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## Intonation variables in Greek polar questions

### 0. Introduction

The aim of this paper is to present the principles and methodology behind the definition of six meaningful intonation variables that appear in one-word polar questions in a Northern Greek dialect. In addition, it will be claimed that these variables relate to epistemic modality, and the meaning and the variants of each variable will be presented and discussed. Finally, this paper attempts to exemplify how the modal meanings of these intonation variables, in combination with pragmatics and conversation structure, crucially contribute to the discourse meanings of polar questions.

### 1. Principles of the study

The present study is held in the framework of sociolinguistics, a framework that imposes two important principles. The first principle is that linguistic study should be based on what is actually spoken by the community in casual, friendly and unprepared speech. It is a type of material that allows sociolinguists to study the linguistic variability of a speech community. In accordance with this principle, the linguistic data that I analyzed are extracted from recordings of casual and friendly conversations among adolescents in a small area of five villages in Northern Greece.

The second principle governing any sociolinguistic study is that the definition of linguistic variables is a prerequisite. I am using the term 'variable' as it has been defined within the sociolinguistic framework, i.e. as an extension of the term 'linguistic unit'. In particular, a linguistic variable is a linguistic unit with one linguistic function, one underlined form, and some other possible forms (i.e. realizations of the variable) due to linguistic or to *socio-linguistic* reasons. The extension of the definition of a linguistic unit lies in the definition of 'free variants'. Within a sociolinguistic framework, 'free variants' are not really free, but their occurrence is systematic and due to sociolinguistic reasons. Sociolinguistics uses the term 'variable' to refer to the abstract linguistic unit – i.e. a linguistic unit with a particular linguistic function and an abstract form – and the term 'variant' in order to refer to the different realizations of the abstract unit. In sociolinguistic studies, the term 'variant' mainly refers to what was previously referred to as "free variant", in other words, to different realizations of the abstract unit due to sociolinguistic reasons.

In the course of data collection, it was observed that many adolescents used intonation patterns not familiar to a speaker of the standard Northern Greek variety (like myself). Therefore, the question arose as to whether the local intonation patterns are linguistic *variables*, distinct from those used in the standard Northern variety, or just *variants* of intona-

tion variables of the standard Northern variety. In the former case, the local intonation patterns would be realizations of different linguistic units, which differ both in form and function from the standard Northern variables. In the latter case, they would form variants (i.e. different realizations of the same variable due to sociolinguistic reasons) of the intonation variables that a speaker of the standard Northern variety would also use. In view of this issue, the definition of intonation variables (i.e. the definition of their linguistic function and their possible different forms) became a major concern of the present dialectal study.

Nevertheless, the fundamental role of linguistic function in the definition of the linguistic variable has scarcely been addressed in intonation studies. Instead, the definition of intonation units has mainly been based on the *form* of the intonation pattern.

In the early studies of American Structuralism and the British School, the definition of intonation units was based on the perception of the form of tones. Similarly, the vast majority of subsequent theoretical proposals and approaches, even in our time, accept a priori the form as the most important criterion for the definition of intonation units, either without taking into consideration the linguistic function of the defined intonation units *at all* (Pierrehumbert 1980, Beckman and Ayers 1997, Grabe 2001), or trying to determine their linguistic function *afterwards* (Halliday 1967, 1970, Crystal 1969, Pierrehumbert/Hirschberg 1990, Bartels 1999).

The predominance of form and the subsequent absence of reference to the linguistic function of intonation in the definition of intonation units run counter to the process followed for the identification of units at every other linguistic level. For example, it is the knowledge of the linguistic function of phonological units vs. their allophones and their free variants that makes us identify two different sounds like [t] and [ʔ] in British English not as different phonological units, but as different *variants* of the same phonological variable (t) (Milroy et al. 1994). I argue that linguistic function should similarly be the major criterion for the identification of intonation units.

Nevertheless, we have to admit that the interference of other intonation elements, and their interaction with other linguistic levels, can obscure the identification of the exact linguistic function of intonation. Therefore, further theoretical issues should be addressed before any attempt is made towards a definition of intonation units.

## 2. Theoretical issues

In order to reduce the difficulties involved in the definition of intonation variables, two theoretical issues should be addressed as prerequisites: a) the reduction of the possible interference of complex intonation elements and structure, and b) the control of the possible influence of other linguistic levels.

The interference and close interaction of different intonation elements can obstruct the identification of intonation units, as the exact definition of a number of aspects and elements of intonation related to prosodic phrasing, accentuation and melody remains controversial.

In particular, there are a number of different proposals concerning the linguistic function of intonational elements such as those mentioned above. More specifically, prosodic phrasing has been related to diverse phenomena such as syntactic structures (Selkirk 1984, Nespor/Vogel 1986, Truckenbrodt 1999), grammatical structures (Halliday 1967, Crystal 1969, Bolinger 1989, Cruttenden 1997), attitudes of the speakers (O' Connor/Arnold 1961, Brown et. al.1980), communicative and discourse functions (Brazil 1985, Johns-Lewis 1986, Couper-Kuhlen/Selting 1996), and styles of speech (Tench 1996).

Accentuation has been related to the syntactic structure of the sentence (Zubizarreta 1998), the pragmatic intentions of the speaker (Bolinger 1972), a combination of pragmatics and syntax (Gussenhoven 1983, Selkirk 1995), and the rhythmical structure of the utterance (Pierrehumbert 1980).

Melody has been associated with attitudinal aspects (Crystal 1969, Halliday 1967, 1970), or with abstract discourse features such as 'new' or 'known' information status, contribution in conversation (Gussenhoven 1983, 1984, Brazil 1985, Pierrehumbert/Hirschberg 1990), or further discourse information (Pierrehumbert/Hirschberg 1990, Couper-Kuhlen/Selting 1996).

In addition, there is further disagreement among the different approaches as regards the description of the structure of prosodic phrasing, accentuation and melody. In view of the above, any attempt to define intonation units should focus on one of these three intonation levels, hence eliminating the possible interference of the other two.

The second theoretical issue concerns the interference of other linguistic levels with the study of intonation. In the beginning of this paper, the casual and friendly recorded conversations were presented as the most appropriate type of data that can capture a wide – if not the entire – range of intonation variability and uses within a speech community. With this type of data, any attempt towards determining exactly what sort of information is conveyed by intonation requires the appreciation of the contribution of semantics, pragmatics and conversation analysis to the discourse meaning of an utterance.

In order to address these theoretical issues and eventually succeed at the definition of intonation variables, particular methodological decisions should be made. The latter will be discussed in the next section.

### 3. Methodological issues

In view of the theoretical issues raised in the preceding section, I argue that the reduction of the possible influence of other intonation elements should be the starting point in the attempt of defining intonation variables. Therefore, I focused my research on one grammatical type of utterances, i.e. polar questions, to avoid the interference of prosodic phrasing.

In the following two paragraphs I will outline the definition of polar questions that has been adopted in the present study in order to include different types of questions, such as true questions, phatic questions, confirmative questions, echo and reflex questions, and positive and negative rhetorical questions. In particular, Lyons' (1977) semantic definition has been adopted, according to which the term 'polar question' refers to all the utterances

that express a relative lack of information about the truth-value of their propositional content. For Bartels, the relative lack of information conveyed is synonymous with a speaker's uncertainty (1999: 9). However, the uncertainty of the speaker is a subjective attitude (i.e. part of the subjective epistemic modality) usually resulting from, but not necessarily coinciding with, the relative lack of information about the truth-value of the propositional content of the utterance. When speakers express ignorance of the truth-value of the propositional content of their utterance, they mainly indicate that there is a propositional content whose truth is *possible*. I argue therefore, that it is not the uncertainty of the speaker that is synonymous with the relative lack of information, but the *likelihood* that the propositional content of the utterance is true (i.e. objective epistemic modality). Furthermore, in anticipation of the discussion in section 4, I argue that speakers can determine different degrees of likelihood about the truth-value of the propositional content of their utterance, still performing a polar question, instead of a statement, as they express a *relative* lack of information about the truth or falsity of the propositional content of their utterance. Crucially, different degrees of likelihood result in the wide range of discourse meanings conveyed by polar questions (such as commitment, confirmation, surprise, polite doubts, disbelief, strong negation, irony etc.), as will be claimed in section 4.

Lyons does not relate the definition of polar questions to the reply of the addressee, contrary to definitions found in pragmatic approaches and in conversation analysis (see, for example, Grice's (1975) definition of a question as 'request for information', and Schegloff and Sacks' (1973) definition of a question as the first of the two elements constituting an 'adjacency pairs' of utterances in discourse). Yet, polar questions almost always trigger the addressee's response. It is the purpose of the present study to determine exactly which elements of a polar question trigger the addressee's reply. A proposal regarding this issue will be put forward in section 4.2.2. In order to further eliminate the possible interference of other intonation elements in the present study, this study focuses on accents and in particular on the nucleus, given the widely held assumption that this part of the intonation curve carries the most important linguistic information. In order to avoid the possible interference of phrase boundaries, intraclausal focus placement, and prenuclear accents, the analysis was restricted to one-word utterances as one-word utterances form a single intonational phrase, do not allow for variation of accent position, and bear no prenuclear tones.

