MASTER THESIS

“Intonation and sentence type interpretation in Greek. - A production and perception approach”

BY

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CONTENTS:

1. INTRODUCTION
   1.1. Topic announcement .................................................. 4
   1.2. General Existing Research ........................................... 4
      1.2.1. Intonation Functions ........................................... 4
         1.2.1.1. Syntactic Function ..................................... 4
         1.2.1.2. Information Function .................................. 5
         1.2.1.3. Paralinguistic Functions ................................. 5
         1.2.1.4. Speech Acts ............................................. 6
   1.3. Existing Research for Greek ....................................... 8
   1.4. Perception Approach of Intonation ................................. 9
   1.5. Theoretical framework of sentence types in Greek ............ 10
   1.6. Present Research .................................................. 11
   1.7. Interpretation of the terms ...................................... 12

2. METHODOLOGY
   2.1. Data collection ....................................................... 13
   2.2. Description of the subjects ....................................... 14
   2.3. Description of Data & procedure .................................. 15
   2.4. Data analysis ........................................................ 17
   2.5. Limitations ........................................................... 18

3. RESULTS
   3.1. Production Test ...................................................... 19
   3.2. Percepcion Test ...................................................... 31

4. DISCUSSION
   4.1. Discussion on findings .............................................. 49
      4.1.1. Discussion on the production test ........................... 49
      4.1.2. Discussion on the perception tests ........................ 52
   4.2. Further research ................................................... 55

5. CONCLUSIONS ............................................................... 56

APPENDICES

APPENDIX I ................................................................. 58
APPENDIX II ............................................................... 65

REFERENCES ................................................................. 69
ABSTRACT

This thesis examines the intonation patterns of Modern Greek with regard to different interpretations of the sentence types (declarative, interrogative, imperative).

14 utterances are produced by Greek native speakers (2 men and 2 women) so as to express various speech acts: STATEMENT, QUESTION, COMMAND and REQUEST.

The acquisition of the F0 curve for each utterance by means of the Wavesurfer tool leads to an analysis of the pitch movements and their alignments. After the F0 curves are analyzed and illustrated using the Excel program we are able to compare and group them. Thus, we come up with 5 different intonation patterns. After a second-level comparison based on the fact that some of the F0 curves were similar but they differed only as far as the final pitch movement is concerned, we ended up with 3 fundamental categories of intonation patterns: Category I whose main feature is the rising pitch movement aligned to the onset of the stressed syllables. This category includes only sentences that denote Statement so we can call it the STATEMENT category. Category II’s main characteristic is a dipping pitch movement aligned to the head of the utterance that is the stress of the verb or a particle that signifies negation (/min/, /den/). Sentences meaning Command or Request belong to this category. Lastly, Category III’s intonation pattern consists of peaking pitch movements aligned to the initial and final stressed syllables. Interrogative sentences belong to this category no matter their interpretation.

A secondary goal of the thesis is to examine to which extent intonation can be a safe criterion for the “correct” interpretation of a sentence. A de facto presumption that since the ratio between the number of utterances (14) and the different intonation patterns (5) is not 1:1 there can always be misunderstandings among speakers, is basically verified by the results of our perception test conducted to Greek native speakers: Greek native speakers were able to identify most of the speech acts that were expressed by the most common (default) sentence type (i.e. imperative sentence for COMMAND and interrogative for QUESTION) however there were combinations that they had difficulties to identify, such as interrogative sentences that were denoting other than QUESTION, e.g. REQUEST or STATEMENT.
Ending, a perception test conducted to Flemish speakers (subjects that were native speakers of another language than Greek) showed that they were more successful in sentences that meant STATEMENT and QUESTION but they could hardly identify an interrogative sentence that meant other than QUESTION and they also confused between COMMAND and REQUEST. This implies that the intonation used to convey different interpretations is basically language-dependent.

Concluding, this study offers a description of the intonation patterns (based on pitch movements) regarding the 3 sentence types with 4 different interpretations. Our findings prove that the intonation for some cases (i.e. for sentences that express COMMAND or STATEMENT) seems to be structure-independent and for others structure-dependent (cf. the interrogative sentences). Additionally, the fact that the negation can play an important role for the choice of intonation pattern (as shown for the case of COMMAND and STATEMENT) could be considered as a structure-dependent feature of intonation. This approach contrasts the approach used for many years in the traditional Grammar according to which the structure alone (sentence type) defines the meaning that is to be conveyed.
1. INTRODUCTION

1.1 Topic announcement

The main goal of the current thesis is to examine how the intentions of the speaker affect the intonation structure of the declarative, interrogative and imperative sentences in Modern Greek.

By means of production and perception test we intend to find out to which extent this linguistic function of intonation (the expression of speech acts) is language dependent and whether the intonation patterns in Greek are based on the information carried by the utterance itself or the sentence type.

A final prospective of the current research is a potential formulization of the Greek intonation, not being based only on the sentence types like in all the traditional grammars but based on the meaning that is to be conveyed.

The results of the production and perception test are demonstrated by means of statistical diagrams using the Excel tool and an intonation model based on the schematic representation of pitch movements (rises/falls etc). Specific descriptive tables make the potential formulization easier.

1.2 General Existing Research

1.2.1. Intonation Functions

In spoken language, the linguistic and paralinguistic functions of intonation have been well examined by linguists and phoneticians:

1.2.1.1. Syntactic Function

A fundamental property of intonation is its syntactic function: there have been many surveys on the correlation of the prosodic disambiguation and phrasing. Among the most representative are Hirschberg (2003, 2002) who focuses on the disambiguation
of Prepositional Phrase (PP) and Noun Phrase (NP). For Hirschberg the intonation has a segmenting and hierarchic function which illustrates the structure of an utterance.

However, the relationship between structure and prosody has been argued. For some linguists (DiCristo, 1981) there is a solid bond between the 2 linguistic features so the intonation is actually dependent on the morphological and semantic structure of each utterance and for others (Botinis, 1998) the intonation can really carry grammatical and structural functions either with or without the linguistic representation (morphology or structure). Grice and Baumann (2007) also observe that the syntactic structure and the intonational phrasing do not have to correspond exactly.

1.2.1.2. Information structure

Another linguistic function of the prosody is the information organization. This relationship between prosody and discourse analysis is another interdisciplinary field of great interest among researchers.

For most of them intonational features can signal the structuring of utterances into larger discourse segments: Lehiste (1975) points out the significance of English prosody for paragraphing: high F0 peaks indicate paragraph initials whereas lower F0 peaks indicate paragraph medial and final utterances.

For others the role of intonation is to cue information status: Halliday (1967) observes that for the English language “tonic” or “nuclear” pitch accents define new information and Brown (1983) adds that speakers place pitch accents on new information and de-accenting on given information.

1.2.1.3. Paralinguistic functions

In addition to pure linguistic functions, the intonation can also carry information on paralinguistic aspects that concern the speaker e.g. age, sex, attitude, emotions.

The importance of intonation in conveying emotions in speech was stated in many different studies. (Cosmides, 1983; Cahn, 1990).

Patterson and Ladd (1999) have considered various measurements for estimating pitch level and pitch range in speech conveying effect. The F0 contours were extracted in initial peaks (H), accent peaks (M), valleys (L), and sentence final lows (F). Using this
patterns, they are trying to describe the pitch level and pitch range of the utterances for each emotion.

Most of the studies conducted in terms of emotional prosody were focusing either on the production (Laor 2000) of emotions or the perception (Cahn 1990, as well as Åsa Abelin and Jens Allwood, 2000).

