# IMPERATIVES, ORDERS AND REQUESTS IN EUROPEAN PORTUGUESE INTONATION

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## ABSTRACT

The main aim of this study is to identify the phonetic features of European Portuguese imperative intonation.

Recognition and categorization of intonation contours associated to imperative sentences type and to illocutionary directive speech acts (order and request) were studied through two perception experiments.

Acoustic and phonetic analyses of perception results revealed the F0 contour features of the European Portuguese imperative prototype. Order and request specific intonation characteristics were also described and analyzed. Intonation global parameters were enhanced on these analyses: pitch span and pitch register play an important role on grammatical and pragmatic distinctions.

**Keywords:** speech prosody, intonation, imperatives, speech perception, speech production

## 1. INTRODUCTION

In European Portuguese, intonation has a grammatical function. It is possible to distinguish sentence types only by their intonation contour, namely declaratives and global questions.

The already available research on European Portuguese intonation did not address, in a systematic way, the issue of imperatives wich was just briefly mentioned in [1] and [2]. Imperatives were said to have an F0 rising-falling contour of large amplitude [1] and were described as having an intonation contour similar to wh-questions, although presented rhythmic differences [2]. A possible increase in pitch span was also reported [2].

High F0 values at the beginning of the sentence and differences in tonal amplitude were also reported in imperative Spanish intonation [3, 4].

Imperative sentences are syntactically and morphologically marked in European Portuguese [1]. In general, these grammatical features may be sufficient to distinguish imperatives from other sentence types. However, the intonation features of imperatives seem to be quite prominent and play an important role on EP perception and processing.

Some studies have already referred to the use of prosodic features (intonation) to express different illocutionary strength. Orders and requests are directive speech acts that are mainly produced with imperative sentences. However, there is no intonation data about this pragmatic distinction in European Portuguese. So, in order to understand the way intonation can, by itself, express different illocutionary strengths and allow pragmatic distinctions, we included these in our research.

Perception experiments data results may reveal the central proprieties of an intonation prototype for these categories.

## 2. METHODOLOGY

Two perception experiments were developed to identify sound sequences features of imperative intonation prototype. In addition, pragmatic based categories (request and order intonation) were also integrated.

Acoustic and phonetic analyses were performed on sound sequences that were categorized as imperatives and on sound sequences that were rated as *good* exemplars of the pragmatic categories under study.

All sound sequences were previously recorded by two EP native speakers: a female (NA) and a male (LL).

### 2.1. Experiment 1

#### *2.1.1. Material*

Experiment material was composed by 195 sound sequences (sentences) of different sentence types: declaratives, questions, wh-questions, imperatives and exclamations.

In this group of sentences, several variables such as segmental constituency, primary stress location, syllable structure, sentence syntactic

constituency and illocutionary strength were controlled.

*2.1.2. Task*

Experiment task consisted on listening to sound sequences and to immediately categorize them in four sentence types that were previously defined.

This task recruited *top-down* linguistic data processing and linguistic explicit knowledge.

Subjects listened to each sound sequence and registered their answer on a paper inquiry.

### 2.2. Experiment 2

*2.2.1. Material*

Experiment 2 was constituted by two sub-tests: one addressed requests intonation while the other required orders intonation.

In the first sub-test (requests), there were 44 sound sequences to evaluate. And on the second sub-test (order) there were 54 sentences to rate.

This material was controlled with the same linguistic and phonetic variables used in Experiment 1.

*2.2.2. Task*

Experiment task was to listen and to evaluate sound sequences in a two-point scale, depending on its proximity to prototypical features of a category. Categories used were the illocutionary speech acts that express orders and requests. Each category was defined at beginning of the test and subjects had to identify intonation features of the heard sequence and to compare them with the prototypical category that they have in memory. They were expected to evaluate if the sound sequence was a *good* exemplar (closer to the prototype) or a *bad* exemplar (more far to the prototype).

Initially data processing was clearly *top-down*. Although decision was linguistically based, this experiment did not need explicit categorical knowledge. Subjects were asked to evaluate sound sequences and not to categorize them.

Like in experiment 1 task, subjects listened to the sound sequences via headphones and registered their answer on a paper inquiry.

### 2.3. Subjects

Forty European Portuguese native speakers, aged between 19 and 50, with no history of hearing or language deficits or disorders, participated in the experiments.

The sample was constituted by undergraduate university students and graduate subjects.

This group of subjects is neither representative of all European Portuguese dialects nor exclusive of any in particular.

## 3. RESULTS

The inclusion criteria of a sound sequence in one of the available categories was a result equal or higher than 75% of the sample, that means that, at least, 30 subjects agreed on its categorization.

In the experiments there were no preferences for any of the speaker's production.

### 3.1. Experiment 1

35 of the 195 sentences of the groups submitted to categorization were imperatives. 85.3% of these imperatives were categorized as imperatives taking into account the inclusion criteria defined above. Imperative sentences achieved the highest level of recognition when compared to other sentences type.