One-word polar questions cannot be described as interrogative clauses, since they lack the syntactic marking (e.g. changes in word order, for example) of interrogative status. Therefore, one-word polar questions constitute declarative questions. This characteristic is crucial, as the defining property of questions, i.e. the relative lack of information, should be indicated by intonation alone in the particular case.

Initially, I tried to check the validity of earlier accounts (O' Connor/Arnold 1961; Crystal 1969; Halliday 1967, 1970; Brazil 1985; Brown et. al 1980; Gussenhoven 1983, 1984, 1986, Pierrehumbert/Hirschberg 1990, Bartels 1999), focusing on the linguistic function of the units, and not on their form. Unfortunately, the definitions of the above scholars proved inadequate for the purposes of the present study. In particular, some of the scholars did not succeed in defining appropriate intonation units<sup>1</sup>. In other cases, it was not clear how the

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<sup>1</sup> O' Connor/Arnold (1961), Crystal (1969) and Halliday (1967) all argue that the linguistic function of tones was the expression of the attitudes of the speaker. However, each of their tones expressed

entire range of discursual meanings expressed by the one-word polar questions of this study could be derived from the abstract meaningful features assigned to the proposed units, especially those proposed by Gussenhoven, Pierrehumbert/Hirschberg, and Bartels (for an analytical description of the inadequacies of the above definitions, see Papazachariou 1998).

In view of the inadequacy of the proposed intonation units, three different methods were used, aiming at the identification of the exact linguistic function of the nucleus: a) minimal pairs, b) the reaction of the addressee, and c) perception tests with two rating groups.

Minimal pairs used to be the traditional method for the identification of the phonological units of a language. Minimal pairs in this study are utterances like the two /pezi?/ {"is it recording?"} questions in Figure 1 (see Dialogue 3 in section 6), which involve the same sentence (i.e. in this case the word /pezi/), but have a different discourse meaning due to their different intonation contour. Minimal pairs, such as the one in Figure 1 showed that the linguistic function of questions is related to the attitudes of the speaker.

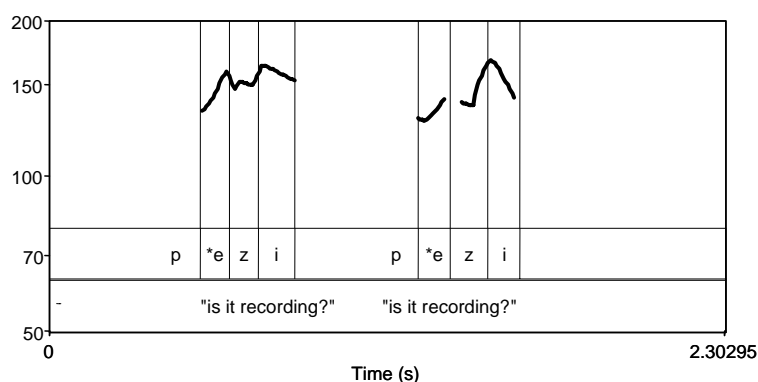


Figure 1. A minimal pair of two polar questions. The upper text line presents the intonation contour of each segment, and the asterisk marks the stressed vowel of the word.

In the particular dialogue, the first polar question expressed surprise while the second expressed the doubts of the speaker, as was confirmed both by myself – me being one of the interlocutors – and by two rating groups, each consisting of five informants. These two different attitudes could not be attributed solely to their position in the dialogue – as Bennet (1982) and Freed (1994) would argue – as the specific discourse meanings are not the only options in the particular conversation structure (for example, the speaker could also express strong opposition and irony).

Minimal pairs alone cannot determine the exact attitude that is being conveyed by their different intonation contour. Two further methodological tools were used for this purpose, i.e. the response of the addressee and perception tests.

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many different attitudes – instead of one – and some of these attitudes were also expressed by other tones of their system.

The response of the addressee indicates how the addressee has perceived the discourse meaning of the utterance (see, for example, the reaction of the addressee, to his interlocutor's question /toipire?/ {"did he get it?"} in Dialogue 1, line 6).

### Dialogue 1<sup>2</sup>

- 1 B:/o stelios o tzunas, otan eyine o sizmos,  
"Stelios Tzunas, when the earthquake started,"
- 2 B:/eðine eksetasis yia to traxter. lipon= ./  
"was taking exams for the tractor license. Well= .."
- 3 C:/ ti? ðiploma?/  
"what? For a driving license?"
- 4 B:/ne/  
"yes"
- H\*H HL%**
- 5 C: / to pi-----re?/  
"did he get it?"
- 6 B:/e=s!!! o stelios ðen tha to pari?/  
"Come on!!! If Stellios didn't get a driving license, who would?"
- 7 /tu lene lei, sti yumenisa lei, exoun pesi pola spitia lei/  
"he says he's been told that in Goumenissa a lot of houses have fallen"

The response of the addressee has become a very important methodological tool within conversation analysis (see Levinson 1983, and Taylor/Cameron 1987). However, there are cases in which the response of the addressee cannot indicate the exact discourse meaning of the question. In particular, there are cases where his/her reaction can be interpreted in different ways. There are also cases where the addressee does not react at all. Furthermore, the addressee could be deliberately 'misinterpreting' the illocutionary force of his/her interlocutor's utterance for purely argumentative reasons. Due to these drawbacks, the addressee's response is not always a reliable method on its own (see also Taylor/Cameron 1987: 118). Nevertheless, it can be combined with perception tests, which, I believe, act complementarily.

Nespor (pers. comm.) notes that informants cannot provide linguistic information (i.e. they cannot be requested to identify particular linguistic units); what they can do is provide judgments about the acceptability of a particular structure or its meaning, on the basis of their native speaker's intuition. In line with this observation, perception tests were used in the present study in order to check the addressee's response and the researcher's intuitions.

The results of the perception tests showed that the informants mainly associated the intonation of the one-word polar questions with speaker attitude (e.g. confirmation or strict negation, doubts and suspicion, surprise or irony, etc). The assumption that the intonation

<sup>2</sup> The following symbols were used for the Discourse transcription:

'.' = Speaker turn start, '[ ]' = Speech overlap, '=' = Lengthening, '...(N)' = Long pause,  
'...' = Medium pause, '...' = Short pause, '(calculated time)' = Calculated pause,  
'@' = Laughter, '< >' = Comment, '/ /' = Phonemic transcription,  
'..."' = Translation

of the nucleus expresses speaker attitude is not new. On the contrary, it coincides with the British tradition's basic claim about the linguistic function of tones. However, scholars of the British tradition repeatedly failed to define intonation units with one linguistic function (i.e. one speaker attitude) and some possible distinctive forms (i.e. an abstract form and its possible realizations due to linguistic or sociolinguistic reasons).

There are two reasons for this failure. The first relates to the assumption that the linguistic function of nuclear tones is the direct expression of speaker attitudes. In this connection, I argue that these discourse meanings are a result of a complex interaction between the meaning of intonation, pragmatics and conversation analysis (see section 2). In section 6, I will demonstrate how the same intonation units (such as these in /tovaze?/ {"did he put it?"} and /pezi?/ {"is it recording?"} in Figure 2 can result in different discourse meanings (i.e. seeking confirmation and expressing speaker's doubts respectively), because of the different place of the utterances in the conversation structure.

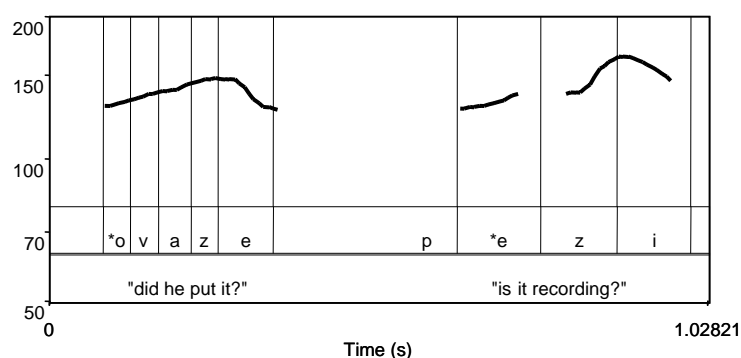


Figure 2. Two polar questions with similar intonation contours but different discourse meanings, due to conversation structure.