Mozziconacci (1998) in her PhD dissertation, is trying to investigate the variation of prosodic elements (pitch range, pitch level, intonation pattern and speech rate) in the vocal expression of emotions, since these parameters are considered to have a major contribution in conveying emotions. The study aims not only to a qualitative description of the speech variation but also to a quantification of the results (with statistics and the IPO-pattern), so that they can be used in speech synthesis.

So, the research on emotional prosody made the applications of emotional synthesis even more necessary. As a result, many researchers are trying to combine their theoretical framework on the intonation conveying emotions with TTS applications: Cf. Cahn (1990).

1.2.1.4. Speech acts

Another significant function of the intonation is the distinction among different speech acts. According to previous researches (Bach and Harnish, 1979 and Searle, 1969) there are four major categories of communicative acts: constatives, directives, commissives and acknowledgments. All speech acts belong to one of the categories above, e.g. statement is a constative, request is a directive, promise is a commissive and apology is an acknowledgment.

However, for most of the languages only very few of the speech acts have been examined, mainly the statement and the question:

One of the first works in this domain is that of Pierre Delattre (1972) where he focuses on the distinctive character of the French intonation when expressing different speech acts (Command, Question, Statement). However, his research is more a descriptive analysis and he avoids any statistical measurements that could lead in a formulization of the French intonation.

Pierrehumbert (1980), on the other hand, makes a full description of the American English intonation using an intonation model that still has success among researchers. This model has been labelled by Ladd (1996) as an Autosegmental-Metrical model,
due to the fact that it separates the segment tier (vowels/consonants) from the tones’ tier. This abstraction and the hierarchic property of the model, allows a more flexible demonstration of the intonation patterns of different utterances making the comparison and categorization quite handy.

Dwight Bolinger and Daniel Hirst (1998) also point out the communication importance of the American and British, respectively, English intonation focusing on the distinction between Statement and yes/no or wh- question. They both use actual recordings to show the different tones used for the statement and the question in English.

DiCristo (1998) makes a similar description for the French language, where the pitch movements are mainly occurring on the last syllables of the words, since in French the stress is predictable: always at the end of the word.

For the Dutch language, V.J. Heuven and J. Haan (2000) also focus on the Statement-Question distinctive character of intonation for their language. They also conduct perception tests (see below).

Ladefoged (2006) makes a descriptive analysis of the English intonation (both British and American) and he comes up with 24 different intonation patterns that can potentially occur. An interesting deduction of his survey is the fact that for the wh-questions there is a significant difference between British and American English at the final tone that is low and high respectively.

Even in tone languages the intonation seems to play a significant role for the distinction between declarative and interrogative sentences (see Xiaoli et alii, 2004).

Judging from the surveys above and others for different languages, we can infer that the distinctive function of intonation (as far as the speech acts –statement, question etc.- are concerned) has been either partially examined (i.e. focusing only on the statement/question distinction) or it belongs to a more general overview of the intonation representation of a language.

In addition, there is not a very clear connection between the sentence types as described in the grammars of each language with the speech act they can express and how the intonation intervenes.

Nevertheless, the study of intonation is quite important since its functions can have many applications. This has already started being shown by some linguists: Hirst/Cristo (1998) recognize the importance of intonation studies for psycholinguists.
and speech engineers but, already, one year earlier Granström (1997) defined the fields that intonation studies can be fruitful for: speech synthesis for making the synthesizers sound as natural as possible using an effective speech, speech recognition, speaker verification since the intonation can bear speaker-dependent characteristics, language identification, medical application (neurolinguistics and psycholinguistics focus in this domain) and, last but not least, education applications such as training of pronunciation of a foreign language.

Another interesting aspect is the inter-language similarities and differences of the intonation linguistic and paralinguistic functions. For some linguists, in the aforementioned function of intonation there can be seen a “universal” feature: Albert di Cristo and Daniel Hirst (1998) point out that the linguistic and paralinguistic functions of intonation systems seem to be shared by languages of different origins. For example, the raised pitch (either final or non final) in opposition to a lower pitch seems to be a universal distinctive feature between the question and the statement. Even in DiCristo/Hirst (1998), where one can find a description of the intonation of 20 different languages (including tonal languages such as Thai, Vietnamese or Japanese), the cross-linguistic comparisons tend to be refrained, due to the fact that the researchers need to be native or near native speaker of all the languages they potentially compare in case the comparisons can be safe.

1.3. Existing Research for Greek:

The Modern Greek intonation, in general, hasn’t been investigated thoroughly in terms of a formulized linguistic analysis. However, there are some really pioneer and interesting surveys as far as the intonation description are concerned:

Waring (1976) was one of the first who tried to describe the Greek intonation using a quite simplified intonation model: combining numbers from 1 to 3 that would correspond to the pitch level 4 tones: falling, rising, rise following a fall, rise followed by fall. For each of these tones he matches a meaning: e.g. the rising tone is mainly referring to questions or phrases without a complete content.

Antonis Botinis (1998) compares the intonation patterns of different sentence types (neutral intonation and question intonation with or without interrogative markers) as well as the affect that some linguistic phenomena such as focus, phrasing, and discourse can have on the intonation pattern and, hence, he comes up with the
“focal intonation” and “phrasing-discourse intonation”. One interesting conclusion of this survey is that the fundamental frequency (F0) is a prosodic parameter the function of which arises from the attribution to a certain stress group of a relative prominence in relation to other stress groups in a speech unit. So, for Greek all the manipulations of intonation that can result in different functions have to be concentrated on the stressed syllables, and this is as well the philosophy of the current research.

Another interesting conclusion of this work is the ascertainment that for the Greek language the intonation tools are essential to convey the question. Such tools are the shortened declination and the final tonal rise.

For the intonation of Greek questions, Maria Karra’s (2003) fruitful survey, where we can see a formulized demonstration of question’s intonation, takes into consideration the morph-phonological structure of the utterances, such as the stress placement of the nucleus.

Baltazani (2007) defines 5 pitch accents for the Greek intonation based on high and low tones (see Pierrehumbert, 1980), matching each of the pitch accents and the place they occur to different sentence types.

Chaida (2006) also describes the intonation pattern of Statement and Question, taking linguistic phenomena, such as focus, and paralinguistic features, such as the sex of the speakers, into account.

**1.4. Perception approach of intonation**

Regarding the perception approach of intonation, we can observe that the current literature is not numerous.

Among the most representative works is that of House (1990) where we see a perception orientated definition of intonation as “a perceptually relevant variation in fundamental frequency used by the speaker to convey information about units larger than a single word (phrase-sentence): Such information is sentence type.”

Mozziconacci (1998), on the other hand, makes a description of the Dutch intonation (with emphasis on emotional prosody) and checks how the different emotions conveyed by intonation manipulations are successfully perceived by native speakers. V.J. Heuven and J. Haan (2000), for the Dutch language as well, combine there production tests with perception tests on the ability of Dutch native speakers to identify Statement and Question sentences.
Jacqueline Vaissiere (2004) focuses only on the perception of the English intonation and its one of the few purely perception-oriented works.

**Greek:**

For Greek, Botinis et alii, (2000) make a contrastive analysis of the perception of focus intonation in Greek and Swedish. The pioneer offer of this survey is its cross-linguistic character.

Chaida (2006) conducts a perception approach of focus in declarative and interrogative sentences.

1.5. Theoretical framework of sentence types in Greek

All the descriptive grammars of Modern Greek from the traditional-structuralistic (cf. Tzartzanos, 1963 second edition: 1996) to the more recent communicative grammars (Klairis/Babiniotis, 2005), make an extensive reference to the sentence types. Tzartzanos’ approach is based in morphological criteria and thus he distinguishes into declarative sentences (the sentences of the Statement, as he mentions), interrogative sentences (the sentences of the Question) and imperative sentences (the sentences of Command). He doesn’t really take into consideration any communicative variations of the sentence types provided by different lexical or prosodic choices.

