Part I. Pragmatics, grammar, and semantics
1. Introduction

Prosody is an important feature of oral speech which makes a significant contribution to online utterance interpretation and helps the listener to uncover the subtleties of discourse meaning. It is widely acknowledged that the way we say things (our use of pitch, rate of speech, and voice quality, among other elements) is often as important as (and at times more important) than what we actually say. Prosodic patterns have been characterized as conveying syntactic meaning about modality interpretation (e.g., sentence type distinctions), pragmatic usage of a given sentence type, together with the attitude, intentions, and beliefs of the speaker. For example, the use of a specific intonation pattern in statements or questions helps the hearer to grasp the degree of confidence, surprise, or concern with which the speaker is asserting or asking something.

In this chapter we provide an overview of a variety of intonational and prosodic features that help Catalan listeners in the process of discourse and affective interpretation. Simultaneously, we will review some of the work that has been conducted on prosodic meaning in Catalan. In general, prosodic studies have concentrated on the description of prosodic and intonational form rather than on its pragmatic and semantic meanings. Though this suggests a need for more interdisciplinary work between prosody and syntax, semantics, and pragmatics, recent promising studies...
are examining prosodic meaning in greater depth and thus helping to bridge this gap between prosody and other linguistic modules.

There is no firm agreement within the linguistic community on how to integrate the prosodic analysis into a unified formal syntactic, semantic, and pragmatic approach. From a syntactic perspective, following the cartographic line of research proposed by Rizzi (1997), some studies have explored the integration of prosody in a syntactic analysis of so-called force operators, whose phonological features are suprasegmental or prosodic (and sometimes also segmental) features. Such force operators occupy a peripheral position in the sentence, specifically in the complementizer zone, which incorporates information related to sentence modality and semantic and pragmatic functions (Hernanz and Rigau 2006; Prieto and Rigau 2007; see also Rigau 1984). Taking a pragmatic perspective, a handful of studies have investigated the role of intonation as a means of encoding procedural meaning (or processing instructions), and have argued that intonation contours have the function of encoding restrictions on potential interpretations of the proposition expressed (e.g., Fretheim 1996, 2002 for Norwegian; House 2006 for Swedish; Escandell-Vídal 1998, 2011 for Spanish; Espinal and Prieto 2011 for Catalan). These studies have applied Relevance Theory (Sperber and Wilson [1986] 1995, Wilson and Wharton 2006) and Politeness Theory (Brown and Levinson 1987) to the analysis of intonational meaning.

The chapter is organized as follows. Section 2 describes the framework that will be employed for the prosodic and intonational description of Catalan, the Cat_ToBI system. Section 3 describes the role intonation plays in the interpretation of different sentence-types, using examples from a variety of intonational contours in Catalan. Section 4 analyzes the affective interpretation of some prosodic correlates and discusses the prosodic expression of politeness in Catalan. The final section summarizes the main findings and points to areas of future research in the pragmatics of intonation.

2. The prosodic analysis of Catalan

The Catalan data presented in this article has been prosodically analyzed using the Catalan AM analysis, namely Cat_ToBI (Prieto et al. 2009; Prieto in press; Aguilar, de-la-Mota, and Prieto 2009). The Cat_ToBI system has been developed on the basis of previous work and the Cat_ToBI corpus of spoken Catalan which can be found on the web page of the
Interactive Atlas of Catalan Intonation (Prieto and Cabré coords. 2006–2010). The ToBI intonational analysis is couched in the Autosegmental Metrical (or AM) framework (Pierrehumbert 1980; Beckman and Pierrehumbert 1986; Jun 2005; Ladd 1996; and Gussenhoven 2004; inter alia). Nowadays this model has become the dominant phonological framework for analyzing intonation. In the AM framework, the F0 contour of an utterance is described as a sequence of high (H) and low (L) tones, with an additional mid (M) tone in certain languages. The tonal units are of two kinds, pitch accents and boundary tones. Pitch accents are tonal events that are associated with the metrically prominent syllables in a sentence, and they can be either monotonal (e.g., H*, L*) or bitonal (e.g., \( L + H^* \), \( L^* + H \), \( H + L^* \)). The starred tone is usually associated with the accented syllable, while leading and/or trailing tones are realized in the pre-tonic and post-tonic syllables respectively. Boundary tones are tonal events that are associated with the edges of prosodic phrases. They can associate to two types of prosodic phrases, namely intonational phrases (IPs, or major prosodic phrases) and intermediate phrases (ips, or minor prosodic phrases). The difference between the two domains is the perceived degree of phrasing juncture, which is greater in the case of IPs. The boundary tones associated with the right edge of an intonational phrase are marked with a ‘%’ sign following the tone (e.g., H%, L%), and the boundary tones associated with the right edge of an intermediate phrase are marked with a ‘-’ sign following the tone (e.g., H-, L-). Prosodic phrases can have more than one pitch accent, and the final one is usually referred to as the nuclear pitch accent; the remaining pitch accents are referred to as prenuclear pitch accents.

The Cat_ToBI annotation system contains three time-aligned tiers: (a) an orthographic tier; (b) a break index tier, where levels of phrasing are annotated, among them the minor or intermediate phrase level (expressed by index break 3) and the major or intonational phrase level (expressed by index break 4); and (c) the tonal tier, where pitch accents and boundary tones are annotated. ToBI as applied to Catalan, or Cat_ToBI, will be used throughout the chapter (for an example of annotation, see Figure 1 in section 3.1).