The second reason for the British tradition's failure was the assumption that the nucleus consists of one tone, i.e. one intonation unit. In contrast, Bolinger proposed in his early work (1958) the idea that speaker attitudes are a result of the combination of smaller meaningful units (i.e. intonation morphemes) that compose the nucleus. Similarly, Pierrehumbert/Hirschberg (1990) assigned different functions to each of the three types of tones (i.e. pitch accents, phrase accents and boundary tones) that compose – according to Pierrehumbert's framework – the traditional nucleus. Although my research did not verify the existence of either Bolinger's or Pierrehumbert/Hirschberg's units in the Northern Greek dialect under study or in Standard Greek (see Papazachariou 1998), the common assumption of the above two theoretical proposals led me to explore the possibility of an internal structure in the intonation contours of one-word polar questions.

Before the presentation of the internal structure of the intonation contours of one-word polar questions, the description of their overall intonation contour must be reviewed. In Modern Greek, word stress is located on one of the last three syllables of the word, i.e. on the antepenultimate, penultimate or ultimate syllable. The one-word polar questions stressed on the antepenultimate and penultimate syllable had an overall LHL – or rising-falling

– contour, as in Figure 3 (see also Mennen 1993, 1999; Arvaniti/Baltazani 2000 and Arvaniti 2002).

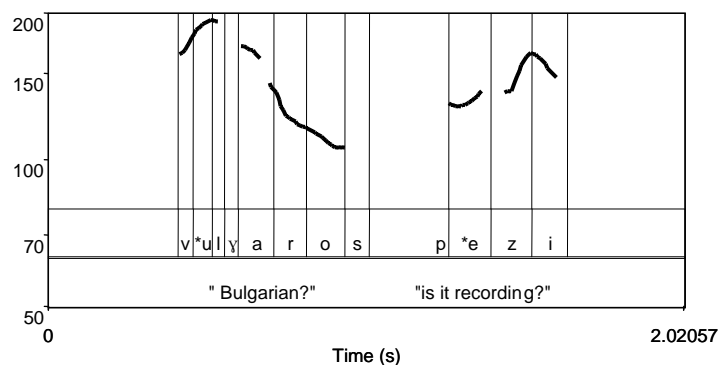


Figure 3. The rising-falling contour of Greek polar questions, stressed on the antepenultimate and the penultimate syllable respectively.

On the other hand, the one-word questions stressed on the ultimate syllable displayed two different patterns, i.e. either the common LHL, or a LH form (Figure 4).

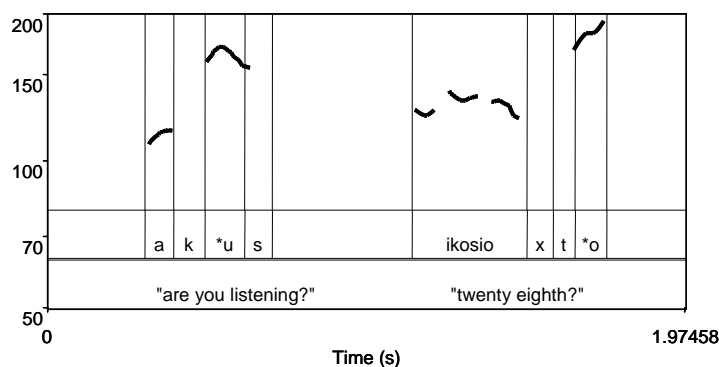


Figure 4. The two different intonation contours of polar questions stressed on the ultimate syllable

As regards the internal structure of the intonation contours of one-word polar questions with word stress on the antepenultimate or the penultimate syllable, the peak of the LHL contour can appear either at the end of the stressed vowel or at the beginning of the vowel of the last syllable, as shown in Figure 3. The different positions of the intonation peak have not been mentioned by Mennen (*ibid*) and Arvaniti (2002)<sup>3</sup>. It can be shown, however,

<sup>3</sup> However, Arvaniti (2002) who studies the intonation of Greek polar questions, treats the different positions of the intonation peak in the sentence as a phonetic variation of the L\* H- L% sequence, therefore a variation without any meaningful importance and relevance. Yet, these studies do not

that the variable timing of the peak results from the fact that the intonation contours of polar questions are composed of smaller components that are systematically related to different modal meanings.

Whenever the peak of the intonation contour appears on the stressed vowel of the word (i.e. the intonation contour on the last syllable is a falling movement starting *lower* than the end of the rising contour on the stressed syllable), all the different discourse meanings of the questions involve *certainty* of the speaker, as, for example, /tudzuna?/ {"Dzunas?"}, which expresses positive knowledge – as a phatic question – and /vulyaros?/ {"Bulgarian?"}, which expresses clear opposition (Figure 5).

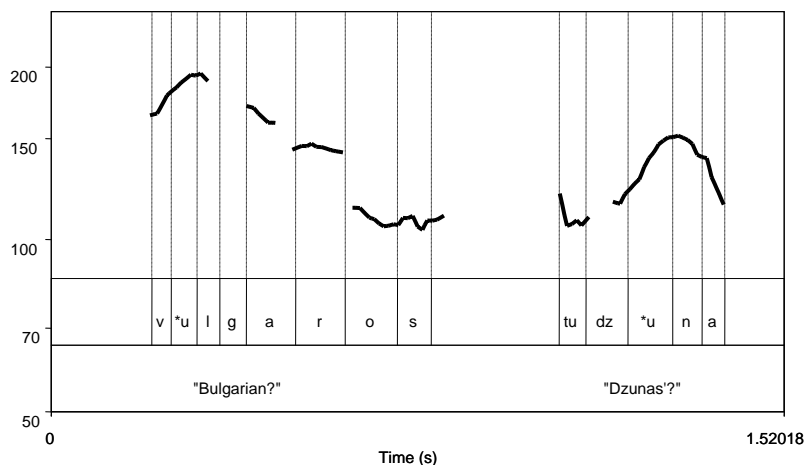


Figure 5. Two polar questions with the peak of their contour on the stressed vowel

Similarly, when the peak of the intonation contour appears on the last syllable of the word, (i.e. the falling movement starts *higher* than the finishing point of the rising movement), all the different discourse meanings of the questions involve the speaker's *uncertainty*, (as, for example, the second /pezi?/ {"is it recording?"} and /topire?/ {"did he get it?"} in Figure 6 which express the doubts of the speaker and disbelief – but not actual knowledge – respectively).

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focus on one-word polar questions, or on the linguistic function of intonation. Moreover, it is possible that differences like those presented in Figure 3 have not even occurred in their data, which have been produced in laboratory conditions, i.e. in artificial conditions, which do not allow the production of the entire range of the different types of polar questions that would appear in casual speech.

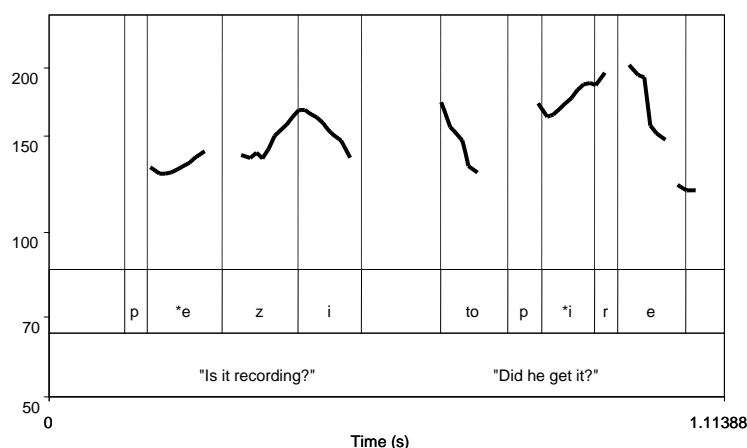


Figure 6. Two polar questions with the peak of their contour on their final vowel.

Recognition of the above systematic relations between the falling movement and subjective epistemic modality, led to the realization of the meaning of the rising movement as well. In particular, speakers can express their certainty or uncertainty of something *possible*, realizing the rising contour of the stressed vowel near the speakers' baseline (as, for example, in phatic questions, such as /tudzuna?/ {"Dzunas'?"} in Figure 5, and in confirmative questions, such as /tovaze?/ {"did he put it?"} in Figure 2).

Similarly, speakers can express their certainty or uncertainty of something *non possible*, realizing the rising contour of the stressed vowel at the top range of their F0 (as, for example, in questions expressing clear opposition and speaker's disbelief, such as /vulyaros?/ {"Bulgarian?"} in Figure 5 and /topire?/ {"did he get it?"} in Figure 6).

The above systematic relations between form and meaning point to the conclusion that the intonation contour of one-word polar questions in Greek consists of *two* meaningful intonation units instead of three (according to Pierrehumbert's or Beckman/Ayers' accounts) or one (according to the British tradition). The first appears on the stressed vowel<sup>4</sup> and the second on the last vowel of the one-word polar question.

In section 4, two groups of semantic-intonation variables are presented, a group of rising variables, and a group of falling variables. Each group consists of three meaningful variables, and one variable from each group appears in succession on one-word polar questions.

