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# The PAC-prosody protocol: eliciting speaking styles for prosodic analysis. The example of Irish English.

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## **Abstract**

The present paper presents a protocol designed for the study of prosody in the framework of the PAC programme. This protocol elicits different speaking styles which allow fine-grained prosodic analysis. The example of Irish English is taken to illustrate the relevance of the different tasks proposed.

First, the protocol is introduced in detail. In the original PAC protocol, several speaking styles were represented. The PAC-prosody protocol adds a few more, that are presented, explained and whose usefulness for prosodic analysis is argued.

The results of prosodic analysis on two varieties of Irish English are then given: Dublin English and Galway Gaeltacht English. The corpora are described, and various results given about the two varieties. A qualitative analysis of rising tones in Dublin is then presented.

Index Terms: prosody; intonation; corpus linguistics; protocols; Irish English; speaking styles

## **1. Introduction: the PAC programme and the common PAC protocol**

The PAC programme (PAC is the French acronym for phonology of contemporary English, Durand & Przewozny, 2012) is an international project which aims at describing contemporary varieties of English from a phonetic and phonological point of view. The project is interdisciplinary and aims at understanding variation and at improving the way English is taught as a foreign language. The original purpose of the PAC programme is to build up a large database of spoken English in its geographical, stylistic and social diversity (Carr *et al.*, 2004). In order to allow comparable data in all the corpora recorded by PAC members, a common protocol is used. It is composed of two reading tasks and two conversational tasks. Two lists of words (one which focuses mainly on the pronunciation of vowels and the second on that of consonants) and a text (used in order to study certain connected speech processes like R-sandhi) have to be read. Then a formal conversation (guided interview) between the speaker and the fieldworker is organized in order to draw the speaker's sociolinguistic profile and to gather information on certain topics: informants are asked about their daily life, their professional life, their perception of the city they live in, and their perception of their accent. The LVTI questionnaires (Przewozny *et al.*, 2013) are used for that purpose. The formal conversation also enables a study of the informant's way of speaking when talking to a person outside their usual social circle. Finally a second conversation between two informants (ideally friends or relatives) and in the absence of the fieldworker takes place, with the aim of obtaining a more informal speaking context and in order to study how the speakers express themselves when with someone they already know and who speaks the same language variety. This protocol is well-adapted to segmental studies, but far less so for suprasegmental ones. The reading of the word lists for example shows a limited interest for the study of intonation and rhythm, the reading of the text does not contain many different syntactic constructions whose intonation can be studied. The

conversations, although more ecological, do not elicit many questions, especially the formal conversation, in which the fieldworker asks questions. Moreover, the formal conversation cannot be fully exploited since the study of prosody requires full sentences. The PAC recordings being anonymous (in accordance with the consent form signed by the informants), studying full sentences from a speaking task where the speakers talk about their life is almost impossible.

In order to extend the possibility to study prosody and more specifically intonation thoroughly within the framework of the PAC programme, the authors of this chapter created the PAC-Prosody extension. It is presented in the next section. The third section illustrates the relevance of this protocol by showing results of prosodic analyses based on two varieties of Irish English.

## **2. The PAC-Prosody protocol: eliciting various speaking styles for the analysis of prosody**

In order to document the prosody of varieties of English, and more particularly the intonation contours produced by the speakers, we needed more tasks than in the original PAC protocol. Previous corpora designed for the study of intonation (Grabe *et al.*, 1998 and Ritchart & Arvaniti, 2014 amongst others) or for other purposes (like the ANDOSL corpus), contain various tasks in various speaking contexts. Some authors distinguish different speaking styles, that is the different settings in which a person speaks (Levinson, 1979; Léon, 1993; Llisterri, 1992). They depend on many factors: the interactional situation, the medium, the interlocutor(s), the context of speech, the purpose of speech, language use, social activity, etc. In prosodic research, the distinction is often made between spontaneous and prepared speech, between natural and experimental data, or more recently between more or less ecological data. Ecological data in this sense refer to data collected with as little interference as possible from a fieldworker. Taking these parameters into consideration, we added several tasks to the original PAC protocol.

### *2.1. List of sentences to read*

In order to establish a typology of intonation, the reading of different types of sentences is necessary. Each sentence is also of segmental interest for the variety under study. It is possible to modify the sentences according to the place of investigation and phenomena to be tested by changing words but keeping the same sentence types. Seven types of sentences were chosen, of variable length, as shown below. For a few, a context is given. The examples are the sentences chosen for the PAC-Dublin corpus (Bongiorno, 2021).