Table 1 shows a set of commonly occurring nuclear pitch configurations in Catalan. Each tune is represented by a schematic contour, the Cat_ToBI label, and one example of the pragmatic meaning it can convey. In the schematic contours, the shaded box represents the accented syllable. Catalan has six basic pitch accents: \( H^* \), \( L + H^* \), \( L + H^* \), \( L^* + H \), and \( H + L^* \). The H tones can be upstepped or downstepped,
i.e., scaled lower or higher than the previous pitch accent. Some of these pitch accents appear only in prenuclear position, such as L₊→H* (rising pitch accent with a peak in the posttonic syllable) or L*₊H (low tone in the accented syllable plus a rise in the posttonic). The nuclear pitch accents can be observed in Table 1 in combination with a variety of boundary tones. Catalan also has a number of boundary pitch movements that convey different discourse meanings, namely, L%, H%, !H%, L!H%, HH%, LH%, HL%, and LHL%. The difference between boundary configurations with one, two, or three tones corresponds to the number of targets that are produced (see Prieto in press).

Cat_TOBI, like many other TOBI systems, is a phonological system that represents work in progress. In order to settle the Cat_TOBI tonal categories, a number of experimental methods have been used to investigate their phonological nature, ranging from semantic congruity tasks to the application of the categorical perception paradigm (Prieto, Torres-Tamarit and Vanrell 2010; and Borràs-Comes, Vanrell and Prieto 2010; inter alia; see Gussenhoven 2004 for a review of methods that can be applied to the investigation of intonational categories).

3. The intonation of speech acts

As mentioned above, prosody is an important tool that helps listeners to identify the communicative goals we typically use in language. Speech acts carry out the purpose or communicative function of an utterance in a dialog. According to Searle (1969), the major types of speech acts are

2. For example, via a set of perception experiments using the categorical perception paradigm, Prieto, Torres-Tamarit, and Vanrell (2010) showed that Catalan listeners perceive the contrast between L + H* LH% and L + H* L!H% configurations in a categorical way. The intonational difference between counterexpectational questions and statements of the obvious lies in the height of the sentence-final boundary tone: whereas counterexpectational questions are produced with a sentence-final low-high boundary tone LH%, obvious statements are produced with a low-mid boundary tone L!H%. Similarly, Borràs-Comes, Vanrell, and Prieto (2010) showed that the contrast between a statement contour and an echo question contour lies in the height of the nuclear pitch accent. In particular, Catalan intonational phonology makes a phonological distinction between a simple rising pitch configuration L + H* L% (which is used for statements) and an upstepped rising pitch configuration L + !H* L% (which is used for counterexpectational echo questions).
Table 1. Schematic representations of some nuclear pitch configurations in Central Catalan, with corresponding Cat_ToBI labels and representative pragmatic meanings (from Prieto in press).

<table>
<thead>
<tr>
<th>Schematic contour</th>
<th>Cat_ToBI label</th>
<th>Context</th>
</tr>
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</table>
| ![Schematic contour](image1.png) | L* L% | Broad focus statement  
*Volens mehmelada* ‘They want some jam’ |
| ![Schematic contour](image2.png) | H + L* L% | Information-seeking yes-no question (falling)  
*Que l’hi durës?* ‘Would you take it to him/her?’ |
| ![Schematic contour](image3.png) | H* L% | Wh- question *Qué li duràs?*  
‘What will you bring to him/her?’ |
| ![Schematic contour](image4.png) | L* HH% | Information-seeking yes-no question (rising)  
*L’hi durës?* ‘Would you take it to him/her?’ |
| ![Schematic contour](image5.png) | L + H* HH% | Inviting yes-no question  
*Que voleu pastis?* ‘Do you want some cake?’ |
| ![Schematic contour](image6.png) | L + H* L% | Narrow focus statement, exclamative, imperative  
*Taronges, i no pas pomes!* ‘Oranges, not apples’ |
| ![Schematic contour](image7.png) | L* HL% | Gentle request  
*(Sisplau), vine. .!* ‘(Please) come!’ |
| ![Schematic contour](image8.png) | L + H* !H% | Vocative chant  
*Maria!* ‘Mary!’ |
| ![Schematic contour](image9.png) | L + H* HL% | Vocative (request for attention)  
*Maria, vine!* ‘Mary, come!’ |
| ![Schematic contour](image10.png) | L + H* LH% | Counterexpectational question  
*(Dius que) has parlat amb el president?*  
‘(You say that) you have spoken with the president?’ |
| ![Schematic contour](image11.png) | L + H* LHL% | Insistent request  
*Vine. .!* ‘Come!’ |
| ![Schematic contour](image12.png) | L + H* L!H% | Statement of the obvious  
*(Home), la Bàrbara!* ‘Barbara (obviously)!’ |
| ![Schematic contour](image13.png) | L + ¡H* L% | Echo question  
*(Dius que) vindrà?* ‘(You say that) he’ll come?’ |
| ![Schematic contour](image14.png) | L + H* !H% | Uncertainty statement  
*Potser no li agradarà* ‘Maybe he will not like it.’ |
declarations (assertions or statements), commissives (promises), directives
(requests, commands, questions), and expressives (expressions of attitudes
and emotions).

Though some sentence types are typically used for certain types of
speech acts (e.g., declarative sentences are typically used for assertions),
there is no one-to-one mapping between linguistic form and pragmatic
function. The grammatical form of a sentence does not directly express
its communicative function in a dialog. For example, questions are com-
monly used for directive speech acts (e.g., *Em pots passar la sal?* ‘Can
you pass me the salt?’) because being asked to do something is usually
felt to be less of an imposition than being ordered to do something.
Rhetorical questions are pragmatically equivalent to a strong assertion
and speakers thus do not expect answer (e.g., *Que no ho saps, que t’estimo?*
‘Don’t you know I love you?’; *Que et penses que tinc quatre mans, jo?* ‘Do
you think I have four hands?’). All of these are instances of indirect speech
acts, as there is no direct relationship between the illocutionary force and
syntactic structure of the sentence.