In section 5, I claim that the combination of the semantics of the two intonation variables results in an attitudinal meaning, which also depends on the question's place in the conversation. In other words, while arguing that the intonation variables are associated with epistemic meanings, I suggest that it is their combination with conversation structure that re-

<sup>4</sup> The decision to take into consideration only the intonation contour of the vowels is in line with Beckman/Ayers's (1997) comment (p.1 of their HTML manuscript) that the "holes" in fundamental frequency caused by the voiceless consonants, as well as the further influence of the voiceless consonants on the intonation pattern, do not influence native speakers' perception of the categorical properties of intonation. If this point is correct, it necessarily follows that the linguistic information is available from the intonation contour of the vowel.

sults in the discourse meaning of the questions (see for example /tovaze?/ {“did he put it?”} in dialogue 2 and the second /pezi?/ {“is it recording?”} in dialogue 3).

#### 4. Definition of the meaningful intonation variables

Arvaniti (2002) describes the rising-falling contour of Greek polar questions as L\* H- L%. I argued instead that this contour is a combination of two meaningful variables, one with a rising form, and another with a falling form. The variables with the rising form are located on the stressed vowel of the word and the variables with the falling form are located on the vowel of the last syllable of the word. In this section I will analytically present all the intonation variables composing the intonation contour of one-word polar questions of my data as well as their standard Greek and regional variants.

##### 4.1 The group of Rising variables

Arvaniti/Baltazani (2000) and Arvaniti (2002) define the pitch accent that appears on the stressed syllable of a polar question as L\*<sup>5</sup> without taking pitch level differences as phonologically significant. This decision is in accordance with the theoretical frameworks of Pierrehumbert (1980) (P henceforth) and Beckman/Ayers (1997) (B&A henceforth).

My proposal is differentiated from the above in that I suggest that three intonation variables are realized on the stressed vowel of the one-word question. I argue that the semantics of these variables relates to objective epistemic modality, i.e. to the degrees of likelihood that the propositional content of the utterance is true according to real world factors (cf. Papazachariou 1998; Papazachariou/Archakis 2001). In particular, I argue that Greek speakers can further indicate different degrees of objective epistemic modality (i.e. great, little or fifty-fifty likelihood that the propositional content of the question is true) depending on the particular pitch level of the rising intonation variables (one out of the three).

The notion of objective epistemic modality is fundamental to polar questions. As mentioned in section 1, it is synonymous with the relative lack of information about the truth-value of the propositional content of the sentence. Moreover, I argue that even when the speaker indicates a particular degree of likelihood (i.e. great or little), the utterance still functions as a polar question, as it still expresses a *relative* lack of information about the truth-value of the propositional content of the utterance. I argue, therefore, that the three rising variables convey the notion of ‘questionhood’ in polar questions. The role of these variables as the sole indicators of the fundamental semantic property of polar questions is particularly clear in the case of declarative polar questions (such as one-word polar ques-

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<sup>5</sup> Compare for example the polar question in Figure 1 of the HTML manuscript of Greek ToBI (Arvaniti/Baltazani 2000) and the polar questions in Arvaniti (2002). Although there is a clear difference in pitch level – as well as in their discourse functions – they maintain that there is only one pitch accent on Greek polar questions, namely L\*.

tions), which lack the syntactic marking of questions. The following sections illustrate these three variables in more detail.

#### 4.1.1 The ‘Rise at low level’ variable

In my corpus, all one-word polar questions starting with a ‘Rise at low level’ intonation variable indicate a great likelihood that the propositional content of the question is true. For example, all confirmatory and phatic questions start with this variable.

The standard phonetic realization of the ‘Rise at low level’ variable is a rising contour produced between the baseline and 140 Hz for male adolescents. In the area of my research, this variable is also realized as a flat contour (a regional variant) at the same pitch range, i.e. near the baseline.

In a representation by using level tones, this variable would be described as L\*H, with L\* indicating the low level and H indicating the rising movement of the ‘Rise at low level’ variable. The asterisk indicates that this particular tone occurs on the stressed vowel of the word. Obviously, this definition does not conform with P’s and B&A’s frameworks<sup>6</sup>.

Three realizations of the “Rise at low level” variable are presented in Figure 7. The first two have the standard rising phonetic realization and the third has the regional flat phonetic realization of the variable.

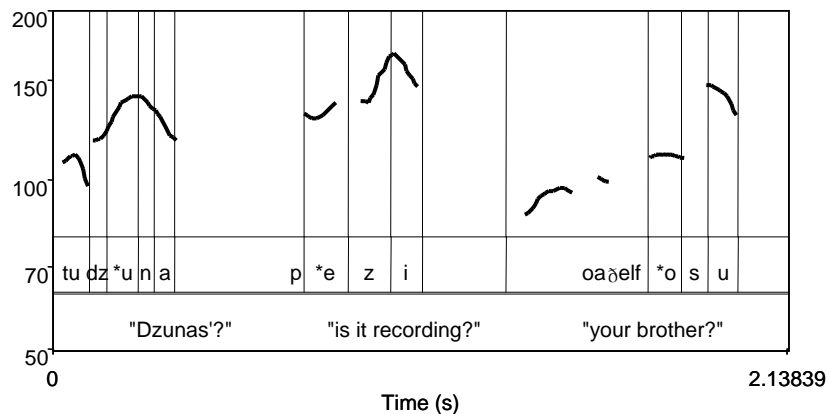


Figure 7: Three one-word polar questions with a ‘Rise at low level’ variable.

<sup>6</sup> According to P and B&A, we should expect a monotonal pitch accent on the stressed penultimate syllable (i.e. a L\* according to Arvaniti 2002) and the rising of the intonation contour would be a modification of the intonation contour due to the following H–phrase accent. However, intonation contours such as /tudzuna?/ {“Dzunas?”} in Figure 7 are not amenable to this account, as the intonation contour of the last vowel (which would be the realization of the H- L%) starts lower than the finishing part of the intonation contour on the stressed syllable.

## 4.1.2 The 'Rise at high level' variable

In the speech of male adolescents the 'Rise at high level' variable is realized on a scale ranging between 160 Hz and 200 Hz (very rarely higher than 200 Hz). Like the previous variable, the 'Rise at high level' variable has a regional variant with a flat contour that is realized at the same pitch level, i.e. between 160 and 200 Hz.

The different discourse meanings of questions with a 'Rise at high level' variable (such as surprise, disbelief, clear opposition etc.) indicate little likelihood that the propositional content of the question is true.

This variable could be described as H\*H in a representation using level tones. The H\* indicates the high level and the second H indicates the rising movement of the 'Rise at high level' variable.

Three realizations of the "Rise at high level" variable are presented in Figure 8. The first two have the standard rising phonetic realization and the third has the regional flat phonetic realization of the variable.

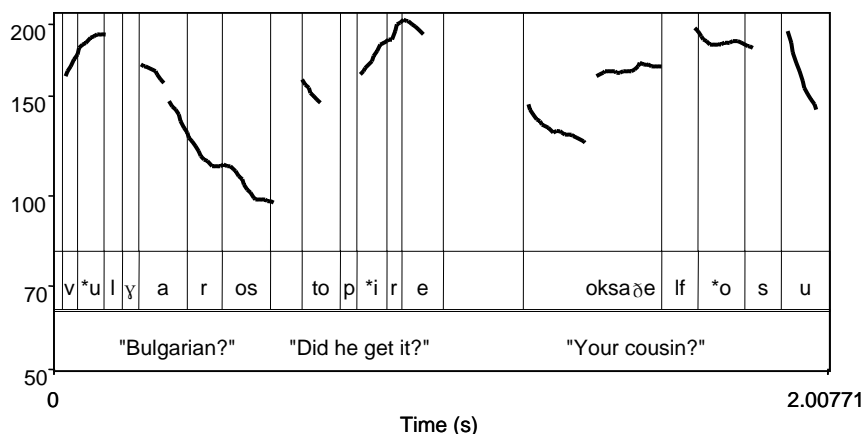


Figure 8: Three one-word polar questions with a 'Rise at high level' variable.

## 4.1.3 The 'Rise at mid level' variable

The 'Rise at mid level' variable does not appear very frequently in the male adolescents' speech. This variable finishes between 140 Hz -155 Hz in the boys' speech and it expresses a fifty-fifty likelihood that the propositional content of the one-word polar question is true.

It is not surprising that the 'Rise at mid level' variable occurs mainly on real polar questions, i.e. on questions expressing ignorance on the speaker's part of the truth or falsity of the propositional content of the utterance, without any further reference to particular degrees of likelihood. The absence of further attitudinal meanings is confirmed by the addressee's response to these questions, which merely consists in providing the requested information.

In a representation using level tones – which is not compatible with P's and B&A's frameworks, as none of them recognizes an intermediate pitch accent – this variable would be described as M\*H. Obviously, a third – intermediate – level would be necessary in order to express the semantic importance of the mid level (Grabe 2001 also argues for the existence of an intermediate level, but on the phonetic level only), and the H indicates the rising movement of the 'Rise at low level' variable.