- Declarative sentences (6): I don't like to drive. / I'll have to take the bus if I want to go to the theatre because someone stole my car a few days ago. / She likes those three trees. / This toy is grey. / I can't tell you if she comes here often, I can only tell you I've already seen her. / When I came in, the kids were doing their homework.
- Open questions (WH- questions) (4): Where is your plane supposed to land? / Why should I call him? / How will they manage to be on time? / What do you think is the best thing to do?
- Closed questions (Yes-No questions) (4): Will you need us to take your coats? / Can he remember any other names? / Is that the friend she told me about? / Do you think it's a good idea?
- Declarative questions (3): [*You're going to your friend's party and ask your roommate if she's coming or not*] You're coming tonight? / [*you want to buy your father a new laptop for Christmas and ask your sister what she thinks about it*] You think it's a good

- idea? / [Your brother is inviting his girlfriend over for lunch for the first time and you ask him questions about her] She likes tea?
- Alternative questions (3): Did you say sheep or ship? / Do you live in Willbrook or in Donnybrook? / Is her name Maria or Maya?
  - Emphatic sentences (4): [You introduce your new boyfriend to your family and your mom cooked shrimps] But I told you he didn't eat shrimps! / [You run into a friend of yours in the street, you haven't seen her in ten years and she tells you] Your daughter is gorgeous! / It's not my daughter, it's my niece! / [someone arriving with a new tie and you tell them that you really like it] I do like your tie!
  - Sentences containing enumerations (2): [You go in a shop and ask the salesperson for:] carrots, apples, tomatoes, strawberries, a pack of sparkling water and a bunch of flowers. / [Making a presentation on the Beatles] They were four young men: John, singer and guitar player, Paul, singer as well, playing the bass and the piano, George, singing in the chorus and playing the guitar solo and some Indian instruments, and Ringo played the drums.

Ideally, as designed in Théveniaut (ongoing) because of the necessity to collect data online during the Covid period and then adopted even in presence, the informants read the sentences on a computer screen: the sentences appear in a randomized order, different for each speaker.

It is of course possible to add sentences for specific purposes. This is what was done for example for the PAC-Galway corpus (Théveniaut, ongoing): in order to analyse peak alignment in relation with the number of preceding or following syllables, the same sentences as in Kalaldehy *et al.* (2009) were added: Man is an animal. / A man from the garage called. / There's a man from the garage here. / There was a man from the garage here. / Here is the man. / He proves manly. / He proves his manliness. / There is some manliness here.

## 2.2. Description of a picture

The picture description is an interesting task as far as the context is concerned. The informant is with the fieldworker when they describe the picture. This elicits yet another speaking style, since there is no actual interaction, but the informant tends to seek feedback from the fieldworker, trying to know if what they are saying is appropriate and is what the fieldworker expects. Our hypothesis was that this task would elicit intonation contours with pragmatic functions like rising terminals (see section 3). The picture chosen is shown in Figure 1 below: as the image is very sober and contains few elements, we expect the speakers to use the same vocabulary, which should make comparison easier. The presence of a man in the middle of a car park during the night also leads the speakers to question what is happening in the photograph. This is why the instruction given for this task is the following: *Describe in a few sentences what you see and feel when looking at this image*. It is a deliberately evasive instruction so as not to influence the speakers and let their imagination run free.



Figure 1: Picture used in the PAC-Prosody protocol

### 2.3. Map-Task

In several studies analysing prosody, a map-task is used (see for example Grabe *et al.*, 1998, Ritchart & Arvaniti, 2014). This protocol was created at the Human Communication Research Center, of the Universities of Edinburgh & Glasgow. The HCRC is an interdisciplinary research centre that brings together linguists, but also psychologists, philosophers and computer scientists, working on communication skills (Anderson *et al.* 1991).

The protocol involves two speakers working in pairs, each with a very simple map: one (the guide) must guide the other (the follower) from one point on the map to another. But the two maps are slightly different, in order to create particular interactions, with misunderstandings, questions, astonishments, exclamations, all interesting phenomena at the syntactic and prosodic levels, as well as for all that characterizes spontaneous interactions: pauses, false starts, feedbacks, etc. This protocol has several advantages for research. It allows spontaneous but controlled speech to be triggered. Indeed, the main interest of the protocol is that it allows the researcher, through the elements given on the map, to choose certain linguistic phenomena (like consonant elisions, assimilations, glottalization, the pronunciation of certain vowels, etc). For the prosodist, the fact that the maps are different supposedly creates surprise and misunderstandings and should allow the analysis of questions, emphases and other such phenomena that an informal conversation rarely contains. The map-task can be created specifically for the variety under study. Figure 2 below shows the maps for the PAC-Dublin corpus and the PAC-Galway corpus. The elements selected on the maps were of interest at the segmental level for Irish English: the pronunciation of <th> as compared to <t> in “three trees”, the pronunciation of <wh> as compared to <w> (when the guider will say “turn around the witch”, the follower will hopefully ask “Which witch?”), the pronunciation of final <t> in “cat”, etc.