However, his classification, known as well as the “traditional;” classification of the sentence has been widely used in education for years.

On the other hand, Klairis/Babiniotis (2005) are trying to make a more communicative approach of the Greek sentence and he points out, but sporadically, the importance of intonation in conveying different communicative intentions.

He preserves the distinction between declarative, interrogative and imperative sentences and using appropriate examples he proves that all these different sentence types can express different speech acts such as Statement, Question, Request/Command. However, his arguments focus mainly on the lexical representation of these different speech acts and only for the distinction between Statement and Question he points out the significance of prosody in conveying the different speech acts: In Greek, he mentions, contrary to other languages like English or French where the structure is a clue of the sentence type, the expression of a yes/no
question is achieved only through intonation.: The rise at the accented nuclear syllable followed by a fall is a typical intonation feature of the interrogative sentences.

1.6. Present research

As aforementioned, little survey has been conducted on how the intonation affects the meaning of the utterance and what the correlations are between the sentence type of the utterance (declarative, interrogative and imperative) and the meaning that the speaker wants to give at the utterance according to his speech intentions.

We find in von Heusinger (1999), in his discussion of intonational meaning, that this is not a limitation of Greek linguistics only, but a general phenomenon due to the fact that more attention has been given to elaborating phonological systems than to the semantics behind intonation.

Thus, a research of this kind, focusing on the pragmatic function of intonation, is pioneer, especially for the Greek language, and the main goal of the present thesis is to illustrate as much as possible the correlation of the morphological types of sentences with 4 intentional categories (COMMAND, REQUEST, STATEMENT and QUESTION) hoping that our results will lead to a further investigation of intonation and pragmatics, perhaps with more applications (TTS, education etc.)

To summarize the questions that the current research aims to answer:

1. Does the intonation affect the meaning of the utterance so that it can express different speech acts? And how can the different intonation patterns be formulized and categorized?
   At this point, we will examine 4 distinct speech acts: Statement, Question, Command and Request.

2. What is the most dominant linguistic feature when people try to communicate? The syntactic structure of an utterance or its prosodic structure?
   To answer this question we need to choose utterances belonging at the same sentence type but expressing a different speech act and vice-versa. The Greek language can offer this opportunity to a great extent, as it will be shown below.
3. A question deriving from the previous one is whether there can be a sentence categorization that will be based on the intonation pattern and not the sentence type. If this is possible, it will mean that the traditional sentence categorization can be replaced by a more phonological-based one.

4. If the prosody plays an important role in expressing different speech acts, are those differences always successfully identified by native speakers, something that could guarantee the absolute unambiguous communication? A perception test shall be useful for this part of the research.

5. Can there be a language-independent way of expressing specific speech acts? For this question a perception test with speakers of other languages that don’t know anything about the Greek intonation will be conducted.

Given this baseline, the current research aims to show evidence to the linguistic function of the Greek intonation, combining production with perception tests, involving cross-linguistic interpretation.

1.7. Interpretation of terms.

It would be useful to define precisely some terms that will be used at the current thesis so that it is clear in which sense they are used and it would make the comprehension of the results of the research easier.

**Intonation**: Intonation is the variation of pitch when speaking. (Jones, 1960). *Rising intonation* means the pitch of the voice increases over time; *falling intonation* means that the pitch decreases with time. A *dipping intonation* falls and then rises, whereas a *peaking intonation* rises and then falls. We have to note that in the current thesis the terms **intonation** and **prosody** are used in the same sense.

**Head**: The main and obligatory information of an utterance or word group. It coincides with the utterance stress. (see DiCristo/Hirst, 1998).
2. METHODOLOGY

2.1 Data collection

Production test

The data collection took place in Athens, at the home places of the subjects, so that they would feel more comfortable and the results would be more spontaneous. The environment was as quiet as possible to avoid “noise” at our analyses. We tried as much as possible that no other people were present during the procedure to guarantee that the “real time” recording wouldn’t have to be interrupted or stopped.

The subjects had to utter some sentences given to them on a paper provided that they would pronounce them using the appropriate intonation corresponding to a question that was preceding the sentences (so the utterances were the answers to these questions). The questions were posed by the researcher so there was a kind of dialogue (see 2.3) between the researcher and the speaker recorded in real time by means of a recording device (laptop and microphone with very good quality of sound) and with audio recording software (Wave surfer application).

After the recordings were completed (2 men and 2 women were recorded), the data collected was saved in .wav format, and later opened with Wavesurfer software in order to be analyzed.

Perception test

The data collection of the Greek speaking subjects took place at the laboratory of phonetics and computational linguistics at the University of Athens, department of linguistics to guarantee that no sounds could distract the subjects’ attention and they would give the most spontaneous and honest answer.

For the Flemish speaking subjects, the experiment took place at their home place (one by one) in Belgium provided that they would be concentrated as much as possible.

For both the experiments, the subjects would have to listen to 14 utterances (the same that were recorded at the production test) spoken by the subject of the
production test that, according to the researcher, had the best articulation. None of the subjects of the perception test had participated at the production test. After each utterance there was a small pause (of about 5 sec) so that the subjects could fill in a questionnaire, given to them by the researcher, with what they believe the speaker’s intention is. They could choose among the categories REQUEST, QUESTION, COMMAND, STATEMENT or they could write something else if they considered so. The Greek speaking subjects had to evaluate their choice (choosing a number from 1 to 5), showing their certainty of their selection. In the scale 1 – 5 1 corresponds to “not certain at all” and 5 “absolutely sure”. This scale we didn’t use for the Flemish subjects since their answers were de facto not certain (they didn’t speak Greek at all). They just expressed what their “feeling” is according to their “linguistic sense”. The subjects heard the recordings twice to guarantee that they had enough time to fill in all the questions.

After the subjects had finished, the researcher collected all the papers.

2.2 Description of the subjects

Production test

The subjects were 2 men and 2 women (between 23 and 25), all students at the University of Athens and they were grown up in Athens. They didn’t have any dialectic accent and they had very good articulation.

Perception test

The Greek subjects were both men and women (between 25 and 55), most of them grown in Athens but as well in South Peloponnese. They were all native Greek speakers and their education status varied from high school to higher education.

The Flemish subjects were as well men and women (between 25 and 60), living and grown up at the province of Antwerp in Flanders, in north - east Belgium. They were all native speakers and they had higher education. None of them knew anything about the Modern Greek language.
2.3 Description of Data and procedure.

For the production test, as aforementioned, the subjects had to utter 14 sentences using the most appropriate for them intonation according to the context: each utterance was an answer to a question, hence the subjects were involved in a kind of dialogue with the researcher in order that their answers were spontaneous and unbiased (see the questionnaire at the APPENDIX).

We chose the questions in a way so that they were a guideline for the meaning of the utterance that the speakers had to say. Consequently, we could guarantee that the speaker would be sure about what the intention of the sentence is, without having ambiguous cases. In addition, the answers expected should have as neutral focus as possible. (e.g. with the question Τί γίνεται; /t i 'j i n e t e/ meaning “what’s going on?”) the expected answer shouldn’t have a focus on any of the terms of the sentence (at least broad focus) contrary to questions like, “Τί κάνει η Μελίνα;” /t i 'k a n i i m e 'l i n a/ meaning “what is Melina doing?” where the expected answer would have a focus on the verb phrase.

The subjects had to repeat the 14 sentences 10 times, but in a different order to guarantee that their answers were not random but consistent.