Although I did not find an intonation contour with its peak at the end of the 'rise at the mid level' (i.e. the peak of the intonation contour always appeared on the last syllable), I propose the M\*H description, as the rising movement of the variable is an important indication of the overall meaning of all the three rising variables, that is their reference to objective epistemic modality.

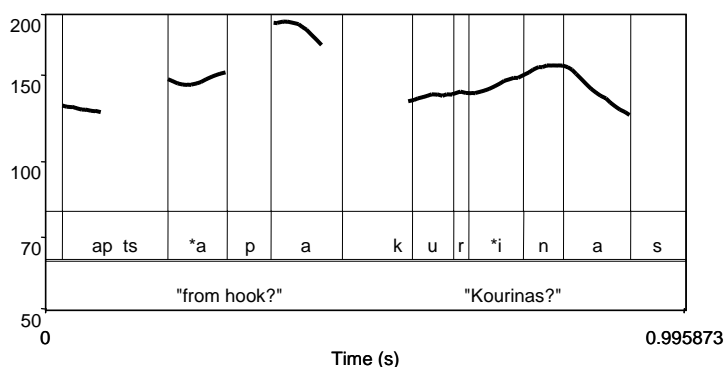


Figure 9: Two one-word polar questions with a 'Rise at the mid level' variable.

#### 4.2 The group of Falling variables

The comparison of polar questions with the same falling contour but different discourse meanings revealed a systematic correlation between the falling part of the intonation contour on the last vowel of one-word polar questions and the speaker's *subjective epistemic modality*<sup>7</sup> (Papazachariou 1998, Papazachariou/Archakis 2001), i.e. the speaker's subjective certainty or uncertainty about the truth of the propositional content of his/her utterance. This systematic relation led to the definition of three falling variables. I argue that Greek speakers can express different degrees of subjective epistemic modality, i.e. great, little or fifty-fifty certainty that the propositional content of the question is true, depending on the particular (i.e. one of the three) falling variable used.

<sup>7</sup> Subjective epistemic modality is a quite different notion from objective epistemic modality. Objective epistemic modality indicates the possible or non-possible, or rather, different degrees of likelihood, due to real world factors (Lyons 1977). Subjective epistemic modality, on the other hand, refers to the certainty or uncertainty of the speaker, a subjective feeling, which is not necessarily in accordance with objective real world factors. Subjective epistemic modality concerns the stance of the speaker towards the content of his/her utterance.

Each variable is located on the vowel of the ultimate vowel of the word. It is realized with two variants: a standard Modern Greek phonetic realization with a falling contour, and a regional variant with a flat contour. According to Arvaniti (2002), the falling part of the intonation contour on Greek polar questions is described as H-L%. However, this description cannot capture the systematic relation between subjective epistemic modality and the position of the falling contour of the last vowel of the word that will be illustrated in the following sections.

#### 4.2.1 The Low Falling variable

Whenever the intonation contour on the final vowel appears *lower* than the finishing point of the previous rising variable, the speaker expresses his/her great certainty about the truth of the propositional content of his/her utterance. This is the case with questions expressing the speaker's strong opposition (with a combination of 'Rise at high level' variable + Low Falling variable, i.e. "there are few possibilities of what I am asking being true, and I am certain about that", as in /vulyaros?/ {"Bulgarian??"} in Figure 10), or with phatic questions (with a combination of 'Rise at low level' + Low Falling variable, i.e. "there are many possibilities of what I am asking being true and I am certain about that", as in /tudzuna?/ {"Dzunas'?"} in Figure 10). In these cases, the speaker never gave the turn to the addressee indicating that s/he is not really expecting a response.

The Low Falling variable has a flat phonetic realization, which is the regional variant of this variable. The regional variant also appears lower than the finishing point of the previous rising variable.

In a level representation, this variable would be described as LL%. The first level should be L, because it appears lower than the preceding rising variable, and the L% is necessary in order to signal the falling movement of the variable<sup>8</sup>.

Three realizations of the Low Falling variable are presented in Figure 10. The first two realizations exemplify the standard falling variant and the third exemplifies the regional flat variant of the variable.

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<sup>8</sup> The common form of the Low Falling variable in the questions in Figure 8 could not be captured in terms of P's and B & A's frameworks. In particular, the end of the intonation contour of the /vulyaros?/ {"Bulgarian??"} in Figure 10 would be described as L- L% (from the overall H\* L-L%), and the respective part of the /tudzuna?/ {"Dzunas'?"} in Figure 10 would be H- L% (from the overall L\* H- L%).

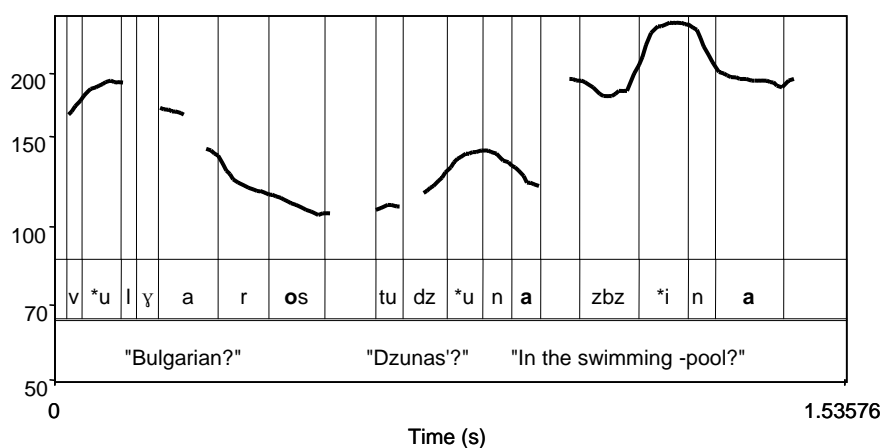


Figure 10: Three one-word polar questions with a low Falling variable on the last vowel.

#### 4.2.2 The High Falling variable

When the falling variable begins *higher* than the finishing point of the previous rising variable, the speaker is indicating his/her little certainty about the truth of the propositional content of his/her utterance. This is the case either with confirmative questions (with a combination of ‘Rise at low level’ + High Falling, i.e. “there are many possibilities that what I am asking is true, but I am not certain about it”, as in /pezi?/ {“Is it recording?”} in Figure 9), or with questions expressing strong disbelief (with a combination of ‘Rise at high level’ + High Falling variable, i.e. “there are few possibilities that what I am asking is true, but I am not certain about it”, as in /siγura?/ {“Are you sure?”} in Figure 9). In both cases, the addressee felt obliged to respond to the speaker’s question, a reaction that did not occur with the phatic questions, or the questions expressing strong opposition. It is argued that the High Falling variable, expressing the uncertainty of the speaker, forces the addressee to provide an answer.

In a level representation, this variable would be described as HL% as it carries the peak of the intonation contour, and it should express the falling movement of its standard Modern Greek realization. Two realizations of the standard High Falling variable are presented in Figure 11.

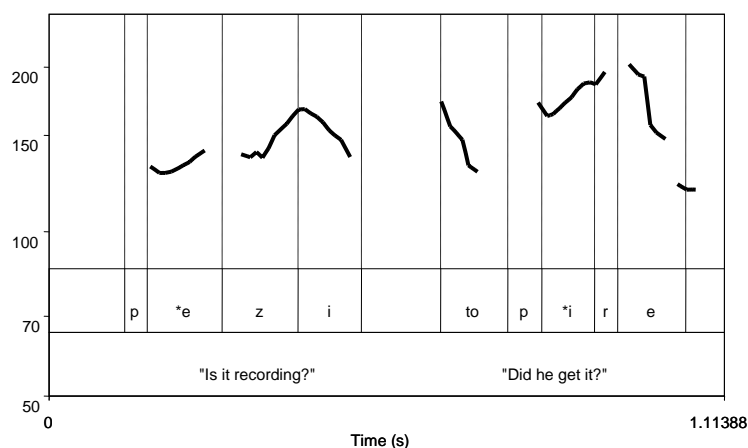


Figure 11: Two one-word polar questions with a High Falling variable on the last vowel of the polar question.

#### 4.2.3 The Middle Falling variable

In the corpus of the present study, another – quite rare – alternative occurs, expressing a fifty-fifty certainty. Hence the speaker actually avoids signalling subjective commitment to the truth-value of the propositional content of the utterance. This is possible either with the falling variable starting almost at the same level as the finishing point of the previous rising movement, when the word is stressed on the penultimate or antepenultimate syllable, or with the absence of the falling movement altogether, when the word is stressed on the ultimate syllable.

This variable usually occurs in cases where the speaker prefers to withhold his/her subjective opinion about the propositional content of his/her utterance. In a representation using level tones, the Middle Falling variable could be described as ML%. The M indicates the intermediate level and the L% indicates the falling movement of this variable.