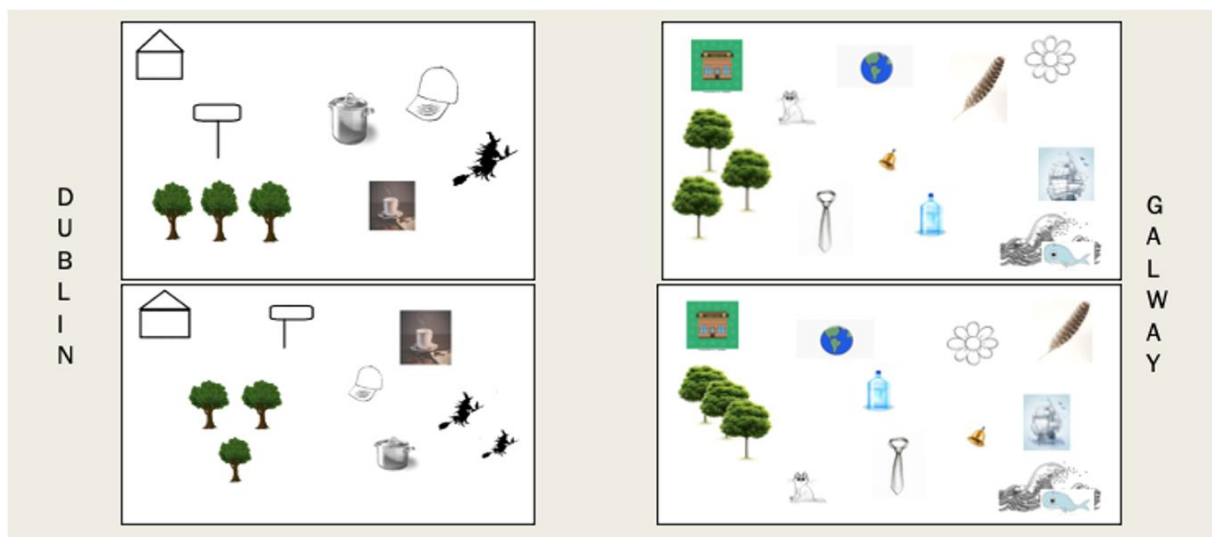


Figure 2: PAC-Dublin and PAC-Galway map-tasks.

#### 2.4. A continuum from least to most ecological data

Each task of the PAC-Prosody extension has an interest when it comes to eliciting different speaking styles: the read sentences allow the researchers to study different sentence types (such as declarative statements, several types of interrogatives, emphases, and sentences that display coordinated elements) in a very controlled context; the picture is more ecological than the sentences because it is not scripted, but the fact that it is recorded by the fieldworker makes it a less ecological task than the Map-Task, where two speakers play together and the fieldworker never interferes.

Added to the original PAC protocol, the PAC-Prosody extension allows the collection of a continuum from least to most ecological data (Figure 3). It is to be noted that with the PAC protocol + the PAC-prosody extension, the reading task includes the two wordlists, the list of sentences and the text. The authors highly recommend the use of both protocols to maintain comparability between the different PAC corpora.

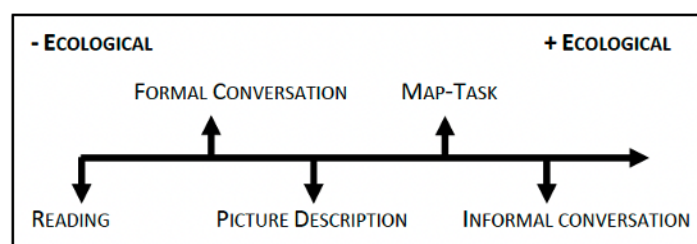


Figure 3: Speaking styles of the PAC and PAC-Prosody protocol

### 3. The example of Irish English

In this section, we illustrate the relevance of the PAC-prosody extension for the study of intonation in two varieties of Irish English: Dublin English and Galway English. First the corpora are briefly described and the way they are annotated is detailed. Then a typology of the intonation of the two varieties, based on the reading of the sentences, is given. Finally, the results of a study of rising tones in Dublin in various speaking styles are given.

### 3.1. *The PAC-Dublin and the PAC-Galway corpora*

#### 3.1.1. The PAC-Dublin corpus

The first corpus that was recorded using the PAC-Prosody extension is PAC-Dublin (Bongiorno, 2021), the study of which is also the first in the PAC programme to focus on prosody, and more particularly on intonation.

This corpus gathers recordings from 30 cisgender speakers (18 women and 12 men) from 19 to 78 years old. All were brought up and still live in the south of Dublin. This part of the capital was chosen in order to reduce geographical variation as much as possible. This was necessary because, according to most of the speakers, there are as many different accents as there are areas in the city.

The speakers were then categorized according to five sociological criteria: gender, age, social class (all of the speakers belong to the lower, middle, or upper-middle classes), level of fluency in Irish, and feeling of belonging to Dublin's traditional culture and identity (in the city, this feeling has an influence on pronunciation at the segmental level according to Hickey, 2005).

All the speakers are friends, friends of friends, or family members: they were recruited using the 'friend of a friend' technique (Milroy, 1987).