By the same token, there is no one-to-one mapping between intonation
and speech act type either. Though there is a general view that prosodic
cues convey systematic and inherent meanings, for decades intonation
studies have failed to find systematic links between elements of prosody
and speech acts. Geluykens’ (1987) experiments revealed that contextual
pragmatic factors play a decisive role in the recognition of an utterance
with declarative form as a question.3 As Searle pointed out, we probably
cannot account for utterance meaning in the absence of the context of
a speech act. Thus, although inherent meanings are often proposed for
particular intonation contours,4 we should be aware that discourse context
has an important role in modulating utterance interpretation. We will dis-
cuss this issue later in the chapter.

For the Catalan language, traditional work has described the ‘standard’
tonational contours for declarative sentences, yes-no questions, wh-

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3. Geluykens (1987) performed a perception experiment which revealed that
when pragmatic cues were sufficiently strong to determine speech act status,
rising intonation (in English) had virtually no impact on utterance interpreta-
tion; if, on the other hand, pragmatic cues did not favor any particular speech
act type, intonation could, but need not, act as a cue for determining question
status.

4. General attempts have also been made to identify compositional meanings for
contours within the metrical-autosegmental model (e.g., Pierrehumbert and
Hirschberg 1990).
questions, and requests as a method for beginning the study of intonation in this language (see Bonet 1984; Badia 1994; Prieto 2002, in press; inter alia). Yet since reading tasks are not particularly suitable for analyzing intonational meaning, other methodological strategies have been used more recently, such as role-play interviews designed to elicit the production of specific pragmatic intentions (e.g., Prieto in press). The application of these elicitation methods, together with the analysis of Map Tasks and other corpora, have allowed for a fine-grained study of prosodic meanings such as certainty, insistence, confirmation, or incredulity. The remainder of this section will be devoted to analyzing the prosodic cues that characterize the most thoroughly researched types of sentence-types, namely, statements, questions, and requests, together with a variety of prosodic meanings such certainty, uncertainty, and incredulity. The examples used throughout the chapter correspond to the standard Catalan variety (i.e., they were uttered by a native speaker of Central Catalan).

3.1. Assertions and exclamations

The intonation of a broad focus statement in Catalan is characterized by the presence of rising prenuclear pitch accents that are associated with the stressed syllables of the utterance, followed by a low pitch accent that occurs on the phrase-final stressed syllable (i.e., the nuclear pitch accent). Figure 1 exemplifies the pitch contour of broad focus statements with the

![Figure 1](image_url). Waveform, spectrogram, and F0 pitch track of the broad focus statement *Volen melmelada* (want.3pl jam, ‘They want some jam’).
utterance *Volent melmelada* ‘They want some jam’. This example illustrates the phonetic realization of the rising prenuclear pitch accent with a delayed peak $L \rightarrow H^*$ and the low nuclear pitch accent $L^*$, followed by a $L\%$ boundary tone, which reaches the bottom range of the speaker.

Exclamatives are speech acts that express strong positive or negative emotions, usually without explicitly stating them. Exclamative speech acts can emphasize the degree of a property expressed by a sentential constituent (e.g., the adjectival phrase *Que bonic* ‘how nice’ in *Que bonic que és, això!* ‘How nice this is!’). They are assertions, imperatives, or questions pronounced with a special intonation that allows the speaker to express surprise, discovery, displeasure, etc. (e.g., *Plou!* ‘It’s raining!’, *Mireu qui ha arribat!* ‘Look who’s here!’, *A mi què m’explicques ara?!* ‘What are you saying?!’). Exclamatory utterances are generally introduced by an interjection (e.g., *oh*) or a vocative (e.g., *noia* ‘girl’, *home* ‘man’, etc.).

In the rest of this section we will focus on the prosody of exclamative assertions. As is well known, prosody is a crucial component in the degree of expressiveness of an assertion, and it is generally implemented by the use of emphatic stresses and pitch accents, which are in turn cued by pitch range expansion. The pitch contour in Figure 2 illustrates an exclamation contour, which is characterized by the presence of emphatic pitch accents with expanded pitch range ($L + H^*$) both in pre-nuclear and nuclear positions. From a pragmatic point of view, while the nuclear pitch accent $L^*$ signals broad focus, $L \rightarrow H^*$ signals exclamation and emphasis.

Catalan has two intonation contours that are able to convey assertiveness on the part of the speaker. The two graphs in Figure 3 illustrate these two intonation contours with the utterances (*Home*), *viuran a Mèrida*,

5. For the syntactic properties of Catalan exclamative sentences, see Villalba (2001, 2008).

6. Pitch can vary along two scaling dimensions, pitch range and pitch register (Ladd 1996: 260–261). Pitch range variation involves increases or decreases in the distance between the lowest and highest F0 points in a given pitch accent (as in the case at hand). Register variation, on the other hand, involves the raising or lowering of both the high and the low target points.

7. Degrees of certainty and uncertainty in assertions can be expressed by tonal means, as well as by lexical means through the use of modal verbs such as *poder* ‘can, may’ or modal adverbs such as *evidentment* ‘obviously’, *segurament* ‘surely’, or *potser* ‘perhaps’. The analysis of the intonational properties of sentences and their concurrence with certain evaluative adverbs, such as *desgraciadament* ‘unfortunately’ and *sortosament* ‘fortunately’ is a promising area of research (see Mayol and Castroviejo 2010).
‘They’re going to live in Mérida, of course!’ (upper panel), and *(Home), la Bàrbara!, ‘Barbara (obviously)!’ (lower panel). The contour in the upper panel is characterized by a nuclear low tone L* followed by a complex boundary movement HL%. Pragmatically it confers a high degree of assertiveness that can contradict the hearer’s beliefs. The contour below is characterized by a rising nuclear L + H* pitch accent produced on the syllable bàr- and followed by a complex falling-rising movement L!H% that ends on a mid tone.

