realization of the tunes does not depend on the activation state. Note that 2 sentences were put aside (mispronunciation of the LDT and hesitation).

Table 1. *Distribution of the tunes for the four speakers (number of tokens on the left and % on the right)*

		L*+H		L+H* L-L%		L+H* L-		L*+H H-H%		L* H-		L+H* LH-		TOTAL	
DEC	ACTIVE	3	12,5	0	0,0	0	0,0	0	0,0	21	87,5	0	0,0	24	100
	INACTIVE	6	25,0	0	0,0	0	0,0	0	0,0	15	62,5	3	12,5	24	100
	SEMI ACTIVE	9	37,5	3	12,5	0	0,0	1	4,2	11	45,8	0	0,0	24	100
YNQ	ACTIVE	4	16,7	16	66,7	4	16,7	0	0,0	0	0,0	0	0,0	24	100
	INACTIVE	6	25,0	13	54,2	5	20,8	0	0,0	0	0,0	0	0,0	24	100
	SEMI ACTIVE	4	17,4	6	26,1	4	17,4	9	39,1	0	0,0	0	0,0	23	100
WHQ	ACTIVE	7	30,4	9	39,1	5	21,7	0	0,0	2	8,7	0	0,0	23	100
	INACTIVE	2	8,3	18	75,0	4	16,7	0	0,0	0	0,0	0	0,0	24	100
	SEMI ACTIVE	0	0,0	11	45,8	1	4,2	12	50,0	0	0,0	0	0,0	24	100

Let us first consider the two opposite categories, the active and inactive states. For declaratives, the tune that predominates is L*H-, independent of the activation state: 87,5% for the active and 62,5% for the inactive state.

Similarly, the tunes L+H*L-L% and L+H* L- are the most frequent tunes in questions, with no differentiation between YNQs and WHQs. The L+H*L-L% tune appears far more frequently than L+H*L-. Moreover both tunes are chosen no matter the activation state: the L+H*L-L% obtains the highest percentage in the active state of YNQ (66,7%) but is also the most selected tune in the inactive state of WHQ (75%); For the L+H*L- tune, there are 4 or 5 occurrences for each active and inactive state of YNQ and WHQ. This distribution corroborates the idea suggested above that these two tunes are part of a same category.

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[1] Note that all figures come from the same speaker ND.

When the LDTs are not uttered with one of the 3 main tunes, they are all associated with the L*+H accent (except for 5 cases). We observe that this tune appears in similar quantities in the different sentence types (3 to 7 occurrences). Note that the location of stress might intervene here, since 71% (20/28) of L*+H associate with paroxytones (and 6 tokens out of 7 tokens in WHQ active). L*+H appears to be the default pitch accent, no matter the activation state or the sentence type.

Let us turn to the semi-active state. The tunes for this state are more scattered reducing the percentage of the major tunes (cf. Table 1). For declaratives, 13 tokens out of 24 are not associated with the expected canonical tune L* H-. However, in 9 cases, the LDTs are associated with the default L*+H accent just discussed above. For the remaining tokens (17%), the tune L+H* L-L% was found in 3 cases out of 24 from a single speaker. In fact, it seems that the LDT was pronounced as a focus and with a marked attitude. Finally the totally unexpected tune L*+H H-H% is realized for one token.In questions, the canonical tune L+H* L-(L%) is realized in only 43,5% of YNQs and 50% in WHQs. The L*+H accent also appears in 17,4% of YNQs but not in WHQs. However, in 39,1% of YNQs and in 50% of WHQs, speakers realize the L*+H H-H% tune. This tune appears in sentences beginning with the conjunction /ke/ 'and', allowing the LDT to appear as an autonomous proposition, that can be paraphrased by "What about X?".

4. Discussion and conclusions

It seems that the distribution of pitch accents in Greek does not follow the same motivations as in English and German where the activation state has an effect on the pitch accents. What motivates the pitch accent for LDTs in Greek is essentially the sentence type, where in most cases, we find an L* tone in declarative vs. an L+H* in questions, with no regard for YNQ or WHQ. The same is true for edge tones of LDTs: H for declaratives, L for questions. When that is not the case, the default L*+H accent is selected in all sentence types and activation states.

For the sentence types DEC and YNQ, the results thus support the phonological analysis, presented in section 1, where the application of a tone inversion rule whereby the phrasal tone L-/H-, that we can consider as the "pivot tone" of the sentence, inverts the tunes of the LDT. As for the WHQ, according to [3], the sentence melody is L+H* L-!H%, with thus an L- phrase accent; if we adopt the phonological rule of tone inversion, the expected tune on the LDT is an L*H- and not an L+H* L-(L%) as found in our study. As a matter of fact, the phrasal L- tone of WHQs seems to have no effect on the tune found on the LDT. The use of the L+H* L-(L%) sequence in WHQs can find two possible explanations:

1) The inverted tunes on LDT are not governed by a phonological rule but would be an effect of a perception oriented process, that is: tunes are inverted in questions (in general) to help the listener determining whether the utterance she is processing is a declarative or a question.

2) The tone inversion rule can take place if a "pivot" tone is present, being an H in WHQs as in YNQs. A first possible candidate for this function might be the !H% found at the end of the sentence. However, this final !H% is optional according to [1] and [3] (and confirmed by our results), which leads us to eliminate this possibility. The other more plausible candidate for the pivot tone of the sentence inverting the LDT tune is the H tone associated with the WH-word. In [3]'s terms, this H tone as an NPA which cannot be a source of tone inversion rule in our analysis.

However, the melodic pattern found on WH-word is similar to the tune L+H* H-H% observed on some LDTs: a rise on the WH-word stressed syllable with its f0 peak on the subsequent object pronoun. This maximum value is the highest of the sentence and reaches the top values of the speaker's pitch range: we thus propose that this peak is an edge tone indicating illocutory force (recall that the final !H% tone is optional) and triggers tone inversion. A similar analysis has been proposed for WHQs in French ([8]), where WH-word is associated with the "nuclear contour" in [8]'s terms of the sentence and expresses the illocutory force. Nevertheless, further investigation needs to be done in order to clarify the process at work in WHQs. In particular, LDTs in sentences with negation should be tested, for negation and WHQs use similar melody ([5]).

In sum, the production experiment we carried out showed that Greek seems to be closer to French than languages such as English and German as regards to intonation structure and its relation with information structure. We believe perceptual experiments can enlighten us on the role played by phonological processes in the intonation of Greek.

5. Aknowledgments

6. References

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