### 3.2. Experiment 2

In the request category sub-test, 22.7% of the sentences were rated as *good* exemplars. As far as the order category is concerned, 50% of the sentences were identified as *good* exemplars of the respective pragmatic category.

## 4. DATA POST-PROCESSING

An acoustic and phonetic analysis using *Praat* software [5] was performed on sound sequences categorized as imperatives and on sound sequences rated as *good* exemplars of requests and orders.

Based on earlier studies on European Portuguese [2, 6, 7], all of these sentences were labelled on specific phonetic points believed to be the most informative ones for intonation analysis.

Phonetic points considered were: onset of the sentence (O); first stressed vowel (FSV); F0 peak (FP); final pre-stressed vowel (FPSV); last stressed vowel (LSV); last vowel or voiced consonant (LVC). Other phonetic variables such as total duration and pitch slope contributed to the study of these grammatical structures.

For local events analysis, all F0 movements were categorized concerning their direction (rising, falling, rising-falling, falling-rising, flattened),

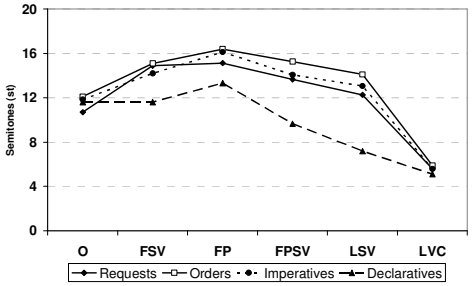
movement amplitude and segmental alignment. Tonal events alignment with segmental structure in European Portuguese is directly related with stressed vowel/syllable location [6, 7, 8, 9].

For global intonation events study, we considered pitch register [10], pitch level [11] and pitch span.

## 5. DATA INTERPRETATION

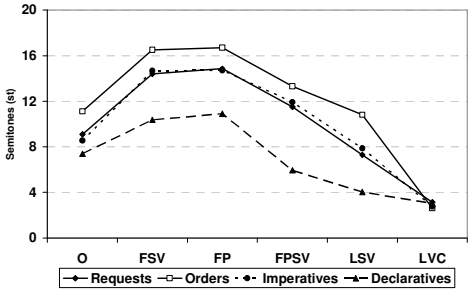
The analysed imperatives show an initial rise from the onset (O) to the F0 peak (FP). In all of these sentences, FSV occurs in the verb. After FP, begins a falling movement of large amplitude, that is more visible from the final pre-stressed vowel (FPSV) or the last stressed vowel (LSV) to the last vowel or voiced consonant (LVC) (see Figures 1 and 2).

**Figure 1:** Representation of F0 average topline values in sentences expressing requests, orders, imperative and declarative sentences, produced by the female speaker (NA), in semitones.




In NA productions (Figure 1) there is a category hierarchy based on F0 levels: order category occurs in higher F0 levels and request category occurs in lower F0 levels.

**Figure 2:** Representation of F0 average topline values in sentences expressing requests, orders, imperative and declarative sentences, produced by the male speaker (LL), in semitones.




In LL productions (Figure 2) imperatives and requests are mainly coincident. Order category is enhanced showing F0 higher average values along the sentences.

Figures 1 and 2 represent the average F0 topline values for requests, orders, imperatives and declaratives produced by both speakers. For comparison reasons we decided to integrate in these graphs values for normal and neutral declaratives.

Comparing declarative and imperative intonation contours, we found a clear difference that lies on F0 levels and on intonation contour shapes. This difference is even more prominent when we look at the values, for example, to FPSV and LSV F0 values on declaratives and on imperatives (see Tables 1 and 2).

**Table 1:** Average F0 values and respective standard deviations of phonetic variables (O, FSV, FP, FPSV, LSV and LVC) in sentences expressing requests (*Req.*), orders, imperative (*Imper.*) and declarative sentences (*Declar.*), produced by the female speaker (NA), in semitones.

| NA | O | | FSV | | FP | | FPSV | | LSV | | LVC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **A** | SD | **A** | SD | **A** | SD | **A** | SD | **A** | SD | **A** | SD |
| ***Req.*** | ***11*** | *0,3* | ***15*** | *2,8* | ***15*** | *2,4* | ***14*** | *1,6* | ***12*** | *3,1* | ***6*** | *0,6* |
| ***Orders*** | ***12*** | *3,4* | ***15*** | *2,2* | ***16*** | *2,6* | ***15*** | *3,3* | ***14*** | *5,3* | ***6*** | *1,5* |
| ***Imper.*** | ***12*** | *3,3* | ***14*** | *3,1* | ***16*** | *2,2* | ***14*** | *3,3* | ***13*** | *5,2* | ***6*** | *1,4* |
| ***Declar*** | ***12*** | *1,4* | ***12*** | *1,9* | ***13*** | *1,0* | ***10*** | *1,0* | ***7*** | *1,3* | ***5*** | *1,5* |

The major intonation distinction between declaratives and imperatives is related both with local events, that determine utterance contour shape, namely F0 movements (see Tables 1 and 2), and global events that locate F0 levels (see Tables 3 and 4).