Figure 4 exemplifies the Catalan uncertainty contour (L + H* !H%), which expresses a high level of tentativeness and involves a sentence-final mid boundary tone configuration. The utterance *(Potser) ve en Joan, i després la Bàrbara *(Perhaps) Joan is coming, and also Barbara’ is produced with a rising L + H* nuclear pitch accent followed by a falling movement to a final mid sustained tone.

3.2. Questions

Questions are the most versatile of the sentence-types, as they are used for a variety of speech acts that range from directive to assertive functions. They can also express degrees of certainty and counterexpectational meanings. In this section, we will analyze the contribution of prosody to the interpretation of pragmatic meanings in questions. We will focus on the description of yes-no interrogative sentences.
3.2.1. Information-seeking questions

Central Catalan allows for two possible intonation contours to express information-seeking (or non-presuppositional) yes-no questions, a falling pattern and a rising pattern. The two graphs in Figure 5 show the pitch contours of the falling yes-no question optionally headed by que, (Que) l’hi duries? ‘Would you take it to him/her?’ (top panel) and the rising
version of the same question *L’hi duries?* ‘Would you take it to him/her?’ (bottom panel). The falling intonation pattern is characterized by a high pitch plateau which spans from the beginning of the sentence to the onset of the last accented syllable in the prosodic phrase. The pitch then falls during this syllable ($H^*$), to be followed by a low boundary tone $L%$. By contrast, the rising intonation pattern is characterized by a nuclear low tone $L^*$ associated with the last stressed syllable, followed by a sharp pitch rise ($HH%$) at the end of the utterance.

Recent work on the pragmatic meaning of interrogative utterances has sought to characterize the pragmatic factors that influence how Catalan speakers choose between the two types of intonation contours. Traditionally, information-seeking interrogative sentences in Central Catalan have been characterized as having both the rising and the falling pattern (e.g., Bonet 1984, Badia i Margarit 1994, Prieto 2002, Torrent-Lenzen 2001). Payrató (2002) was the first to observe that the selection of the intonation contour was sensitive to the pragmatic cost-benefit scale in which

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8. Catalan yes-no questions display a rich intra- and interdialectal variation which relates to the type of intonation contour, the presence of the particle *que*, and its semantic/pragmatic properties – for a review, see Prieto and Rigau (2007).
the cost or benefit of the proposed action to the hearer is estimated: for example, a sentence like ¿Em deixaríais el teu cotxe nou? ‘Can you lend me your car?’ is less adequate and less polite when being uttered with the falling pattern. Prieto and Rigau (2007) confirmed Payrató’s hypothesis that speakers use the falling intonation pattern when the cost of the proposed
action to the hearer is considered low. As soon as the cost of the action is believed to be relatively high for the hearer, the use of *que* and the falling intonation pattern is no longer so adequate, as the examples in (1) show – examples in (1) and (2) have been taken from Prieto & Rigau (2007). The sentences with the falling intonation pattern (with or without *que*) will only be felicitous in the discourse if indeed the hearer has previously offered the apartment or his/her help with the kids:

(1) a. # (*Que*) em deixes el teu apartament a la platja, aquest cap de setmana? / Em deixes el teu apartament a la platja, aquest cap de setmana?  
   ‘Would you let me use your apartment at the beach this weekend?’

b. # (*Que*) et puc deixar els nens, aquest cap de setmana? / Et puc deixar els nens, aquest cap de setmana?  
   ‘Could I leave the kids with you this weekend?’

Likewise, depending on whether it is pronounced with a falling or rising intonation pattern, the utterance *Puc fumar?* in (2) will lead the hearer to infer two different beliefs on the part of the speaker. If the sentence (*Que*) *puc fumar?* is produced with a falling intonation pattern, as in (2a), it conveys the meaning that the speaker is convinced that the hearer will interpret the action as low-cost, and thus will have no objection to inhaling tobacco smoke. Thus (2a) would not be appropriate when addressed to a person who is trying to quit smoking. On the other hand, *Puc fumar?* uttered with a rising intonation pattern, as in (2b), communicates the speaker’s belief that the hearer will not necessarily interpret the action as a low-cost action.

(2) a. (*Que*) *puc fumar?* (falling intonation pattern)

b. *Puc fumar?* (rising intonation pattern)
   ‘Can I smoke?’

The existence of such pragmatic restrictions on the cost-benefit scale explains why interrogative sentences with falling intonation (and optionally headed by *que*) are used extensively in invitations and small offers, where the benefit of the proposed action is estimated to be relatively high for the hearer (e.g., *Que vols més cafè?* ‘Would you like more coffee?’, *Que vol que li ho emboliqui?* ‘Do you want me to wrap this up for you?’). Conversely, when participants in a court of law ask questions, something which gen-
erally implies a higher-cost interaction, the same intonation pattern and
the use of que would be considered inappropriate (i.e., impolite), e.g.,

Que he de declarar, senyoria? ‘Am I supposed to make a statement,
Your Honor?’, Que coneixeu l’acusat? ‘Do you know the accused?’. In
general, polar sentences headed by que are not found in such formal
speech styles. Importantly, the speakers’ selection of falling and rising
intonation is sensitive to pragmatic factors such as cost, social distance,
and power. In order to investigate these effects in more detail, Astruc et
al. (2010) conducted a set of controlled role-play interviews applying exist-
ing models of speech-act analysis such as Brown and Levinson’s (1987) to
the investigation of offering strategies in Catalan. They found that
although the most effective predictor of the intonation contour (rising vs.
falling) was the cost scale of the offer, factors such as the power of the
hearer over the speaker and the social distance between participants had
an important interacting effect.