#### 3.1.2. The PAC-Galway corpus

Because of the COVID pandemics, the PAC-Galway corpus was collected in two waves: the first wave consisted of remote recordings. The second wave was recorded on site by the third author. Only the results of the first wave of recordings are presented in this paper: 15 speakers (12 females, 3 males) were recruited thanks the 'friend of a friend' technique (Milroy, 1987) in the areas of Spiddal and Carraroe (County Galway), two Irish-speaking areas known as *gaeltachtaí*, that is to say parts of the country where the Irish language is the predominant vernacular. Spiddal is located on the edge of Galway city and on the very touristic road to Connemara and the Aran Islands. Contact with English is therefore stronger than in Carraroe, which is geographically isolated on a Western peninsula. The informants are aged 21 to 55 and grew up in an Irish-speaking environment, in all-Irish schools and some of them speak Irish within the household and at work. The data were collected using the Zoom recording option as well as by the speaker via the App "Easy Voice Recorder" (Cool Developer 472, 2020, Easy Voice Recorder, 1.0.1 for Android) to ensure a double recording each time, except for two speakers, who were recorded on site with a Handy Zoom Recorder (H4n).

#### 3.1.3. Annotation

The two corpora are fully annotated orthographically. SPPAS (Bigi, 2015) was used to align the text to the signal, and the IViE system (Grabe *et al.*, 1998) to annotate the intonation on a very large part of the corpora on four different tiers: an orthographic tier, a prominence tier where stressed and accented syllables are indicated, a phonetic tier, and a phonological one. This method makes it possible to study intonation in detail thanks to the four tiers and is well-adapted to non-standard varieties of English (Nolan & Grabe, 1997). For the PAC-Dublin corpus, the read sentences and the picture-description are fully annotated for intonation, and so are 3 minutes from each Map-Task, and about one third of the informal conversations. For the PAC-Galway corpus, read sentences from the first wave are annotated. The annotation of the other tasks and of the recordings of the second wave is currently in progress.

Table 1 below presents the phonological nuclear tones that were used for annotation with the IViE method.

<b>H* %</b>	High target (high tail if any)
<b>H* H%</b>	High accent followed by a rise
<b>L*H %</b>	Nuclear rise (+ plateau on tail if any)
<b>L* H%</b>	Late rise (low nucleus + rising tail or high tone)
<b>L*H H%</b>	Double rise (nuclear rise + rising tail)
<b>H*L H%</b>	Fall-rise
<b>L* %</b>	Low target (low tail if any)
<b>H*L %</b>	Nuclear fall
<b>H* L%</b>	High target followed by a fall
<b>L*H L%</b>	Rise (plateau) fall

Table 1: IViE contours (adapted from Grabe *et al.*, 1998)

The first six tones are rising contours, the remaining four are falling contours. Although H\* % and L\* % are static tones, they were included in the rising and falling contours respectively. This will be discussed in section 3.3.

### 3.2. A typology of intonation in Dublin and Galway

Thanks to the PAC-Prosody protocol, and more specifically to the read sentences, the first author was able to make a full typology of the intonation in Southern Dublin English, and the third author of Gaeltacht English (County Galway) on the basis of her first wave of recordings (speakers of the Gaeltachtai). The use of the IViE method allows a direct comparison of the two varieties of English thanks to the common phonological contours used (see Table 1). Indeed, the phonological tier does not depend on the researcher's perception (unlike the phonetic tier), but rather on a more objective method where all the different tones are the same for each researcher using this annotation method.

Figure 4 below displays the different tones used in Dublin (left) and in Galway (right) in the read declaratives of the PAC-Prosody protocol.

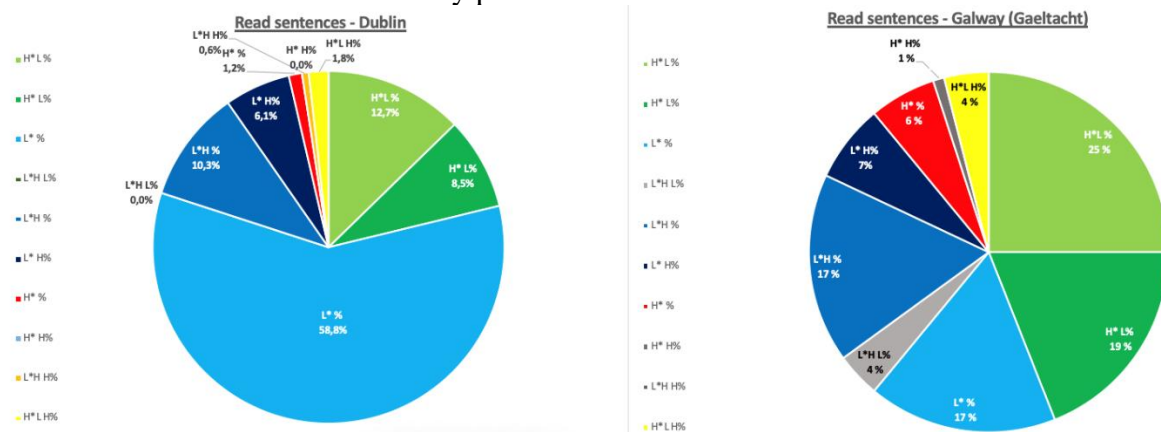




Figure 4: Different tones used in Dublin (left) and in Galway (right) in the reading task (declaratives only)

As can be seen in figure 4, the results show that, overall, both varieties have predominantly static and falling patterns. Dublin English displays a large proportion of low static tones L\* %, which is the default tone for statements in the Irish capital city. In Galway, the results show that people tend to favour falling tones in declaratives as in Standard British English. What is also striking is the fact that there seems to be much more variation in Galway than in Dublin, where there are no occurrences of H\* H% and L\*H L% for this speaking task.