Selection of sentences:

Since our approach is a 2 dimension approach (of both the sentence types and the intention of the speaker) we selected sentences of all the sentence types in Greek (as a reference we had the traditional grammatical theory of Tzartzanos (1963 I), where we read that the Greek sentence can have three types: Declarative, Interrogative and Imperative of both positive and negative form) having different meanings:

1. Declarative sentence denoting Statement, positive (thereafter, SD+)
2. Declarative sentence denoting Statement, negative (SD-)
3. Declarative sentence denoting Command, positive (CD+)
4. Declarative sentence denoting Command, negative (CD-)
5. Interrogative sentence denoting Question, positive (QQ+)
6. Interrogative sentence denoting Question, negative (QQ-)

As far as the symbolization is concerned, the symbols, the first character corresponds to the meaning and the second to the sentence type.
7. Interrogative sentence denoting Request, positive (RQ +)
8. Interrogative sentence denoting Request, negative (RQ-)
9. Interrogative sentence denoting Statement, positive (SQ +)
10. Interrogative sentence denoting Statement negative (SQ -)
11. Imperative sentence denoting Command, positive (CI +)
12. Imperative sentence denoting Command, negative (CI -)
13. Imperative sentence denoting Request, positive (RI +)
14. Imperative sentence denoting Request, negative (RI-).

The declarative sentences are the sentences that mainly refer to a statement, and they can be affirmative or negative (with the particle “δεν” for the negation).

The interrogative sentences are the sentences that mainly pose a question and they have all the main characteristics of a question-structure (inversion in some cases, question mark when written). They can also be affirmative or negative (with the particle “δεν” for the negation). There are 2 types of interrogative sentences: yes/no questions and questions with interrogative markers e.g. Γιατί, πού, από πότε, πώς/ English: Why, Where, since when, How etc.

We need to mention that for the current research we only examine the yes/no question.

Lastly, the imperative sentences are those that mainly refer to an order or a request. In Greek those sentences have some morph syntactic features such as the imperative case or the subjunctive (with the particles “ας”, “να”). They can also be affirmative and negative (with the particle “μη” for the negation).

But as we aforementioned, those sentence types can have different meaning than their default meaning.
2.4 Data analysis:

Production test:

After the subjects have been recorded, we had to check the F0 contours of each utterance by means of Wavesurfer. In the F0 contour, we isolated each syllable and we measured the frequency of 3 parts of the syllable. (The initial, the middle and the last). This procedure occurred for the 14 utterances said 10 times for each speaker. Afterwards, we made a list of these numbers showing the frequency using Excel and we could have the diagram of the F0 contour of each utterance. By means of the statistical tools of Excel we could have the averages of the frequency values for each part of the syllable of each speaker. Thus we could recreate a more abstract diagram for each utterance of each speaker. Since the nature of the current research is more qualitative and descriptive, the use of statistical tools, such as StatView or SPSS for the calculation of t-tests or r-Pearson was judged to be unnecessary (there were no comparison between 2 categories). The only variable comparison is that of the fundamental frequency and the sex of the speakers so, in this case, the probability coefficient (p) was calculated.

When we had all the diagrams for the 14 utterances of each speaker, we could compare the F0 contours of the utterances among the speakers.

For the annotation of the F0 pattern we considered that it would be preferable to schematically represent the F0 curves using straight lines that would show the basic pitch movements. There is a special illustration of the stressed syllables (by adding the mark │ above the line that corresponds to that syllable and we also make a distinction between the stressed syllable and the “head-syllable”: i.e. the syllable that carries the basic accent of the utterance (for our utterances it is either monosyllabic: δε, μη or multi-syllabic words: the verb of the utterance so the head is on the stress of the verb). For those syllables we use a blue │ above their line.

An annotation that is based on the syllable as the perceptual unit of speech can easily show the main pitch movements and their alignments to the stressed or non-stressed syllables.
By having a consistent annotation for each utterance it would be easier to compare the F0 contours of the utterance and deduce how their sentence type and meaning affect their intonation pattern.

For the perception test, after the collection of the answers of both the Greek and Flemish native speakers, by means of the statistic tools of Microsoft Excel we could create the diagrams of the answers for each utterance.

2.5 Limitations

One limitation of the study is, as far as the perception test is concerned, the fact that there couldn’t be a full control of the researcher for the conduction of the Flemish test. One part of this test was conducted under the surveillance of the researcher but another part was conducted with the help of a native Flemish speaker, without linguistic knowledge or experience in perception tests. However, he was instructed as adequately as possible on how to conduct the test in the most accurate way.
3. RESULTS

3.1. PRODUCTION TEST

Below, we state the figures of the intonation for each sentence. The figures correspond to the means of all the occurrences of the subject whose recordings were used for the perception test.

Generally, since we focus on the basic intonation module for each utterance and given the fact that it was mainly the same for all the speakers (both male and female) we only cite the utterances of one speaker.

The only difference, as expected, between male and female occurrences was the higher frequency for the female:

\[(p<0.001)\]

<table>
<thead>
<tr>
<th>RANGE</th>
<th>&lt;100</th>
<th>100-120</th>
<th>&gt;120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentences</td>
<td>RI+, CD-</td>
<td>RQ+, QQ-, QQ+, CI-, SD-, SQ-, RI-, CD+, RQ-, SQ+</td>
<td>SD+, CI+</td>
</tr>
</tbody>
</table>

1. Statement Declarative

![Figure 1: F0 contour of Statement Declarative (positive)](image-url)
The F0 contour of a declarative sentence expressing Statement has the following characteristics:

A heightening of the pitch starting at the first stressed syllable (/ˈli/) with its peak being at the first post accentual syllable ( /na/). This initial rise aligned to the first stressed syllable of the utterance was common for all the speakers. Then, after a small dip before the stress of the word /ba’loni/, the pitch turns higher again with a peak on the post-accented syllable where it starts to fall (final lowering).

2. Request interrogative (-)

![Figure 2: F0 contour of Request interrogative (negative)](image)

For the F0 contour of the negative interrogative sentence expressing Request we can see that (for all the speakers) at the beginning of the utterance there is a continuous rise until the first accented syllable (/ˈli/ of the word /meˈlina/) followed by a low plateau (due to the “calling function” of the word /meˈlina/). A rough peak is aligned to the onset of the accented syllable /di/ (of the word /ma ˈdi lia/) followed by a fall.
3. Command Imperative (+)

![Figure 3: F0 contour of Command Imperative (positive)](image)

Figure 3: F0 contour of Command Imperative (positive)

Again, we can see the rise of the contour throughout the accented syllable followed by a low plateau (for the calling function). Then, a continuous rise, peaked at the post-accented syllable of the word /ˈba ló ne/ followed by a continuous fall until the end of the utterance. The peak at the head’s accent after the low plateau of the calling function (dipping intonation) can be annotated to the fact that, for an imperative sentence, the verb itself carries the main information of the utterance so it has to be emphasized.
4. Question interrogative (-)

After the peak on the first stressed syllable, there is a rough fall which keeps the intonation contour at a low level until the sudden rise on the stressed syllable of the word / ma ‘di lia/. The rise is followed by a rough fall at the last syllable of the utterance. This pattern is the typical pattern of the Greek interrogative sentence and it occurred for all the speakers.

Figure 4: F0 contour of Question interrogative (negative)
5. Question with interrogative (+)

Figure 5: F0 contour of Question interrogative (positive)

Here, the pattern of the contour is identical to the previous one, with less rough dipping intonation in the end.