From a syntactic point of view, Prieto and Rigau (2007) claimed that
information-seeking questions are headed by an interrogative operator
that occupies a peripheral position in the complementizer zone. These inter-
rogative operators determine the prosodic properties of the sentence; that
is to say, they are ‘visible’ not only by virtue of suprasegmental or pro-
sodic information but rather by the use of segmental material. Assuming
the proposal put forth by Rizzi (1997, 2001), the complementizer zone
may be schematically represented as in (3):

\[(3) \text{ [ Force (\ldots) Finiteness [ IP ]]}\]

The Inflectional Phrase (IP) expresses the propositional content of the
sentence, whereas the positions at the left of IP correspond to the comple-
mentizer zone. This zone allows for the expression of sentential modality
and the articulation of the discourse. Sentence modality is related to Force
position, while Finiteness reflects the finite or non-finite character of the
sentence. Between Force and Finiteness other positions, which can remain
inactivated, are possible, such as Topic positions and Focus. In (4) we
offer an approximate representation of the syntactic structure of the sen-
tence Que l’hi duries? (literally, ‘that it to him/her would-take.2s’) ‘Would
you take it to him/her?’, whose intonation is represented in Figure 5a.

\[(4) \text{ [[ForceP NEUTRAL INTERROGATIVE OPERATOR ] [FinP que [IP l’hi duries ]]]}\]

9. Catalan is a null-subject language. In (4) and (5) the elliptic subject is recover-
able by the verbal inflection (second person, singular).
Force Phrase (ForceP) shows a neutral polar interrogative operator, which is realized by prosodic means (see Figure 5a) and confers a neutral polar question reading to the sentence. The head of Fin(finiteness) Phrase, which conveys the information that the sentence is a finite sentence, is realized by the conjunction que (see Prieto and Rigau 2007 for more details).

The structure of the sentence in Figure 5b, *L’hi duries?* (literally, ‘it to him/her would-take.2s’) ‘Would you take it to him/her?’, is roughly represented in (5). As in (4), a neutral polar interrogative operator is in Force Phrase. Its realization is also not segmental but prosodic. However, the operator in (5) determines a rising intonation pattern, contrary to the falling intonational pattern in (4). Moreover, Finite phrase is not phonologically realized, since there is no conjunction in it.

\[(5) \quad [[\text{ForceP} \text{ NEUTRAL INTERROGATIVE OPERATOR}] [\text{FinP} \text{ [IP } \text{L’hi duries }]]]\]

We assume that the neutral interrogative operator in (4) and (5) is a yes-no quantifier originating inside IP, in the same position as the polarity markers *yes* and *no*, and moves to Force phrase. Consequently, information-seeking questions are neither true nor false. They express a disjunction between the affirmation and negation of their propositional content. The disjunction meaning can be expressed in the question: *(que)* *L’hi duries o no?* ‘(that) it to him/her would-take.2s or not?’.

### 3.2.2. Counterexpectational questions

Counterexpectational questions are used to express the denial of a discourse-activated assumption. First, it is worth discussing the relationship between counterexpectational questions and echo questions, also known as reprise questions. Echo questions can be used to signal a failure to understand the previous move in a conversation and thus are typically a repeat (‘echo’) of the preceding sentence, as shown in (6).

\[(6) \quad \text{a. Speaker A. – } \text{He parlat amb el president} \]
\[\quad \text{‘I have spoken with the president’}\]

\[\quad \text{b. Speaker B. – (Dius que) has parlat amb el president?}\]
\[\quad \text{‘(You say that) you have spoken with the president?’}\]

Yet the sentence in (6b) can also express a counterexpectational meaning, that is, the lack of agreement between the speakers’ own expectations and the discourse context. Depending on the prosodic correlates chosen,
this question can communicate either a ‘positive’ counterexpectational meaning (that is, the speaker expresses an acceptance of the situation by expressing a certain degree of surprise or astonishment) or a ‘negative’ counterexpectational meaning (whereby the speaker still expresses a certain degree of incredulity or unacceptance of the discourse-activated assumption).

Figure 6 illustrates the standard pitch contour of surprise counterexpectational questions in Catalan. Though echo questions can express a genuine failure to understand the utterance, they can also convey a counter-expectational meaning of surprise. Typically, the pitch contour used to express this type of counterexpectational meaning starts with a low pitch that continues until the last stressed syllable in the utterance, which is pronounced with an upstepped $L + \downarrow H^*$ pitch accent. After that, the contour ends in a final falling tone. As noted above, Borràs-Comes, Vanrell and Prieto (2010) found a phonological contrast in pitch range between two types of rises in Catalan, $L + H^*$ (which indicates contrastive focus) and $L + \uparrow H^*$ (which is used in surprise counterexpectational questions).

The sentence in (6a) can also adopt the rising intonation pattern (see Figure 5b), in which case it would convey incredulity. An important prosodic cue to the counterexpectional meaning is the increased pitch range of
the final falling or rising pitch movement. Crespo-Sendra, Vanrell, and Prieto (2010) conducted a set of perception experiments with rising pitch contours that showed that an increase in pitch scaling of the boundary tone HH% was the primary cue used by Catalan listeners to identify an incredulity interpretation. The contribution of duration was small but consistent, and served as a secondary cue to the incredulity meaning.