As can also be seen in figure 4, there is a high proportion of rising (L\*H %, L\* H% and H\*L H%) tones in Galway (28 %), and far less so in Dublin (18,2 %). There are also way more high static tones (H\* %) in Galway (6 % against 1,2 % in Dublin). Even though H\*L % is the most common tone in the read declaratives of the western city, it is only favoured by 25 % of speakers, against almost 60 % for L\* % in Dublin, which is quite surprising and needs to be further investigated. Indeed, these different realisations of the same sentence type might be due to sociological criteria, the study of which will be possible thanks to the formal conversation of the original PAC protocol.

Table 2 below displays the main tone used for each sentence type in Dublin (first column) and in the County Galway Gaeltachtaí (second column). It shows that, even though the informants in both the PAC-Galway and the PAC-Dublin corpus read the same sentences, there are substantial differences in the way they produce them regarding intonation.

Dublin English appears to be more static than Galway Gaeltacht English, since static tones (L\* % and H\* %) are the most commonly used in three sentence types, while only L\* % is the most common tone for WH-questions in Galway Gaeltachtaí. On the contrary, statements in Galway Gaeltachtaí are mainly realised with a nuclear falling contour (H\*L %) as in Standard British English (Wells, 2006) and as was shown in figure 4.

	<b>Dublin</b>	<b>Galway Gaeltachtaí</b>
<b>Statements</b>	L* %	H*L %
<b>Yes-no questions</b>	L*H %	L*H %
<b>WH-questions</b>	L* %	L* %
<b>Declarative questions</b>	H* % or L*H %	L*H %
<b>Emphatic statements</b>	L*H L%	H*L %

Table 2: Main tones used for each sentence type in Dublin (based on Bongiorno, 2021) and Galway Gaeltachtaí (based on Théveniaut, ongoing).

What is also worth noticing is that, even though the main tone for yes-no questions is L\*H % in both varieties of English, there is a majority of falling tones for this sentence type in Galway (54% overall with different tones combined). This predominance echoes the results found for South Connemara Irish in the very same area (Dalton, 2008). We may thus wonder if there could be a possible transfer from the Irish language to the English language in a community of informants who speak Irish on a daily basis. This substrate influence would be worth investigating.

The different examples and comparisons given above show that the read sentences are very efficient when it comes to comparing different varieties of English. Much variability is found in the read sentences, which also helps investigating social variation.

As was mentioned earlier in this chapter, the original PAC protocol augmented with the tasks of the PAC-Prosody extension elicit various speaking styles. Studying the different ways in which people speak according to the context of speech allows a fine-grained prosodic description and helps understand what factors can lead someone to change the way they speak. The following section focuses rising tones in Dublin in various speaking styles.

### *3.3.A study of rising tones in various speaking styles in Dublin*

Three speaking styles are studied in this section: i) the image description, where the speaker is not directly talking to anyone but still trying to get the fieldworker's agreement on what is being said and on how the task is completed; ii) the read sentences (and more particularly the declarative statements), where there is no interaction at all; iii) the informal conversation where two speakers freely discuss a topic.

#### 3.3.1. Rising tones in three speaking styles

In the image description, a total of 565 tone units were annotated. Only declaratives, except for two questions, are uttered in this task by all the informants. This is the reason why we chose to take into account only the declarative sentences in the list of sentences of the reading task: the number of tone units reaches a total of 287 in this second speech style. For the informal conversation, 50 tone units were randomly chosen and annotated. The total number of tone units for the 3 speaking styles thus amounts to 902. Figure 5 shows the results for the three tasks in terms of rising and falling contours<sup>1</sup>, with no distinction between the various tones in each category. It is very clear from the figure that the proportion of rising tones is much greater in the image description than in the two other tasks. We expected very few rising tones in the reading of the declarative sentences, but the very few rises in the informal conversation are more surprising. This may be due to the very few data analysed (only 50 tone units chosen randomly). As for the image description, our hypothesis is that since the fieldworker is present, the informants use rising tones to seek feedback from them. The rises are used in this task for interactional purposes, as will be seen in the next subsection.

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<sup>1</sup> As explained for table 1, the static tones were included in the falling and rising contours for this study. Falling tones are L\* %, H\*L %, H\* L% and L\*H L%. Rising tones are H\* %, H\* H%, H\*L H%, L\*H %, L\*H H% and L\* H%. This will be discussed at the end of this chapter.