Two realizations of the Middle Falling variable are presented in Figure 12. The first realization exemplifies the standard falling variant and the second exemplifies the regional flat variant of the variable.

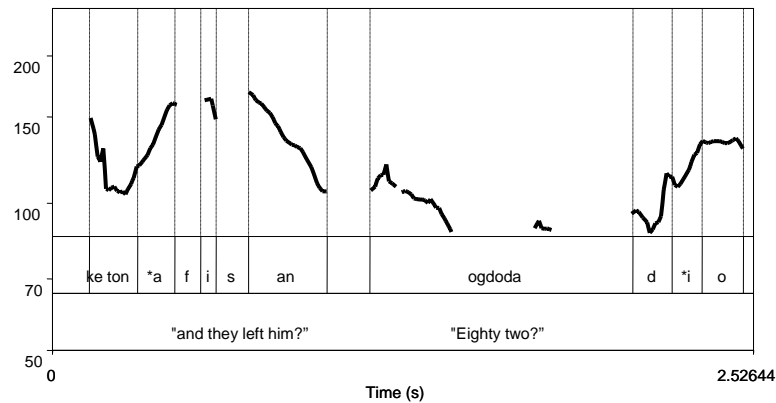


Figure 12: Two polar questions with the Middle Falling variable on the last vowel of the word.

## 5. Distribution of intonation variables over syllables

As already mentioned in section 3, in Modern Greek words are stressed on the ultimate, penultimate or antepenultimate syllable. It was also noted that the rising variables appear on the stressed vowel of the word and the falling variables appear on the last vowel of the one-word polar question. In cases where the one-word polar question is stressed on the penultimate syllable, a rising variable appears on the stressed vowel, and a falling variable follows immediately on the last vowel (see Figures 1, 9 and 11).

In cases where the one-word polar question is stressed on the antepenultimate syllable, the intonation movement that appears on the middle – penultimate – syllable just connects the two variables. In particular, when the falling variable appears higher than the finishing point of the rising variable, the intonation contour on the penultimate syllable is a rising one (see /tovaze?/ {“did he put it?”} in Figure 2). On the other hand, when the falling variable starts lower than the finishing point of the previous rising variable, the penultimate syllable has a falling contour (as in /vulyaros?/ {“Bulgarian?”} in Figure 8).

Finally, when the word is stressed on the ultimate syllable, both variables are realized on the last syllable, forming a crowded rising + falling pattern, as in /akus?/ {“Are you listening?”} in Figure 4. In a few cases, the intonation contour of the ultimate-stressed word consists of a simple rise. In all of these cases, the speaker did not indicate either certainty or uncertainty (see Figure 4).

## 6. The combinations of intonation variables and their contribution to the final discourse meaning

The epistemic meanings of the two sets of intonation variables defined earlier remain constant in different contexts. However, the final discourse meaning of a question is not only due to the semantics of intonation but also to its combination with the semantics of the sentence, with the conversational structure and the shared knowledge of the interlocutors. Therefore, the final meaning of the questions cannot be accounted for without consideration of the wider discourse context.

In section 3, I have shown that the overall intonation contour of one-word polar questions is a combination of two different meaningful variables. In what follows, I will try to describe how the same combinations of objective and subjective modalities can result in different final meanings depending on conversation structure and on the wider discourse context.

### Dialogue 2

- 1 R:/ (1,2 sec) kato sto reθimno/,  
 “down in Rethimno”,
- 2 R:/prin vyi to kokteil me ton tom kruz./  
 “before ‘Cocktail’ with Tom Cruise was released,”
- 3 R:/itan enas barman .. se teties fasis./  
 “there was a barman .. in cases like this”
- 4 R:/opote ixē kefia...petuse payaki .. psila, poli psila./  
 “when he was cheerful... he used to throw an ice-cube .. up-high, very high”.
- 5 R:/yirize.. me to potiri stin plati/  
 “he turned around .. with the glass on his back”
- L\*H HL%**
- 6 A: / to--va--ze?/  
 “did he put it -in the glass-?”
- 7 R:/ tovaze/  
 “he did”
- 8 A:/ posa payakia espase omos... yia na to maθi/  
 “yea, but how many ice-cubes did he break ... before he learned the trick”

In Dialogue 2, line 6, speaker A asks something that seems a logical assumption at the particular point in R’s (researcher) narration. R provides definite confirmation without any further comments and finishes his story. This response indicates that R did not interpret A’s question as surprise, opposition, or irony, in which case a different – defensive – reaction would be more likely. Neither did he interpret it as a phatic question, in which case he would have probably not replied. Moreover, the two groups of five speakers in the perception test interpreted the above question as a confirmative polar question (i.e. a question with which speakers try to provide and confirm predictable information related to the narration of their interlocutor) that needs an answer. Therefore, both the speaker’s response and the results of the perception tests point to the same interpretation.

The next question is how the addressee and the native informants who participated in the perception tests arrived at that interpretation, as at this point of the conversation, speaker A could also be expressing his doubts, opposition, negation, or even irony, with the same sentence. I argue that the particular combination of a ‘Rise at low level’ with a High Falling variable indicates that there are many possibilities that the propositional content is true, but he (speaker A) is not certain about it. In the particular structure of Dialogue 2, where the requisite information is not part of the interlocutors’ mutual knowledge, the “Rise at low level” indicates that the truth-value of the propositional content of the question is easily predictable. Moreover, the uncertainty of the speaker expressed by the High Falling variable forces the addressee to reply and confirm the predictable information.

The combination ‘Rise at low level’ + High Falling’ usually occurs on confirmative polar questions in Greek. With this intonational combination speakers indicate that they are indeed listening to their interlocutor and following his/her narration, as they can guess parts of it. Moreover, they are not trying to take the turn. On the contrary, the indication of uncertainty with the High Falling variable again leaves the turn to the narrator.

The same combination of the “Rise at low level” with the High Falling variables can have an absolutely different meaning in a different conversational structure, as illustrated by the second /pezi/ {“is it recording?”} question in Dialogue 3.

### Dialogue 3

- 1 A:/ai valto ðimitri...valto na pezi/  
 “Come on Dimitris, start the recording”
- 2 R:/edaksi pezi/  
 “O.K. it’s recording”
- H\*H ML% L\*H HL%**
- 3 A: /pe----zi? .. pe-----zi?/  
 “Is it recording? ... is it recording?”
- 4 R:/ne re si../  
 “Yes, sure;”
- 5 /afto ine pu ðelo, ti nomizis oti ðelo?/  
 “this is what I want, what do you think?”
- 6 A:/[kala..ti=]/ <embarrassed>  
 “well .. of course=”
- 7 R: @ [laughter]

In this dialogue, speaker A is not trying to provide predictable information, as in Dialogue 2, but is instead questioning the previous statement of speaker R (the author of this paper).

R’s response is not a simple answer but rather an emphatic positive expression (line 4) followed by further explanation (line 5) regarding the progress of the recording. As is particularly shown in line 5, R states that this is the kind of conversation that he is interested in (i.e. casual conversation). The reason for this statement was that he assumed speaker’s A questioning was related to his ideas about the type of recordings that R was interested in. Although R had repeatedly stated that he was interested in recordings of casual dialogues (hence the emphatic use of the definite “this” instead of “casual speech” in line 5), this particular speaker expected more formal, interview-like conditions. So, when R said that he was already recording the dialogue, A questioned the truth of R’s statement, as he had not

expected that R would really be interested in recording casual and unprepared speech. R believes that A's embarrassed reaction in line 6 is explained in the light of this context, i.e. A feels embarrassed because he has expressed doubts about R's statement, when R had repeatedly explained earlier that he wished to record casual and unprepared speech. R's laughter at the end serves to reduce his embarrassment.

From R's response to the addressee's questions, it is obvious that speaker A does not believe that R was already recording, and he in turn expresses this disbelief with two echo questions. However, there are different degrees of opposition that could be expressed by a polar question in this particular part of the dialogue structure – from mild doubts to clear opposition, or even irony. R's reply in line 4, although emphatic, does not indicate that R interpreted speaker A's echo questions as clear opposition, otherwise R's answer would have been more challenging. Moreover, the perception tests associated the second question with the expression of speaker A's doubts about the truth of R's statement. Why did R – as the addressee – and the ten informants participating in the perception tests interpret the second question in this way?

The 'Rise at low level' variable indicates that there is a great likelihood that what the speaker is asking – which echoes R's statement – is true; therefore, the validity of R's statement is not challenged and speaker A does not threaten R's face. However, the High Falling expresses speaker A's subjective uncertainty about the truth of the preceding proposition, i.e. of R's statement that he was recording, so it allows speaker A to express his personal and subjective doubts.