6. Command Imperative (-)

Figure 6: F0 contour of Command imperative (negative)
The F0 contour starts with a continuous rise throughout the stressed syllable of the pre-head followed by a fall at the end of the word /me´li na/. (calling function). Then, a continuous rise, peaked at the stressed syllable of the head (that in this case is the negation particle /min/) followed by a continuous fall until the end of the utterance where there is a final rise.

7. Request imperative (+)

The contour has a continuous rise until the post-accented syllable of the word /me´lina/, however in this syllable there is a fall as well, whose stop is aligned to the end of the syllable (calling function). Afterwards, there is a “sharp” rise throughout the accented syllable of the head –in this case the verb /’balone/- (common for the imperative sentences) followed by a continuous fall until the accented syllable /’di/ where a new but very “mild” rise starts until the end of the utterance.
8. Statement Declarative (-)

The contour starts with a dip before a rise peaked at the stressed syllable /ˈliː/, then low plateau until the syllable /ˈdiː/, where we can see a slight rise followed by a rough fall. Generally, the F0 contour of this sentence seems like the F0 contour of the yes-no questions (see 4, 5) however the initial dip is very smooth, a fact that makes the sentence although being declarative, have some features of the typical yes-no question contour.

Figure 8: F0 contour of Statement Declarative (negative).
9. Command Declarative (-)

The F0 contour starts with a continuous rise until the peak at the accented syllable /'li/ and after that peak we notice a sudden fall of the pitch at the end of the syllable /na/. This abrupt fall we can ascribe to the vocative (calling) function at the end of the proper name “Melina” (see also examples of request and the rest of the command examples).

Then, there is another rise of the pitch peaked at the syllable /ðe/ (negation) which is the head of the sentence. After that peak we can notice a continuous fall until the end of the utterance.

Figure 9: F0 contour of Command declarative (negative).
10. Statement interrogative (-)

The contour starts with a rise peaked at the accented syllable /'li/', then fall at the head (low plateau) until the first post-head accented syllable /'di/' where we have the peak of the second rise. Afterwards, we notice an abrupt fall until the end of the utterance.

11. Request imperative (-)

Figure 10: F0 contour of Statement interrogative (negative).

Figure 11: F0 contour of Request imperative (negative)
The contour starts with a continuous rise until the end of the “vocative” word (/Melina/), then there is a small dip followed by a rise peaked at the head word /min/ and the utterance ends with a continuous fall.

12. Command Declarative (+)

![Graph showing F0 contour of Command declarative (positive)](image)

*Figure 12: F0 contour of Command declarative (positive)*

The contour starts with a rise until the accented word of the word /melina/ ("vocative" word), then an abrupt dip followed by a rise at the accented syllable of the head word (ba’lonis). The utterance ends with a fall of the pitch.
13. Request interrogative (-)

![F0 contour of Request interrogative (negative)](image)

Figure 13: F0 contour of Request interrogative (negative)

The F0 contour starts with a small dip, then there is a peak at the accented syllable /li/ followed by a continuous fall until the second peak at the post-head accented syllable /’di/. After this peak, the utterance ends with a fall.

14. Statement interrogative (+)

![F0 contour of Statement interrogative (positive)](image)

Figure 14: F0 contour of Statement interrogative (positive)
The F0 contour starts with rise with a peak at the accented syllable /li/ followed by a dip, since there is another peak at the head stressed syllable /'lo/. After this peak, the contour falls but there is a slight rise at the post-head accented syllable /'di/ followed by a fall in the end. We can notice that the F0 contour of this sentence has features of both a mere statement and question.

Classification of the sentences according to their F0 contours:

<table>
<thead>
<tr>
<th>F0 contour format: this is an approximate description of the main pitch movements. The black marks correspond to the stressed syllables and the blue to the head of the utterance.</th>
<th>Sentence type</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="F0 contour diagram 1" /></td>
<td>SD+</td>
</tr>
<tr>
<td><img src="image" alt="F0 contour diagram 2" /></td>
<td>SQ+</td>
</tr>
<tr>
<td><img src="image" alt="F0 contour diagram 3" /></td>
<td>CD+ CI+</td>
</tr>
<tr>
<td><img src="image" alt="F0 contour diagram 4" /></td>
<td>RI-, CD-, RI+, CI-</td>
</tr>
</tbody>
</table>
3.2. PERCEPTION TEST

Here are the results for the **Greek native speakers**. Each pie corresponds to each of the fourteen (14) combinations of the intentional categories with the sentence type:

A. Sentences that denote STATEMENT

![Pie chart](image)

**Figure 15: Statement Declarative (positive)/Greek**

For the declarative sentence (positive) that denotes a Statement, all subjects recognized it as a STATEMENT (60% were sure, and 40% they answered that probably it is a Statement).
For the declarative sentence (negative) that denotes Statement, all the subjects recognized it correctly as a STATEMENT; however, 20% of them were uncertain about their choice.

For the interrogative sentence (negative) that denotes a STATEMENT, 90% of the subjects considered it as a QUESTION and only the 10% as, probably, a STATEMENT.
For the interrogative sentence (positive) that denotes a STATEMENT, 90% of the subjects considered it as a QUESTION and only 10% as a STATEMENT. (“probably a statement”).

B. Sentences that denote REQUEST

For the interrogative sentence (positive) that denotes request, 40% recognized it as a REQUEST (10% were sure and 30% said that it’s probably a request), and the rest, 60%...
% recognized it as a QUESTION. However, its indicative to mention that around 20% of the subjects were not sure at all about their choice (10 % rather a question and 10% rather a request).

For the imperative sentence (positive) that denotes request, 80 % of the subjects recognized it as REQUEST and only 20 %, of which the 50 % were not sure at all about their choice, considered it as a COMMAND.
For the interrogative sentence (negative) that denotes a REQUEST, all the subjects recognized it as a REQUEST (50% were certain, and 50% said it’s probably a Request).

For the interrogative sentence (negative) that denotes request, 70% recognized it as a REQUEST (of which 14% weren’t sure at all about their answer). The rest, considered it as a QUESTION.
C. Sentences that denote COMMAND

Figure 23: Command Imperative (positive)/Greek

For the imperative question (positive) that denotes command, all subjects recognized it as a COMMAND (80% were absolutely sure about their choice).

Figure 24: Command Imperative (negative)/Greek
For the imperative sentence (negative) denoting Command, 60% of the subjects recognized it as a COMMAND and 40% considered it a REQUEST. The percentage of the subjects that were not sure at all about their choice is 10%.

![Figure 25: Command Declarative (negative)/Greek](image)

For the declarative sentence (negative) that denotes COMMAND, 40% recognized it as a COMMAND, and the rest (60%) considered it a STATEMENT. However, 75% of the subjects that said it is a COMMAND were absolutely sure, and only 33% of those who said it is a STATEMENT were absolutely sure.

![Figure 26: Command Declarative (positive)/Greek](image)
For the declarative sentence (positive) that denotes Command, 70% of the subjects recognized it as a COMMAND and only the 30% as a STATEMENT, of which 33% were not certain at all about their choice.
D. Sentences that denote QUESTION

Figure 27: Question Interrogative (negative)/Greek

For the interrogative (negative) that denotes question, all the subjects recognized it as a QUESTION, however there was a 10% that was not sure about their choice.

Figure 28: Question Interrogative (positive)/Greek

For the interrogative sentence (positive) that denotes QUESTION, all the subjects recognized it as a QUESTION however the majority (70%) decided to say that they probably consider it as a Question, and only 30% were totally sure.
It’s quite interesting to see what the Flemish native speakers answered for each sentence:

A. Sentences that denote STATEMENT

![Figure 29: Statement Declarative (positive)/Flemish](image)

Most of the subjects (90%) recognized it correctly as a STATEMENT and only 10% considered it as a COMMAND.