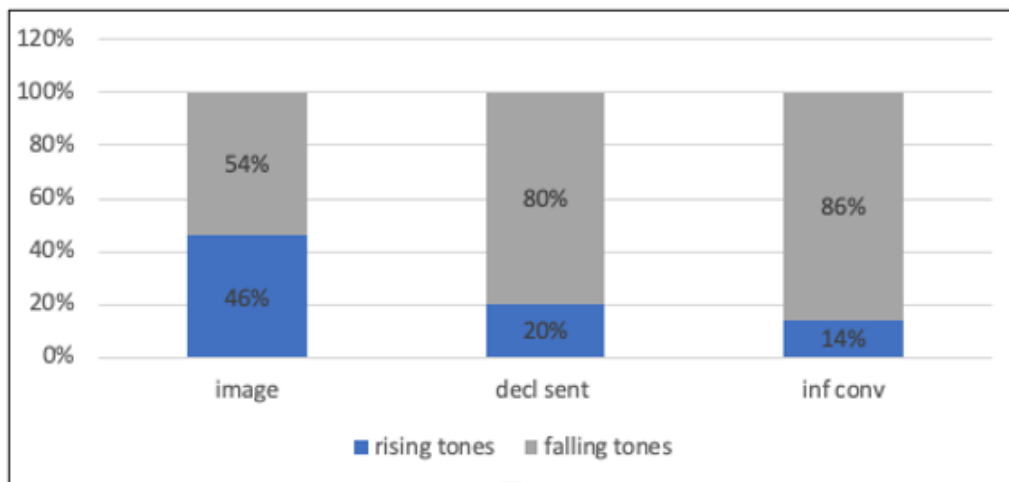


Figure 5: Proportion (%) of rising and falling contours in three speaking styles in Dublin English.

It is interesting to have a closer look at the various tones encountered in the three speaking styles, as shown in Figure 5, which gives the proportion of tones (given in Table 1) in each speaking style.

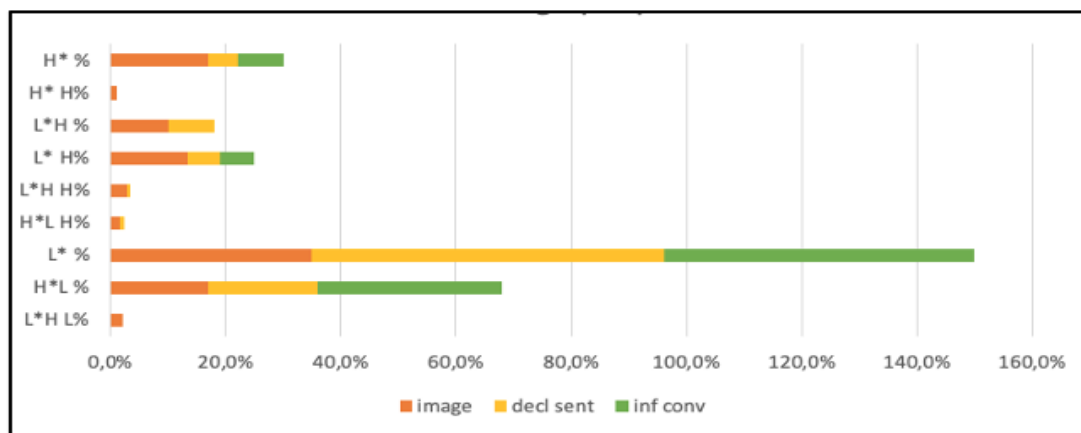


Figure 6: Proportion (%) of the various contours in 3 speaking styles in Dublin English

As in Figure 5, it is clear that falling contours (the last three in Figure 6) are prevalent here: L\* % is the most common tone found in DubE in the three speaking styles analysed here (44,5% of all the nuclear tones), followed by H\*L % (18,5%). Regarding rising contours, H\* % is the most common one across the three speaking styles. This is due to the fact that it is very present in the image description (17% of all contours in the image description and 36,5% of the rising tones realized in the image description) and in the informal conversation too (8% of all the contours and 57% of the rising contours). H\* % is not the most common rising tone in the reading of the sentences, where L\*H % is more common (although it only reaches 8% of all the nuclear tones of the reading of declarative sentences). L\* H%, the late rise, comes just after H\* % in the rising contours: it comes as the second rising tone in the image description and in the informal conversation, but not in the reading of declarative sentences. This is not surprising, since the reading does not solicit an interlocutor (see 2.2). Finally, L\*H % does not appear in the informal conversation, nor does H\*L H%, L\*H H% or H\* H%. This needs to be qualified again, since we have very little data for this task.