Actually, the combination of 'Rise at low level' with High Falling variables on echo questions is one of the most polite ways in Greek for opposing somebody's views, as the speaker does not question the objective truth of his interlocutor's statement and consequently does not threaten his/her face. What he merely does is try to express his/her subjective uncertainty, therefore his/her subjective doubts.

In Dialogue 4, the same combination of 'Rise at low level' and High Falling variables in /ογδodaena?/ {'eighty one?'} (line 2) results in a different final meaning.

#### Dialogue 4

1 B:/lipon= .. akus?/

“so= .. listen to this”

**L\*H HL% L\*H ML%**

2 B:/proti xronia pu ðimiuryiθike itan to **ογδoda--e---na?** ογδoda-ði----o?/

“It first applied in eighty-one? eighty-two?”

3 A:/ emis θa piyenumo olo teleftea ðesmi .. /

“we'll always be at the last module .. ”

4 A:/ olo stin teleftea/

“always at the last”

5 B:/ akus? .. tote itan i xronia tu ksaðelfu mu .. /

“are you listening? .. my cousin was in the last grade that year .. ”

6 R:/ ..mm../

“..aha.. ”

7 B:/ i pio treli ilikia re γamoto ... /

“it's the craziest bloody age ... ”

It is interesting that although speaker A interrupts speaker B and takes the floor, he does not reply to speaker B's questions. This behaviour indicates that these two questions are not meant to be answered by the addressee – the information requested is only available to the narrator anyway. Moreover, all the informants in my perception tests agreed that the meaning of the two questions in this narration was: “If it was not in 81, it was in 82”. But how does one reach this interpretation? I suggest that the combination ‘Rise at low level’ + High Falling’ on the first question indicate that “there are many possibilities that it was 81, but I am not certain about it”. The fact that this question is part of the speaker’s narration, i.e. it does not give the turn to his interlocutors, leads the latter to perceive it as highly probable information.

My aim in this section was to support the claim that the abstract meaning of the intonation variables is the same irrespective of context. In addition, I have suggested that the discourse meaning of a polar question in a dialogue derives from the interaction of the semantics of the sentence, the semantics of the intonation variables, pragmatics and conversation structure. Nevertheless, due to space limitations, only one combination of intonation variables (i.e. “Rise at low level” + “High Falling”) is discussed, and an explanation is offered for the fact that polar questions with the same meaningful intonation variables reached three different discourse meanings in three different conversation structures.<sup>9</sup>

## 7. Comparison with other ‘compositional’ approaches

As already mentioned in section 3, Pierrehumbert/Hirschberg (1990) (henceforth P&H) proposed that each of the three tones composing the traditional nucleus (according to Pierrehumbert’s model) has a different function. The combination of the meanings and functions of the three accents results in the overall meaning of the utterance.

However, P&H’s semantic analysis of the intonation of American English cannot readily be applied to Modern Greek. In particular, P&H argue that one boundary tone (H% for English) leads the addressee “to interpret an utterance with a particular attention to subsequent utterances” (1990: 305), and the other boundary tone does not express such directionality. If there were two boundary tones in Greek with the function proposed by P&H, we would expect one of them to appear at the end of the intonation contour of the questions that seek a response from the addressee, and the other boundary tone to appear when the speaker does not seek the interlocutor’s response.

As shown in section 4, the intonation contour of Greek polar questions is mainly a rising-falling contour, i.e. the L% boundary tone according to P’s framework is the predominant boundary tone occurring in every type of question. Therefore, it is not surprising to find L% in questions which do not seek a response, e.g. questions expressing clear opposition (such as /vulyaros?/ {“Bulgarian?”} in Figure 8 and /tudzuna?/ {“Dzunas’?”} in Figure

<sup>9</sup> A more extensive presentation of the connection between the abstract epistemic meaning of the intonation variables and the discourse meaning of polar questions in different conversation structures as well as, and a discussion of all the possible combinations of the rising and falling variables, will follow in a future paper.

7). However, the existence of L% in questions which *do* seek a response, e.g. confirmative questions (such as /pezi?/ {“is it recording?”} in Figure 3) speaks against P & H’s proposal. Furthermore, it has been argued in sections 4 and 5 that the H% boundary tone is a phonetic equivalent of the Middle Falling variable when the stress occurs on the ultimate vowel of the word. Therefore, questions with a final H% such as /ikosioxtó?/ {“twenty-eight?”} in Figure 4 seek the response of the addressee, much like questions with a L% boundary tone.

P&H also argue that two phrasal accents (i.e. H- and L-) determine the autonomous/heteronomous status of the whole tone group within the intonation phrase. One phrase accent (H- for American English) indicates that this tone group is connected with the subsequent tone group in order to formulate a “larger composite interpretive unit” (1990: 302) and the other phrase accent (L- for American English) indicates the autonomous status of the tone group in relation to the tone groups that follow. If P&H’s semantic analysis could be successfully applied in Modern Greek, we should expect to discover only one of the two phrase accents, always the same one, i.e. the one that would indicate the autonomous status of the tone group, since our examples were one-word utterances with no subsequent tone groups. Arvaniti (2002) argues that there is always the same phrase accent (i.e. H-) on Greek polar questions. In P’s and B & A’s representation, however, Greek one-word polar questions would present two phrase accents. In particular, a L- would describe the falling contour that follows a “Rise at high level” variable, as in /vulyaros?/ {“Bulgarian?”} in Figure 8 (see also footnote 8). Similarly, in cases where the peak of the intonation contour appears on the last vowel of the word and not on its stressed vowel, a H- would be more accurate in P’s and B & A’s frameworks. Therefore, we should accept the existence of different phrase accents within the intonation contour of one-word questions. That, however, would challenge P&H’s account of the semantic role of phrase accents, at least for Modern Greek.

Finally, P&H argue that one pitch accent (H\* for English) defines an item as “to be evoked” and the other pitch accent (L\* for English) defines it as “already evoked”. If this basic distinction existed in Modern Greek, we should expect the “already evoked” pitch accent to occur on echo questions, and the “to be evoked” pitch accent to occur on questions that contribute new information in the conversation. Nevertheless, my data include echo questions with what P’s model would describe as L\* (/pezi?/ {“is it recording?”} in Figure 3) and H\* (/vulyaros?/ {“Bulgarian?”} in Figure 6). Moreover, questions that contribute new information in the conversation contain either what P’s model would describe as L\* (/tovaze?/ {“did he succeed?”} in Figure 2), or H\* (/topire?/ {“did he get it?”} in Figure 11).

Another proposal for a compositional model of the intonation of questions and statements comes from Bartels (1999). Bartels adheres to P’s and B&A’s description of intonation and intonation units. Furthermore, Bartels argues that the semantics of phrase accents and boundary tones provides the necessary indications for the characterization of an utterance as a question or a statement. In particular, Bartels argues that the fundamental notion of question – i.e. the relative lack of information – is expressed mainly by the absence of assertion through a particular phrase accent, as well as – in complementary terms – by the indication of “continuation dependence” through a particular boundary tone. According to Bartels, one phrase accent (L- for English) indicates that the speaker *asserts* the propositional content of his/her utterance, and this is the typical phrase accent of statements, while the other phrase accent (i.e. H-) expresses *lack of assertion*. The latter is the typical phrase

accent of questions. Furthermore, Bartels accepts P&H's definition of the boundary tones, a definition that has already proven non-applicable in standard Modern Greek.

Bartels makes a clear distinction between *if*-questions (polar questions that express the speaker's "inability to specify the truth value of the sentential proposition"; Bartels 1999: 146) and *whether*-questions (polar questions with which the speaker tries "to assert the proposition towards the addressee that he himself presupposes"; Bartels 1999:148). *If*-questions are marked by the phrase accent expressing lack of assertion (H- for English), and *whether*-questions are marked by the assertive phrase accent (L- for English). Furthermore, Bartels argues that echo questions which express doubt or surprise include the phrase accent that expresses lack of assertion as well, because these utterances question the addressee's assertion.

This distinction can likewise not be verified by the Greek data. In particular, if Bartels' proposal would be applied to Modern Greek, echo questions and confirmatory<sup>10</sup> questions such as /pezi?/ {"is it recording?"} and /tovaze?/ {"did he put it?"} in Figure 2 should differ by the presence or absence of assertion. However, these two questions have the same intonation contour and are composed of the same intonation units, either L\* H- L% according to P's model, or 'Rise at low level' + High Falling, according to my definition.

Another argument against Bartels' proposal comes from a further comparison of echo questions. Echo questions should always present the same phrase accent, i.e. the one that indicates lack of assertion; however, following P's and B&A's representation, we are forced to admit the existence of two phrase accents in echo polar questions. In particular, a H- phrase accent can be recognized in questions where the peak of the intonation contour appears on the last vowel of the word, such as /pezi?/ {"is it recording?"} in Figure 3, and a L- can be recognized on questions where the peak appears on the accented vowel, such as /vulyaros?/ {"Bulgarian?"} in Figure 8.