![Figure 30: Statement Declarative (negative)/Flemish](image)
For the declarative sentence (negative) that denotes Statement, 80% of the subjects considered it a COMMAND or QUESTION and only 10% recognized it correctly as a STATEMENT. The rest 10% considered it as a REQUEST.

![Statement Interrogative (negative)/Flemish](image1)

For the interrogative sentence (negative) that denotes a statement, the majority of the subjects considered it a REQUEST (40%) and only 20% recognized it correctly as a STATEMENT. The rest 40% considered it as a QUESTION (20%), COMMAND (10%) either none of these categories (10%).

![Statement Interrogative (positive)/Flemish](image2)
For the interrogative sentence (positive) that means Statement, the subjects seem to be quite confused since all the possible answers had an equal percentage of 20%.

B. Sentences that denote REQUEST

![Pie chart showing percentages of responses for request interrogative (positive)/Flemish]

*Figure 33: Request Interrogative (positive)/Flemish*

For the interrogative sentence (positive) that denotes a Request, 70% of the subjects could recognize it as a REQUEST, and the rest 30% considered it as QUESTION (10%), COMMAND (10%) or none of the aforementioned choices (10%).
Figure 34: Request Imperative (positive)/Flemish

For the imperative sentence (positive) that denotes Request, the majority of the subjects considered it as a COMMAND (40 %), then 30 % as a QUESTION, and only 20 % as a REQUEST. 10 % of them, considered it as a STATEMENT.

Figure 35: Request Imperative (negative)/Flemish

For the imperative sentence (negative) that means a Request, the majority of the subjects recognized it as a REQUEST (40 %) and the rest considered it as a QUESTION (30 %), STATEMENT (20 %) either as none of the aforementioned categories (10 %).
Figure 36: Request Interrogative (negative)/Flemish

For the interrogative sentence (negative) meaning Request, 50% of the subjects considered it as a QUESTION and 50% as a STATEMENT.

C. Sentences that denote COMMAND

Figure 37: Command Imperative (positive)/Flemish

For the imperative sentence (positive) that denotes a Command, 90% of the subjects recognized it correctly as a COMMAND and only the 10% considered it a STATEMENT.
For the imperative sentence (negative) that means a Command, most of the subjects considered it a REQUEST (70 %) and only 20 % recognized it as a COMMAND. The rest 10 % considered it a STATEMENT.

For the declarative sentence (positive) that denotes a Command, 40 % of the subjects recognized it as a COMMAND, 40 % considered it as a REQUEST and the rest 20 % as a STATEMENT.
For the declarative sentence (positive) denoting a Command, 70% recognized it as a COMMAND and the rest 30% as a REQUEST (20%) or STATEMENT (10%).

D. Sentences that denote Question

For the interrogative sentence that denotes a Question, the majority of the subjects (70%) recognized it as a QUESTION and the rest 30% considered it as a COMMAND, STATEMENT or REQUEST, with 10% for each category.
For the interrogative sentence meaning Question, the majority of the subjects (40 %) considered it as a REQUEST and 30 % recognized it as a QUESTION. The rest 30 % considered it as a STATEMENT (20 %) or COMMAND (10 %).

Below we can see the results of the perception test comparing the answers of the Greek and the Flemish speakers for each of the 7 intonation pattern categories as shown at the production test. With capital letters are the answers that had 70 % or more in total (which means for the Greek speakers: “certain”, “probably”, “rather”). When there are 2 categories for each sentence type, the first with capital letters means the most dominant answer (but still less than 70 %) and the second category (in minuscule), is the next dominant answer. If the 2 categories are both in capital letters it means that they had the same percentage.
<table>
<thead>
<tr>
<th>SD+</th>
<th>STATEMENT</th>
<th>STATEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>QQ-</td>
<td>QUESTION</td>
<td>QUESTION</td>
</tr>
<tr>
<td>QQ+</td>
<td>QUESTION</td>
<td>REQUEST/Question</td>
</tr>
<tr>
<td>SD-</td>
<td>STATEMENT</td>
<td>QUESTION/COMMAND</td>
</tr>
<tr>
<td>RQ-</td>
<td>REQUEST</td>
<td>QUESTION/STATEMENT</td>
</tr>
<tr>
<td>SQ-</td>
<td>QUESTION</td>
<td>REQUEST/Question/Statement</td>
</tr>
<tr>
<td>RQ+</td>
<td>QUESTION/Request</td>
<td>REQUEST</td>
</tr>
</tbody>
</table>

| CI-     | COMMAND/Request | REQUEST |
|---------| COMMAND/Question | COMMAND/COMMAND |
| RI+     | REQUEST         | REQUEST/COMMAND |
| CD-     | STATEMENT/Command | REQUEST |
| RI-     | REQUEST         | REQUEST/Question |

| CI+     | COMMAND/Command/Statement | COMMAND |
|---------| COMMAND/Command | COMMAND |
4. DISCUSSION

4.1. Discussion on findings

4.1.1. Discussion on the production test

Based on the results of our production test, the intonation contours for the 14 utterances were not all radically different. That means that the ratio between utterances and intonation contours was not 1:1. Contrary, there were utterances that shared the same intonation contour. This practically means that we ended up not with 14 different pitch contours but with 5:

(1). The first pattern, whose most distinct feature was the rising pitch movements aligned to the onset of the stressed syllables and the final lowering, was used to express declarative sentences showing statement. This finding reinforces the conclusions of precedent researches. (See also Chaida, 2006 and Baltazani, 2007).

(2). The second pattern, with a peaking intonation aligned to the final stressed syllable, is, what other researches show (Karra, 2003 and Chaida, 2006) as well, a pattern of the interrogative sentences. It seems that all interrogative sentences have this F0 contour no matter the speech act they belong to. As a result, interrogative
sentences showing REQUEST and STATEMENT, in addition to pure QUESTION share the same pattern.

However, a positive interrogative sentence meaning STATEMENT has an additional rise on the middle stressed syllable (contrary to the aforementioned utterances where there was a lowering.) Thus, we come up with a third pitch pattern (3) for the positive interrogative sentence denoting STATEMENT that, simply, we could say it is an “amalgam” of the pitch contours (1) and (2). This combination is not very common in regular speech. So, it is quite interesting to check to which extent the subjects were able to identify it. (See discussion on the perception test).

The fourth (4) intonation pattern consists of a dipping pre-head intonation combined with a final rise. This pattern appears in imperative and declarative sentences showing COMMAND and REQUEST. However, not all the utterances meaning COMMAND share the same F0 contour. Positive declarative and imperative sentences meaning COMMAND end (5) in a final fall instead of rise.

Already, this first-level categorization shows evidence of the fact that the sentences belonging at the same category have either the sentence type in common (cf. interrogative sentences) or, like the COMMAND sentences, they express the same speech act.

In addition, there are sentences that belong to different categories but their intonation pattern differs only at the end of the utterance.

So, we can create a second-level categorization, showing those similarities among different categories, with only 3 categories:

I. The category of the Statement: For this category, we had 2 variations of an intonation pattern whose basic feature is a rising pitch movement aligned to the onset of the stressed syllables. However, there was a variation concerning the last stressed syllable: there was either a falling pitch movement or a rise aligned to the stress followed by a final lowering. The first of the 2 variations appeared for the pure “STATEMENT” with declarative sentence (positive) and the second refers to the “STATEMENT” with interrogative sentence (positive). The “High-Low” ending is very common for the interrogative
sentences (as will be shown below) and this can explain the “amalgam” of the second variation.