### 3.3.2. HRTs in four speaking styles in DubE

A qualitative analysis of the data allows the detection of rising contours which typically have an interactional function in discourse, namely High Rising Terminals (HRTs), also called upspeak or uptalk. These rising contours appear at the end of declarative statements and integrate discourse functions such as seeking feedback to make sure the interlocutor is following the conversation, asking for confirmation, trying to hold the floor, expressing linguistic insecurity or lack of confidence, etc. (see Warren, 2016, for a very detailed study of uptalk in many varieties of English).

In order to detect HRTs in the data under scrutiny and so as to avoid a circular approach, the analysis of the context and also the triggering of feedbacks were first taken into account (and not the phonetic form of the rise). A rising contour was thus categorized as HRT when the sentence was a declarative and when one of the interactional functions described in Warren (2016) could be detected thanks to the context and the possible presence of feedbacks. For the analysis of HRTs, a fourth speaking style was examined, the map-task (2 to 3 minutes of speech for each of the 15 pairs, *i.e.* about 40 minutes of speech).

### 3.3.3. Results in four speaking styles

All in all, 84 HRTs were extracted: 56 in the image description, 27 in the Map-Task, 1 in the reading of sentences and 0 in the informal conversation.

As explained above, we only studied 50 tone units (chosen randomly) for the informal conversation, so the result for this speaking style might be due to chance.

Only one occurrence of HRT was found in the reading task (Figure 7): the speaker stammers and confuses "three" and "trees". A pause can be heard (and seen on the figure) between the two words. The speaker produces an HRT, probably to make sure she has pronounced the right word the second time, as a request for validation that she has read correctly.

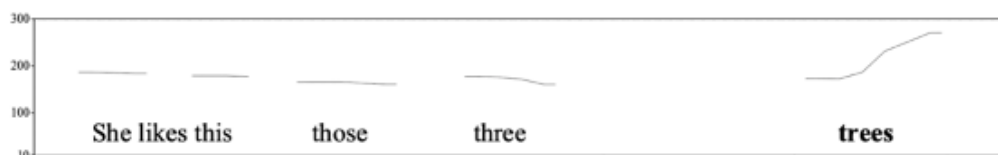


Figure 7: Only occurrence of HRT in the reading of sentences

As expected, HRTs appear at a greater degree in the speaking styles which involve 2 speakers, like the Map-task. As for the image description, this is the task in our corpus in which HRTs are the most numerous. This might seem surprising since there is not a real interaction, but it can be explained by the fact that the task is initiated by the fieldworker, who is present while the informant describes the image. The instruction given by the fieldworker was vague, so the informants certainly wanted to check if what they were saying was what was expected of them. Even if the informant is the only one to speak, they address the fieldworker when describing the image: this triggers HRTs with particular interactional functions, which differ from those of the map-task.

### 3.3.4. Interactional functions

The analysis of the interactional functions conveyed by HRTs in the Map-task and the image description reveals very interesting. HRTs seem to have two types of function in Dublin:

- In the Map-Task, HRTs are listener-oriented: the speaker (the guider) checks that the other participant understands the indications and follows them well.
- In the image description, HRTs are also addressed to the listener, but are more oriented towards the speaker themselves: the speaker checks that they are following the fieldworker's instructions and shows that they are only giving their opinion.

### 3.3.5. The forms of HRTs

Figure 8 shows the various rising contours found for HRTs in the map-task and the image description. Four tones, L\* H%, L\*H %, H\* H% and H\* % are found in both speaking styles, H\*L H% is only found in the map-task (only once) and L\*H H% is found only in the image description (6 occurrences out of 56, *i.e.* 11%). The most common tone is the late rise, L\* H% (44,5% of all HRTs in the map-task and 61% in the image description), followed by L\*H % (44,5% of HRTs in the map-task and only 19,5% in the image description). The least common tone is H\* %, with 2 occurrences in the image description and one in the map-task.

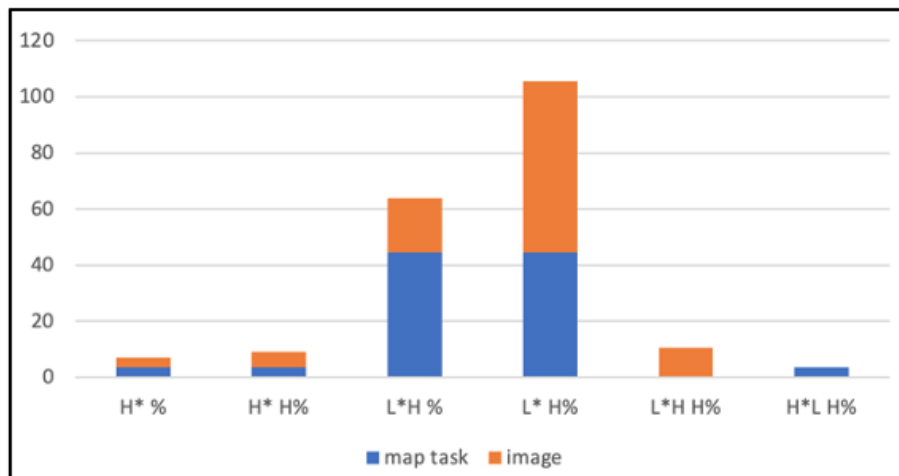


Figure 8: Proportion (%) of the various contours found for HRTs in the map-task and the image description in Dublin English.