Prieto and Rigau (2007) offered a syntactic analysis of counter-expectational questions in which they argue that the interrogative operator, as in other biased questions, originates directly in ForceP, not inside IP. Consequently, in contrast with information-seeking interrogative sentences, counterexpectational questions can be negative, as in (7):

(7) Que no volies un collaret? Doncs, jo em pensava que sí.

that not wanted.2s a necklace. Then I myself thought.1s that yes ‘Didn’t you want a necklace? I thought you did.’

In (8) we schematically represent the structure of the sentence in (7).

(8) \[
\text{\text{[ForceP \text{\text{counterexpectational interrogative operator}} \text{\text{[FinP \text{que \text{\text{IP no volies un collaret}}}]]]}}}
\]

3.2.3. Confirmation-seeking questions

Recent studies in the field of intonational phonology have shown that information-seeking questions can be distinguished from confirmation-seeking questions by prosodic means in a variety of languages (see Vanrell et al. 2010b for a review). Typically Catalan confirmatory questions are headed in Force Phrase by question operators such as \textit{oi} or \textit{eh}, among others, which are followed by the conjunction \textit{que}, as in (9a) and (9b).

(9) a. Oi que vindrás?

Op. that will-come.2s ‘You’re coming, aren’t you?’

b. Eh que vindrás?

Op. that will-come.2s ‘You’re coming, aren’t you?’

The syntactic structure of (9a) is schematically represented in (10).

(10) \[
\text{\text{[ForceP Oi \text{\text{[FinP que \text{\text{IP vindrás}}}]]]}}
\]
Confirmatory questions headed by *oi que* or *eh que* convey a strong degree of presupposition on the part of the speaker, who expects a clear confirmation on the part of the hearer. The other possible form that these sentences may take is tag questions, which are composed of a statement followed by the tag in an interrogative form, as in (11a) and (11b) (for more information on confirmatory questions, see Cuenca 1997; Rigau 1998; Hernanz and Rigau 2006, and Prieto and Rigau 2007). From a prosodic point of view, the sentences in (9) and (11) are characterized by the rising question contour (see Figure 5b), which applies to either the whole sentence or just the tag element.

(11) a. *Vindràs, oi?*
   will-come.2s Op.
   ‘You’re coming, aren’t you?’

b. *Vindràs, eh?*
   will-come.2s Op.
   ‘You’re coming, aren’t you?’

However, as is well known, languages can also use prosodic means to express softer degrees of confirmation-seeking in questions. Vanrell et al. (2010a, 2010b) performed a set of production and perception experiments that showed that different Catalan dialects use distinct tonal configurations to mark the distinction between non-tag confirmation- and information-seeking questions. In the case of Central Catalan, the interrogative conjunction *que* ‘that’ and the falling intonation pattern (see Figure 5a) were

10. This is corroborated by the fact that these questions allow for the presence of evaluative adverbs such as *per desgràcia* ‘unfortunately’ (1a), something that would be unacceptable with information-seeking questions such as the one in (1b) – see Mayol and Castroviejo 2010 for a discussion. In fact, the question in (1a’) would only be felicitous with a counterexpectational question interpretation:

(1) a. *Oi que la Maria, per desgràcia, ha hagut de marxar?*
   ‘Isn’t it true that Mary, unfortunately, had to go?’
   Example from Mayol and Castroviejo (2010:26)

   a’. *#La Maria, per desgràcia, ha hagut de marxar?*
   ‘Mary, unfortunately, had to go?’
found to correlate with the meaning of confirmation-seeking questions.\textsuperscript{11} For example, an utterance such as *Que tens gana?* or *Que tens fred?* can be uttered with a confirmation-seeking goal. Importantly, in dialects such as northern Central Catalan, questions headed by *que* have exclusively a confirmation-seeking function.\textsuperscript{12}

Escandell-Vidal (1996) proposed a pragmatic model that takes into account the degrees of knowledge of speaker and hearer in the instantiation of questions. She applied the classical distinction between transactional discursive goals (i.e., the speaker’s intentions are mainly informative) and interactional discursive goals (i.e., the speaker seeks to cooperate and socialize) to interrogative sentences. When the discursive intentions of the speaker are mainly informative (or transactional), the interrogative variable is an informative gap that the hearer can fill through a certain piece of information. Yet in other cases the different degrees of knowledge on the part of the speaker and the presumed knowledge possessed by the hearer shape different types of questions that can have different prosodic forms. Table 2 represents a diagram with a summary of Escandell’s proposal. The left part of the table represents the speakers’ knowledge about the content of the question and the right part of the graph the hypothesis that the speaker formulates about the knowledge possessed by the hearer.

Information-seeking questions are located at the top of the scale because they imply minimal knowledge on the part of the speaker and at the same time a maximal presumption of the knowledge in possession of the addressee. By contrast, at the opposite extreme of the scale we find exam-style questions, which imply a maximal degree of knowledge on the part of the speaker and a minimal degree of knowledge on the part of the addressee. Different types of confirmatory questions, where the speaker’s

\textsuperscript{11} In the case of Majorcan Catalan, results from a variety of perception experiments showed that it is the choice of the nuclear pitch accent that distinguishes information-seeking questions from confirmation-seeking questions (namely, the choice of a $\text{H} + \text{L*}$ for the former and $\text{H} + \text{L*}$ for the latter) – for more information on other dialectal differences in the expression of confirmation, see Vanrell et al. (2010a).

\textsuperscript{12} Interestingly, the presence of evaluative adverbs in interrogative sentences headed by *que* is more acceptable than in the case of confirmatory sentences starting with *oi que* (see footnote 11) – although see Mayol and Castroviejo (2010) for a discussion of the role of discourse context in setting up the right presuppositions. This compatibility is corroboration that questions headed by *que* and falling intonation display a weaker degree of presupposition than confirmatory questions headed by *oi que* or *eh que*. 
ignorance is not total and he/she seeks different levels confirmation of his/her hypothesis, are located at intermediate points in the diagram.