Bartels argues (1999: 152) that a question with the boundary tone indicating non-continuation dependence merely poses the question and therefore does not necessarily trigger the production of an answer; it is the boundary tone expressing continuation dependence, according to Bartels, that directs the question to the addressee, therefore forces the cooperative addressee to reply and provide an answer. According to my account, when the speaker shows his/her certainty about the degrees of likelihood of the propositional content of his/her sentence, then the addressee does not feel obliged to answer. Rather, the uncertainty of the speaker expressed by the High Falling variable forces the cooperative addressee to reply and to provide an answer.

Finally, Bartels' proposal about the assertive phrase accent is not adequate for identifying all the different discourses meanings of *whether*-questions. According to Bartels, the L-phrase accent in English asserts the speaker's presupposed proposition to the addressee; however, there is no further indication in Bartels' proposal of whether or not the speaker's suspicion is in accordance with the propositional content of the utterance or not. Bartels' model cannot account for this distinction, which in the present proposal is exemplified by the rising variables, in particular by the 'Rise at low level' and 'Rise at high level'.

<sup>10</sup> Confirmatory questions assert highly probable information. Therefore, according to Bartels' definition, they are a type of *whether*-questions.

## 8. Conclusions

In this paper I presented the two basic principles that guided my study, and the methodology followed in order to define the two groups of meaningful intonation variables occurring in one-word polar questions.

These two groups of intonation variables, which indicate different degrees of objective and subjective epistemic modality, are independent of conversation structure and context. Could it be argued that the meanings exist irrespective of the particular grammatical category of polar questions, i.e. that the above defined intonation units are morphemes, which are part of an intonation lexicon? As my study focused only on one-word polar questions no definite answer can be provided to that question. Further study will show whether or not these six intonation units occur in other types of sentences (such as statements or *wh*-questions) conveying the same meanings.

Finally, I have argued that the discourse meanings of polar questions are a result of the combination of the meanings of the intonation units with conversation structure. At this point I would like to emphasize once more that the final meanings of polar questions in a conversation are neither due to conversation structure nor to the meaning of intonation alone. As has been suggested in section 6, the specific discourse meanings of polar questions result from the combination of the two intonation units with pragmatics and conversation structure.

## References

- Arvaniti, Amalia (2002): "The intonation of yes-no questions in Greek." – In: Marianthi Makri-Tsilipakou (ed.): *14<sup>th</sup> International Symposium: Selected papers on Theoretical and Applied Linguistics*, 71-83. Thessaloniki: Department of Theoretical and Applied Linguistics, School of English, Aristotle University of Thessaloniki.
- Arvaniti, Amalia/Maria Baltazani (2000): *GR ToBI*. HTML Ms. (URL: <http://www.ucy.ac.cy/faculty/amalia.html/grtobi.html>; accessed 13 September 2001).
- Bartels, Christine (1999): *The intonation of English statements and questions*. New York/London: Garland.
- Beckman, Mary/Gayle Ayers (1997): *Guidelines for ToBI labeling. Version 3*. HTML Ms. (URL: <http://www.ling.ohio-state.edu/phonetics/ToBI/ToBI.0.html>; accessed 13 September 2001).
- Bennet A. (1982): "Strategies and counterstrategies in the use of yes-no questions in discourse." – In: J. J. Gumperz (ed.): *Language and Social Identity*, 95–107. Cambridge: Cambridge University Press.
- Bolinger, D. (1951): "Intonation: Levels versus Configurations." – In: *Word* 7, 199–210.
- (1958): "A theory of pitch accent in English." – In: *Word* 14, 109–149.
- (1972): "Accent is predictable (if you're a mind reader)." – In: *Language* 48, 633–644.
- (1989): *Intonation and Its Uses: Melody in Grammar and Discourse*. – London: Edward Arnold.
- Brazil, D. (1985): "Phonology: Intonation in Discourse." – In: T. A. Van Dijk (ed.): *Handbook of Discourse Analysis II: Dimensions of Discourse*, 57–75. London: Academic Press.
- Brown, G./K. Currie/J. Kenworthy (1980): *Questions of Intonation*. – London: Croom Helm.

- Couper-Kuhlen, Elizabeth/Margret Selting (eds.) (1996): *Prosody in Conversation*. – Cambridge: Cambridge University Press.
- Cruttenden, Alan (1997): *Intonation*. – Cambridge: Cambridge University Press.
- Crystal, David (1969): *Prosodic Systems and Intonation in English*. – Cambridge: Cambridge University Press.
- Freed, A. F. (1994): “The form and function of questions in informal dyadic conversation.” – In: *Journal of Pragmatics* 21, 621–644.
- Grabe, Esther (2001): *The IviE Labelling Guide. Version 3*. HTML Ms. (URL: <http://www.phon.ox.ac.uk/~esther/ivyweb/guide.html>; accessed 19 January 2004).
- Grice, H.P. (1975): “Logic and Conversation.” – In: J. Morgan (ed.): *Syntax and Semantics Vol. 3: Speech Acts*, 41–58. New York: Academic Press.
- Gusenhoven Carlos (1983): “Focus, mode, and the nucleus.” – In: *Journal of Linguistics* 19, 377–417.
- (1984): *On the Grammar and Semantics of Sentence Accents*. – Dordrecht: Foris.
- (1986): “The intonation of George and Mildred: Post-Nuclear Generalizations.” – In: C. Johns-Lewis (ed.): *Intonation in Discourse*, 77–123. London: Croom Helm.
- Halliday, M.A.K. (1967): *Intonation and Grammar in British English*. – The Hague: Mouton.
- (1970): *A course in spoken English: Intonation*. – London: Oxford University Press.
- Johns-Lewis, C. (ed.) (1986): *Intonation in Discourse*. – London: Croom Helm.
- Levinson, Stephen (1983): *Pragmatics*. – Cambridge: Cambridge University Press.
- Lyons, J. (1977): *Semantics*, vol. 2. – Cambridge: Cambridge University Press.
- Mennen, Ineke/Els Den Os (1993): “On the intonation of Several Modern Greek Sentences.” – In: Irene Philippaki-Warbuton/Katerina Nikolaidis/Maria Sifianou (eds.): *Themes in Greek Linguistics*, 233–240. Amsterdam: Benjamins.
- Mennen, Ineke (1999): “Second language acquisition of intonation: the case of Dutch near-native speakers of Greek.” – Unpublished PhD thesis, University of Edinburgh, Edinburgh.
- Milroy, James/Lesley Milroy/Sue Hartley/David Walshaw (1994): “Glottal stops and Tyneside glottalization: competing patterns of variation and change in British English.” – In: *Language Variation and Change* 6, 327–357.
- Nespor, Marina/Irene Vogel (1986): *Prosodic Phonology*. – Dordrecht: Kluwert.
- O’ Connor, J. D./G. F. Arnold (1961): *Intonation of Colloquial English: A Practical Handbook*. – London: Longman.
- Papazachariou, Dimitris (1998): *Language Variation and the Social Construction of Identity: The Sociolinguistic Role of Intonation among Adolescents in Northern Greece*. – Unpublished PhD Thesis, University of Essex, Colchester.
- Papazachariou Dimitris/Argiris Archakis (2001): “The dialectal role and discourse function of six semantic-intonation variables in Northern Greece.” – In: Ralli Angella/Brian Josef/Mark Janse (eds.): *First International Conference on Modern Greek Dialects and Linguistic Theory*, 223–236 Patras: Patras University Press.
- Pierrehumbert, Janet (1980): *The Phonology and Phonetics of English Intonation*. – Unpublished Ph.D. Thesis, MIT, Massachusetts.
- Pierrehumbert, Janet/Julia Hirschberg (1990): “The meaning of Intonational Contours in the Interpretation of Discourse.” – In: P. Cohen/J. Morgan/M. Pollack (eds.): *Intentions in Communication*, 271–311. Cambridge, Mass.: MIT Press.
- Schegloff, E./H. Sacks (1973): “Opening up Closings.” – In: *Semiotica* 7, 289–327.
- Selkirk, E. (1984): *Phonology and Syntax. The Relation between Sound and Structure*. – Cambridge, Mass: MIT Press.
- (1995): “Sentence Prosody: Intonation, Stress and Phrasing.” – In: John A. Goldsmith (ed.): *The Handbook of Phonological Theory*, 550–569. Oxford: Blackwell.
- Taylor, Talbot/Deborah Cameron (1987): *Analyzing Conversation*. – Oxford: Pergamon Press.

Tench, Paul (1996): *The Intonation Systems of English*. – London: Cassell.

Truckenbrodt, H. (1999): “On the relation between syntactic phrases and phonological phrases.” – In: *Linguistic Inquiry* 30, 219–255.

Zubizarreta, Maria-Luisa (1998): *Prosody, Focus, and Word Order*. – Cambridge, Mass.: MIT Press.