II. The category of the COMMAND-REQUEST. The intonation pattern for the utterances belonging to this category has the following characteristics: rising intonation aligned to the initial stressed syllable, then dipping intonation for the head of the utterance and 2 variations for the ending. The first variation, where the pitch level around the last stressed syllable remains high and is followed by a final lowering, corresponds to the positive Command (declarative and imperative sentences) and the second where the falling intonation appearing after the head is followed by a final heightening, to the Request imperative sentences and the negative Command sentences.

III. The last category is the Interrogative sentences’ category. Its main characteristics are the peaking intonations aligned to the initial and final stressed syllables. In this category there are no variations and it contains all the interrogative sentences (except for the Statement-Interrogative that is at the first category) plus the Statement Declarative-negative.

So, judging from the aforementioned categorization we came up with the following conclusions:

There is a specific pattern (category II) for denoting COMMAND or REQUEST only (and not any other category). The same pattern occurs for both imperative and declarative sentences that mean COMMAND or REQUEST.

The difference between the Command and the Request concerns how abrupt the loop at the dipping pitch movement before the stressed syllable of the head is (the dipping intonation in this part of the utterance is explained by the phrasing construction that divides the utterance into 2 phrasing groups): For command it is very abrupt contrary to request that it is not.

We have to mention as well that this pattern denotes COMMAND or REQUEST even if the sentence is declarative (not only imperative).
There is another category (category I) for the sentences that denote STATEMENT (and not for other speech acts) however there are sentences that denoted Statement but don’t belong in this category but in category III.

In category III, we have the majority of the sentences that belong to the Interrogative sentence type, no matter their actual meaning.

So, if we want to give an answer to our hypothesis whether the sentence type or the speech act has the dominant influence on the intonation contour, this answer would be “both”. For some speech acts like COMMAND and REQUEST and less for STATEMENT there seems to be predominance over the sentence type with the exception of the Interrogative sentences where the main affecting factor is the sentence type.

So, the categorization of the traditional grammar (Tzartzanos, 1967) where the declarative sentences denote statement, the interrogative question and the imperative command seems to neglect the variation of speech acts that can mainly be expressed by means of prosody. On the other hand, our findings partially reinforce the arguments of communicative Greek Grammars (Klairis-Babiniotis, 2006) that the different sentence types can express all the 4 speech acts that we investigate, however in these grammars the fundamental contribution of prosody for the distinction among different speech acts is subordinate over the lexical and structural contribution.

In addition, we came up with another factor that can affect the intonation: the negation.

For the imperative sentences that denoted COMMAND the presence or absence of the negation seemed to affect the final pitch movement: for the positive utterance there was a final lowering contrary to the negative ones where a final heightening occurred. Also, The declarative sentences that denoted statement appeared with different intonation pattern for the positive and the negative modality: the positive intonation pattern consists of rising pitch movements aligned to the stressed syllables whereas the negative intonation pattern seemed to compress the pitch level of the median stressed syllable and appeared a peaking pitch for the last stressed syllable.

As a result, it’s the intonation that gives the clue about the intentions of the speakers and not simply the syntactic structure of the sentence. However, since the
same intonation pattern can be used to express more than one intentions (e.g. the same pattern for interrogative sentences denoting QUESTION and REQUEST) there can always be misunderstandings, something that is clearly illustrated in our perception test:

4.1.2. Discussion on the perception tests.

For most of the categories the speakers were able to identify the meaning (SD+, QQ-, QQ+, SD-, RQ-, CI-, RI+, RI-, CI+, CD+).

For the declarative sentences denoting STATEMENT, they seemed to be certain for their answers. On the other hand they could hardly identify interrogative sentences denoting STATEMENT and most of the subjects considered them as denoting QUESTION with high percentage of certainty, around 60%.

The declarative sentences denoting Command were correctly identified but the percentage of certainty for the negative sentence was quite low (30%). On the other hand, the imperative sentences meaning COMMAND had much higher certainty percentage up to 80%.

Lower certainty percentages occurred for the REQUEST sentences varying from 40% (interrogative) to 50% (imperative). However, for the imperative there was high percentage of answers that were not absolutely certain but rather sure.

Generally speaking, the speech acts with the most successful results were the COMMAND and the QUESTION. The reason why these two intention categories have the highest percentage of successful identification can be the fact that they have a quite restricted range of possible sentence types that they can be denoted by (COMMAND can be denoted by imperative sentences and declarative and QUESTIONS can only be denoted by interrogative sentences). The STATEMENT was found successfully only when the sentence type was declarative (Category I) and the REQUEST mainly when the sentence type was imperative.

The interrogative sentences had high successful rates for the QUESTION but lower for the rest of the speech acts that can be expressed by the interrogative sentence.
The categories with the lowest percentage of successful answers were RQ+, SQ- and SQ+ because the subjects were influenced by the interrogative sentence and they considered it as a QUESTION (the intonation pattern is similar to the intonation pattern of the category where QUESTION is dominant) and CD- where they were influenced by the declarative sentence that they considered it as a STATEMENT.

So, the 3 more general categories mentioned above can explain the ‘perceptional behavior’ of the native speakers, since sentences that belonged at the same category could be confused with each other but not with sentences of other categories. There seemed to be as well a tendency from the subjects to have higher successful rates whenever the speech act coincided with its dominant sentence type that according to the traditional grammar. For example, the QUESTION denoted by interrogative sentences had 100% successful results (with certainty varying from 30% for positive to 50% for negative), STATEMENT denoted by declarative sentences had also 100% successful results (certainty varied from 40% negative to 60% positive) and COMMAND denoted by imperative sentences 100% with 80% certainty.

This fact can lead to misunderstandings of course and the safest tool to eliminate these misunderstandings is the context.

Now as far as the Flemish speakers are concerned, that they didn’t know anything about the Greek language and intonation, they were more successful in sentences that meant STATEMENT and QUESTION but they couldn’t easily identify interrogative sentences that meant other than QUESTION (with the exception of the positive interrogative sentence that meant REQUEST) and they also confused between COMMAND and REQUEST.

Of course, what we expected from the start was that they would have problems in identifying the interrogative sentences since it is already shown in other researches (Babiniots, 2005) that the Greek intonation of interrogative sentences is quite different from other European languages. Additionally, another unique characteristic of the Greek interrogative sentences is the fact that they can be used (with a different intonation pattern) for expressing intentions other than just a Question. That can explain partially the fact that they could not successfully identify other meanings for the interrogative sentences than the default one.
So, the intonation is more or less language dependent (more for speech acts such as QUESTION or REQUEST and less for COMMAND) so it is important to be taught to non-native speakers that want to learn a language.

### 4.2. Further Research

It’s interesting to conduct a similar survey regarding Flemish Dutch so as to investigate how their intonation structure affects the answers that they gave for the Greek sentences. A potential survey in this frame could give explanations for the results of our current survey.

Similarly, another question that arises is the influence that the Greek intonation pattern can have for the second-language acquisition. To be more specific, it would be fruitful to check to which extent the Greek speakers are affected by their language’s intonation pattern while speaking or perceiving foreign languages.

In addition it would be quite interesting that more intention categories could be taken into consideration and this could lead to a more adequate categorization of the categories according to their intonation pattern.

And lastly, a quite ambitious and challenging survey could make a cross-linguistic comparison among the intonation patterns of different languages (of the same or other linguistic family) which could lead to a categorization or even which could bring out possible universal intonation patterns.
5. CONCLUSIONS

Summarizing the findings of the current thesis regarding the questions in the introduction part:

1. The changes of intonation pattern can really convey different speech acts such as COMMAND, REQUEST or QUESTION. This was proved by the fact that sentences of the same sentence type could express different intentions by means of a different intonation pattern. In addition since there were utterances that shared similar intonation pattern, we could make a categorization. Thus, we initially ended up with 5 different intonation patterns that could in a more abstract level be reduced into 3 fundamental categories. 2 of the categories were dominated by speech acts (STATEMENT and COMMAND) and one by the sentence type (interrogative sentences).