Following Escandell-Vidal’s model, Vanrell et al. (2010b) undertook a perception experiment to test whether Majorcan Catalan listeners could distinguish between four levels of knowledge presupposition in questions depending on a set of prosodic and lexical cues. The materials used for the rating test were an information-seeking question (‘Teniu mandarines? ‘Do you have tangerines?’), a confirmation-seeking question (‘Teniu mandarines? ‘You have tangerines?’ with the appropriate intonation contour), a tag question (‘Teniu mandarines, no? ‘You have tangerines, don’t you?’), and a broad focus statement (‘Teniu mandarines ‘You have tangerines’). Subjects had to rate whether the speaker had knowledge of the presence of tangerines by pressing one of four possible options, namely, “1” for ‘He/She has no idea’, “2” for ‘Perhaps’, “3” for ‘Probably’ and “4” for ‘Definitely’, with number values thus reflecting the strength of certainty of a “yes” or positive answer. The results revealed an average presupposition score of 1.15 for information-seeking questions (in a 1 to 4 scale), 2.05 for confirmation-seeking questions, 3.08 for tag questions and 3.72 for statements, thus providing empirical support for Escandell-Vidal’s model. Further confirmation that intonation can reflect a scale of knowledge presupposition in confirmatory questions comes from a recent analysis of a Map Task corpus in Peninsular Spanish (Pérez-Broncano et al. in press).

### 3.3. Requests

Imperative utterances (including both commands and requests) are interpreted as directive speech acts, i.e., they reflect the speaker’s attempt to get the hearer to perform the action described by the proposition. The illocutionary strength with which the speaker conveys this speech act ranges from a strong command to a gentle request or suggestion, and it can be modulated linguistically through lexical choice of linguistic items such as *si us plau* ‘please’, and/or through the use of prosodic features such as

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**Table 2.** Diagram with Escandell-Vidal’s (1996) proposal.

<table>
<thead>
<tr>
<th></th>
<th>Speaker</th>
<th>Hearer</th>
<th>Knowledge presupposition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Real knowledge</strong></td>
<td>−</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>−</td>
<td></td>
</tr>
</tbody>
</table>
intonation and speech rate. In this section we describe a set of intonation patterns that characterize commands and requests, as well as the prosodic realization of pragmatic nuances such as differences in the degree of insistence in these types of utterances.

Figure 7 illustrates the standard pitch pattern used for strong commands. The stressed syllable is pronounced with a very prominent rising pitch accent (L + H*) followed by a fall on the posttonic syllables. An important feature of imperative utterances is the expanded pitch range of the focalized pitch accents and the fast speech rate of the whole utterance, which expresses the urgency of this speech act.

In Catalan the distinction between commands and requests can be conveyed by pitch accent choice (L + H* in commands and L* in requests) and by final boundary marking (L% vs. HL%). Furthermore, differences in boundary tones (e.g., L!H% vs. LHL%) can express a variety of modal or attitudinal meanings like degree of insistence. The three panels in Figure 8 illustrate the contrast between a gentle request (L* HL%) and two more insistent requests (L + H* L!H% and L + H* LHL%). The tritonal boundary tone LHL%, which expresses a fall-rise-fall pitch movement, is the so-called “insistence tune” mentioned elsewhere (Prieto 2002). Importantly, the illocutionary strength of imperative utterances is ex-
Figure 8. Waveforms, spectrograms, and F0 pitch tracks of the same utterance (*Sisplau*), *vine.*! (*'Please come!') produced as a gentle request (upper graph) and as two more insistent requests (central and lower graphs).
pressed through the use of not only intonation but also other prosodic features such as duration. Longer durations can signal stronger degrees of insistence or submission in requests.

4. Affective meanings in intonation

There is a specific dimension of intonational meaning that is typically associated with affective or emotional states of mind of the speaker. For example, the use of a high register tends to conveys submissiveness, whereas the use of a low register tends to convey dominance (see Gussenhoven 2002). Recently, some authors have endorsed a biological basis for the relationship between pitch height and affective intonational meanings. Initially, Ohala (1984) suggested the existence of a cross-species phylogenetic use of F0, which he labeled the “frequency code”. According to his view, the current use of pitch in human languages has evolved from a primitive code which relates high F0 and low F0 to basic meanings of “smallness” and “bigness” respectively (as vocal cord size relates to body size) and to secondary social meanings of “subordination, submission, lack of threat or confidence, politeness” and “dominance, threat, authority, aggression, assertiveness” respectively. As Ohala (1984:2) remarked, “although the evidence is not as extensive as that concerned with the use of F0 to mark sentence types, it seems safe to conclude that such ‘social’ messages as deference, politeness, submission, lack of confidence, are signaled by high and/or rising F0 whereas assertiveness, authority, aggression, confidence, threat, are conveyed by low and/or falling F0.”

According to Gussenhoven (2002), “affective interpretations of the frequency code are rather numerous. Submissiveness, or ‘feminine’ values, and its opposite, dominance, or ‘masculine’ values, constitute one obvious dimension. Meanings that are associated with this dimension are (for higher pitch) ‘friendliness’ and ‘politeness’.” He proposed two other biological codes, the effort code and the production code. The effort code relates to the increases in effort expended in speech production, which are signaled in prosody by pitch range variation: this can be related to a general phenomenon across languages whereby increases in pitch range index degrees of prominence and speaker involvement in the speech act. Finally, the production code relates to the tendency in production to have high tones at the beginning of utterances and low tones at the end. This explains why final high tones at the ends of sentences signal marked meanings like continuation. Gussenhoven (2002) claims that although
these types of affective prosodic meanings are universal and based on biological conditions, language-particular differences emerge in the specific use of these correlates. For example, Chen et al. (2004) investigated experimentally the perception of meanings derived from Ohala’s frequency code in Dutch and English, i.e., the perception of semantic scales such as “friendliness”, “confidence”, or “surprise”, as conveyed by gradual changes in pitch range or peak alignment. Their findings showed that, though there were differences in the fine-grained perception of English and Dutch listeners, stimuli with high pitch range tended to be perceived as more friendly.