We looked at the prenuclear contours as well. In the two speaking styles, the most common contour preceding the late rise (L\* H%) and the nuclear rise (L\*H %) is L\*. H\* L comes next. When looking at the phonetic form of the nuclear rise (available in the 4<sup>th</sup> tier of the IViE annotation), we can see that lLh and lLH are the most common forms, which means that the tone immediately preceding the rise is low and that the rise starts from low as well. A minute analysis of the HRTs produced by five speakers of the PAC-Dublin corpus (see Bongiorno, 2021 and Bongiorno & Herment, 2022) also proves that HRTs usually have a more dramatic rise (with a mean 50,4 %) than the interrogatives and the non-final tone units of the list of sentences. These results confirm previous studies on HRTs (see Warren, 2016 for an overview).

## 4. Discussion

First the static tones are worth discussing. As mentioned above, we included H\* % in the rising tones and L\* % in the falling ones. We could have left them apart as a separate category of static tones. We could also have followed Grabe (1998), who extends Gussenhoven's (1984) "complete linking" theory to nuclear accents and suggests that H\* % might be a falling tone whose trailing L tone has been deleted. The analysis of the other types of sentences of the list

(see Bongiorno, 2021) shows that questioning declarative sentences (ex: You think it's a good idea?) display a large proportion of H\* % (33%, making it the most common tone for this type of sentences), which reinforces the idea that H\* % is indeed a rising contour. H\* % is also the most common rise in non-final tone units of the declarative sentences (Bongiorno, 2021: 190). Since H\* % is scarcely used with the pragmatic functions of HRTs but is very present in the image description (see Figure 6), we suggest that H\* % in Dublin English is used for continuation mostly, along with L\*H % and L\* H% (see Wells, 2006). As for HRTs, the late rise (L\* H%) preceded by low prenuclear tones is the most common tone.

Second, the proportion of rising tones for HRTs in the map-task and the image description is interesting in relation with the interactional functions. The late rise (L\* H%) and the rise (L\*H %) are the most common contours, reaching when added 89% of the rising tones in the map-task and 81% in the picture description. But if we take a closer look at the other rises, L\*H H% (double rise) and H\* H% (high accent followed by a rise) are more numerous in the image description (even though few), which is more oriented towards the speaker, than in the map-task (more speaker-oriented). This might suggest that when the rise continues after the nuclear syllable (and does not make a plateau as in L\*H %), the speaker is more concerned about themselves and their performance or what is expected of them than about the listener. This is only just a hypothesis, as there were too little occurrences of these tones in our study.

## 5. Conclusions and perspectives

The PAC-Prosody protocol, along with the original PAC protocol, facilitates the study of several speaking styles and allows direct comparison of the intonation of different varieties of English. As shown in this chapter, the two varieties of Irish English presented here (Dublin and Galway Gaeltacht) differ from Standard British English (SBE), even though Dublin has often been described as quite similar to SBE regarding intonation.

Dublin English and Galway Gaeltacht English show similarities, but the latter seems to be more influenced by the Irish language than Dublin English. This is still a topic to be explored, as the linguistic situation in Ireland is complex. The influence the Irish language may have on the prosody of Irish English is one of our research perspectives.

Further comparisons between Dublin, Galway Gaeltachtaí and Galway city will be possible once the PAC-Galway corpus is fully annotated and analysed. It would also be interesting to record PAC corpora in other parts of Ireland in order to map the way intonation varies in the country. A PAC-Cork corpus is under construction by the three authors of this paper.

The PAC-Prosody protocol enabled us to perform a study of rising contours in various contexts of speech. Rises are found in all speaking styles, but in various proportions. This is not correlated to the degree of ecology of the speech style, it depends on the type of interaction. Contrary to what was expected, rises are not more common in the informal conversations analysed. However, too few data were taken into account for this speaking style, and further investigation is needed. Rises are far more common in the picture description task, where most of them have checking functions that can be associated to HRTs and have a particular phonetic form: low prenuclear tones, a rise starting from low and a great augmentation of the F0 curve. It is suggested that the form of the rise gives information about who the speaker is more oriented towards, but again further research is needed. A perception experiment could help test this hypothesis.

To sum up, 3 main rising contours are found in DubE:

- H\* % marks continuation, mostly in interactional speaking styles. It is very scarcely found in reading (where falls are prevalent).
- L\*H % is used for neutral questions (like yes-no questions) and also for HRTs.
- L\* H% is mostly used for HRTs.

It is undeniable that the study of speaking styles is crucial in the study of prosody and intonation. This paper is a contribution to a better understanding of these issues. We focused on rising contours but showed that falls are the most common contours in the speaking styles studied here. The next step will be to propose a more formal account of intonation contours, including falls, in all the speaking styles available thanks to the PAC-prosody protocol.

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