A Principal Component Analysis of imperatives data revealed that variance in these sentences are due to FSV, FP, LSV, FPSV, Pitch Register and Pitch Span variables. This result was also corroborated by a Classificatory Analysis that joined these variables in the same cluster.

An EP intonation study [12] points to the minimalist hypothesis that the most important phonetic distinction between these two types of sentences may rely only on FPSV variable. On the other hand, in the same study, a Categorical Perception experiment refers to LSV as the defining variable for this type of sentence.

**Table 2:** Average F0 values and respective standard deviations of phonetic variables (O, FSV, FP, FPSV, LSV and LVC) in sentences expressing requests (*Req.*), orders, imperative (*Imper.*) and declarative sentences (*Declar.*), produced by the male speaker (LL), in semitones.

| LL | O | | FSV | | FP | | FPSV | | LSV | | LVC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | SD | A | SD | A | SD | A | SD | A | SD | A | SD |
| ***Req.*** | ***9*** | *6,7* | ***14*** | *2,1* | ***15*** | *1,5* | ***12*** | *3,8* | ***7*** | *2,8* | ***3*** | *3,4* |
| ***Orders*** | ***11*** | *1,7* | ***17*** | *1,5* | ***17*** | *1,4* | ***13*** | *1,7* | ***11*** | *4,2* | ***3*** | *1,8* |
| ***Imper.*** | ***9*** | *2,4* | ***15*** | *2,7* | ***15*** | *2,7* | ***12*** | *2,6* | ***8*** | *3,4* | ***3*** | *1,6* |
| ***Declar.*** | ***7*** | *1,5* | ***10*** | *1,9* | ***11*** | *1,6* | ***6*** | *1,9* | ***4*** | *1,7* | ***3*** | *1,0* |

In terms of intonation contour shape, orders and requests are similar (see Figures 1 and 2). The main difference is related to global parameters (see Tables 3 and 4). *Good* exemplars of order category show higher F0 values than the ones from request category. Order is also produced with an F0 level higher than the imperative sentence type.

**Table 3:** Average F0 values and respective standard deviations of Pitch Level, Pitch Register and Pitch Span in sentences expressing requests (*Req.*), orders, imperative (*Imper.*) and declarative sentences (*Declar.*), produced by the female speaker (NA), in semitones.

| NA | Pitch Level | | Pitch Register | | Pitch Span | |
|---|---|---|---|---|---|---|
| | A | SD | A | SD | A | SD |
| ***Req.*** | ***3*** | *1,6* | ***11,*** | *1,4* | ***12*** | *3,3* |
| ***Orders*** | ***3*** | *1,1* | ***13*** | *2,6* | ***14*** | *2,9* |
| ***Imper.*** | ***3*** | *1,3* | ***12*** | *2,3* | ***14*** | *2,8* |
| ***Declar.*** | ***3*** | *1,0* | ***9*** | *0,6* | ***10*** | *1,7* |

We may then purpose a hierarchy based on Pitch Register and Pitch Span average values: orders > imperatives > requests.

**Table 4:** Average F0 values and respective standard deviations of Pitch Level, Pitch Register and Pitch Span in sentences expressing requests (*Req.*), orders, imperative (*Imper.*) and declarative sentences (*Declar.*), produced by the male speaker (LL).

| LL | Pitch Level | | Pitch Register | | Pitch Span | |
|---|---|---|---|---|---|---|
| | A | SD | A | SD | A | SD |
| ***Req.*** | ***2*** | *0,78* | ***10*** | *0,35* | ***13*** | *2,26* |
| ***Orders*** | ***2*** | *0,83* | ***12*** | *1,45* | ***15*** | *1,88* |
| ***Imper.*** | ***2*** | *0,32* | ***11*** | *2,68* | ***13*** | *2,62* |
| ***Declar.*** | ***2*** | *0,27* | ***7*** | *1,02* | ***9*** | *1,73* |

A *good* exemplar of order will have a F0 contour similar to imperative sentence type but with higher F0 global values, with at least 3 semitones of difference from declaratives. The same can be said to describe a *good* exemplar of request, although the difference is about 2 semitones.

## 6. CONCLUSIONS

The prototype of imperative category in EP is clearly related to high F0 global values and to a particular intonation shape described earlier. Requests and orders differ in Pitch Register and Pitch Span. We can say that the illocutionary strength of this two variants of the directive speech act depend on these phonetic variables. From a perceptual point of view, it seems that a prototypical production of an imperative sentence doesn't totally fulfill the required phonetic intonation features for the categorization for a *good* directive speech act such as an order. Experiment 2 low rates on *good* requests and orders reveal it is harder to distinguish this pragmatic difference than sentence type one.

## 7. REFERENCES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