With respect to the expression of politeness, the seminal work by Brown and Levinson (1987) founded Politeness Theory within the field of pragmatics. These authors pointed out that one positive politeness strategy consisted of the exaggeration of “interest, approval, sympathy with H[earer]”, which is “often done with exaggerated intonation, stress, and other aspects of prosodics, as well as with intensifying modifiers” (p. 104). Even though this prosodic expression indeed relates to Ohala’s frequency code and the perception of friendliness, it is also clear that politeness can be coded at the linguistic and pragmatic levels. Perhaps one of the most robust tonal correlates of perceived politeness that have been highlighted in the literature is that of tonal pitch range: as Brown and Levinson noted, an increase in pitch span (what they call ‘exaggerated intonation’) can trigger the impression of a higher degree of politeness.

For Catalan, Payà (2003) examined how the perception of politeness in questions is affected by conflicting or non-conflicting prosodic elements (e.g., choice of pitch contour type and speech rate) and non-prosodic elements (e.g., lexical and morphological choice). Her results revealed that the presence of a single impolite cue, of whatever type, overrode all other cues. Nadeu and Prieto (2011) explored the contribution of pitch range increases to the expression of politeness in information-seeking yes-no questions in Catalan. Two perception experiments were carried out with the utterance (Que) tens hora? ‘What time is it?’, spoken with both rising and falling intonation contours and then manipulated so that the ending contained gradual increases or decreases in pitch. The results of the first experiment revealed that, for both contours, increasing the pitch range of the final part of the utterance tone triggered a decrease in perceived politeness, whereas decreasing the pitch range had no effect whatsoever. The second perception experiment showed that adding contextual (gestural) information could reverse the tendency. Taken together, these results
point to the complex interaction between prosodic cues and contextual information (specifically, facial gestures; see also Payà 2004).

The results of the abovementioned experiments show that there is nothing intrinsically polite about using an increased pitch range, unless it is accompanied by consistent contextual information. Consequently we believe that when assessing the degree of perceived politeness of an utterance, attention must be paid to various prosodic aspects together with contextual and gestural information. As noted, the importance of such contextual factors in prosodic interpretation has been increasingly recognized (e.g., Wichmann and Cauldwell 2003, Wichmann in press, and others). For example, Wichmann and Cauldwell (2003) asked students to use their own labels to describe the attitudinal or affective meanings conveyed by a series of sentences, first out of context and later in context. Participants’ perception changed drastically when sentences were embedded in their context. Crucially, sentences in isolation were typically regarded as negative, whereas when inserted in a context, they received more positive ratings. All in all, these studies showed the importance of factoring in contextual knowledge when attempting to describe of the perceptual association between prosody and meaning.

5. Conclusion

Taken together, the results of the studies presented in this chapter have convincingly shown that prosody is one of the linguistic means listeners use in the interpretation of speech acts, alongside choice of lexical and grammatical items, facial and body gestures, or neighboring discourse structure. A promising avenue for future investigation will consist of further uncovering the relative contributions of these cues to utterance interpretation. This chapter has described the pragmatic function of a selection prosodic patterns in Catalan within three well-known types of sentence-types, namely, statements, questions, and requests. We have reviewed the prosodic cues Catalan speakers use to express notions like degrees of certainty/uncertainty in statements and degrees of incredulity and certainty in questions. Nonetheless, we have seen that pragmatic factors such as cost, power, and social distance are relevant when a speaker must choose between two different pitch contours (rising vs. falling) for information-seeking questions. Thus, though prosody certainly helps the hearer to identify a speech act type, it is not possible to claim a one-to-one relationship between prosody and pragmatic interpretation.
With respect to the expressive meanings of prosody, we have reviewed the expressive attributes that are crosslinguistically related with expansions and reductions of pitch range (Ohala 1984, Gussenhoven 2002). We have highlighted the results of a recent experiment showing that discourse and gestural context can also be crucial in the perception of politeness (Nadeu and Prieto 2011). This experiment showed that the very same questions in Catalan could be perceived as conveying more or less politeness depending on how much information about the context hearers possessed. In the absence of visual cues, participants tended to react more negatively to stimuli whose boundary tone had been increased. When visual cues were brought into play, however, the tendency reversed. Thus, though it is clear that pitch height is associated to the perception of politeness, this role is highly dependent on the discourse context.

From a methodological point of view, this chapter has pointed to several promising directions for research in the pragmatics of intonation. First, the application of speech act theories to the study of intonation could make use of experimental methodologies to investigate the role of pragmatic factors in the selection of prosodic patterns. Second, the semantic investigation of the combinatorial properties of intonation and modal adverbs could be useful to attain a more fine-grained syntactic analysis of prosodic features. Third, the relative contribution of prosody to overall utterance interpretation could be investigated by means of experimental techniques that simultaneously measure the impact of behavioral data such as facial gestures. Moreover, systematic corpus-based studies of all aspects of intonational meaning, a field of research still largely in its infancy, will likely continue to yield important results.

In conclusion, we hope that the examination of Catalan prosodic meaning presented in this chapter will serve as a stimulus for further research in this area that can refine our knowledge on the impact of prosody on utterance interpretation for language in general.

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