2. Judging by this categorization we infer that for some utterances it’s the speech act that defines the intonation, so no matter their sentence type they had a similar F0 contour (this for the case of COMMAND, REQUEST and partially STATEMENT) and for others it’s the sentence type that plays the significant role: the interrogative sentences, no matter their meaning, they tend to have a specific curve. There were also utterances that consist “amalgams” since they bear features of both their sentence type and meaning (cf. interrogative sentence expressing Statement, positive).

3. Apart from the sentence type and the speech act, there seemed to be a secondary element that has some effect on the pitch contour such as the negation.

4. However, the boundaries in the categorization are not absolute, so the native speakers were not 100% successful in identifying the meaning of the utterances. They were more successful in identifying speech acts whose intonation pattern was dominated by the speech acts themselves such for the case of COMMAND and STATEMENT (see 1, 2) or for the QUESTION due to the fact that there is only one sentence type that can express this speech act (interrogative sentences). They were less successful with interpreting sentences whose intonation is basically affected by their structure (sentence type): such as interrogative sentences that mean REQUEST or STATEMENT.
5. There seemed to be speech acts that can be relatively easily identified by people that don’t speak Greek such as Command or Statement, but for others this was quite hard (such as Question or Request). So, it seems that the intonation function is language-dependent.
APPENDIX I

Sample Spectra of the utterances: (subject: FEMALE)

Figure 1. Statement Declarative (positive)

Figure 2. Request interrogative (negative)
Figure 3. Command Imperative (positive)

Figure 4. Question interrogative (negative)
Figure 5. Question interrogative (positive)

Meli’na balo’ni madi’La

Figure 6. Command imperative (negative)

Meli’na mi balo’nis madi’La
Figure 7. Request imperative (positive)

Figure 8. Statement Declarative (negative)
Dimitrios Kotsifas   Högskolan i Skövde

Figure 9. Command declarative (negative)

Figure 10. Statement interrogative (negative)
Figure 11. Request imperative (negative)

Meli’na  mi  balo’nis  mad’La

Figure 12. Command Declarative (positive)

Meli’na  balo’nis  mad’La
Figure 13. Request interrogative (negative)

Meli’na δem balo’nis madi’lia

Figure 14. Statement interrogative (positive)

I meli’na balo’ni madi’La
APPENDIX II

Questionnaire for production test

1. Τι γίνεται;
   ➢ Η Μελίνα μπαλώνει μαντήλια.
2. Παρακάλεσε τη Μελίνα να κάνει τη δουλειά
   ➢ Μελίνα μπαλώνεις μαντήλια;
3. Διάταξε τη Μελίνα να κάνει τη δουλειά!
   ➢ Μελίνα μπάλωνε μαντήλια!
4. Η Μελίνα δεν κάνει τίποτα!
   ➢ Η Μελίνα δε μπάλωνε μαντήλια;
5. Τι με ρώτησες;
   ➢ Η Μελίνα μπαλώνει μαντήλια;
6. Πες στη Μελίνα να σταματήσει!
   ➢ Μελίνα μη μπαλώνεις μαντήλια!
7. Παρακάλεσε τη Μελίνα να κάνει τη δουλειά
   ➢ Μελίνα μπάλωνε μαντήλια!
8. Τι πρόβλημα υπάρχει;
   ➢ Η Μελίνα δε μπαλώνει μαντήλια.
9. Τέλος η δουλειά για σήμερα! Πες της να σταματήσει εντελώς!
10. Τι είπες ότι κάνει η Μελίνα;
   ➢ Η Μελίνα δε μπαλώνει μαντήλια;
11. Παρακάλεσε τη Μελίνα να σταματήσει.
   ➢ Μελίνα μη μπαλώνεις μαντήλια!
12. Τώρα πιάνουμε δουλειά. Πες στη Μελίνα να αρχίσει!
   ➢ Μελίνα μπαλώνεις μαντήλια!
13. Παρακάλεσε τη Μελίνα να κάνει τη δουλειά
   ➢ Μελίνα δε μπαλώνεις μαντήλια;
14. Η Μαρίνα βαριέται που ζει. Και θέλει να μας πείσει τώρα ότι δουλεύει...
   ➢ Η Μελίνα μπαλώνει μαντήλια;

An attempt to translate the questionnaire into English! It's a WORD BY WORD translation.

What’s going on?
➢ Melina is patching neckerchiefs.²

Beg Melina to do the job.
➢ Melina are you patching neckerchiefs?³

Order Melina to do the job.
➢ Melina, patch neckerchiefs!

Melina doesn’t do anything!
➢ Isn’t Melina patching neckerchiefs?

What did u ask me?
➢ Is Melina patching neckerchiefs?

Tell Melina to stop!
➢ Melina don’t patch neckerchiefs!

Beg Melina to do the job!
➢ Melina patch neckerchiefs!

What’s up?
➢ Melina isn’t patching neckerchiefs.

That’s all for today!! Tell her to stop!

² We choose the question “What’s going on in case we can get a neutral (as far as focus is concerned) utterance from the subjects.
³ The question can also mean REQUEST in Greek using a specific intonation.
Melina you aren’t patching neckerchiefs.  

What did u say Melina is doing?

Isn’t Melina patching neckerchiefs?

Beg Melina to stop.

Melina don’t patch neckerchiefs!

We start work! Tell her to start!

Melina you patch neckerchiefs!

Beg Melina to do the job

Melina aren’t you patching neckerchiefs?

Melina is so bored…And she wants to persuade us that she is working

Melina is patching neckerchiefs?

Questionnaire for perception test

Greek

Παράκληση Προσταγή Απόφαση Ερώτηση Αλλο

1. Η Μελίνα μπαλώνει μαντήλια
2. Μελίνα μπαλώνεις μαντήλια
3. Μελίνα μπάλωνε μαντήλια
4. Η Μελίνα δε μπαλώνει μαντήλια
5. Η Μελίνα μπαλώνει μαντήλια
6. Μελίνα μη μπαλώνεις μαντήλια
7. Μελίνα μπάλωνε μαντήλια
8. Η Μελίνα δε μπαλώνει μαντήλια
9. Μελίνα δε μπαλώνεις μαντήλια
10. Η Μελίνα δε μπαλώνει μαντήλια
11. Μελίνα μη μπαλώνεις μαντήλια
12. Μελίνα μπλαλώνεις μαντήλια
13. Μελίνα δε μπαλώνεις μαντήλια
14. Η Μελίνα μπαλώνει μαντήλια

Flemish:

The simple declarative sentence using the right intonation can mean COMMAND.

Interrogative sentence that doesn’t have the meaning of QUESTION but the speaker just intends to say something (STATEMENT). It’s the case of the so called rhetorical questions.

Από 1 μέχρι 5. (5 = απόλυτα σίγουρος/η, 1 = καθόλου σίγουρος / η)
<table>
<thead>
<tr>
<th>Request</th>
<th>Command</th>
<th>Statement</th>
<th>Question</th>
<th>Other</th>
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</table>

² From 1 to 5. (5 = absolutely sure, 1 = not sure at all)
REFERENCES:


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Μπαλτατζάνη, Μ., 2007. *Εισαγωγή στη Φωνητική*, Πατάκης, Αθήνα. Translation from:

