

First results of a lexical analysis and a prosodic parsing of English and Spanish speech in weather forecast news

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Introduction

The weather forecast is a ubiquitous and necessary part of daily life. It informs individuals and communities of upcoming weather patterns and helps them prepare accordingly. The presentation of weather information to the public is done through various media forms, such as radio and television, where presenters face the challenge of delivering meteorological information, thus attributable to an inherently scientific discipline, in an objective and rational manner, while also resorting to non-scientific and attention-grabbing features of speech. In the field of Linguistics and Media Studies, numerous studies have been conducted on the language and prosody of TV news broadcasts (Bell, 1991; Conboy 2007; Busà 2014), but little attention has been devoted to analyzing the peculiarities of weather-forecasting spoken reports. From a linguistic and prosodic point of view, it can be stated that there are several sim-

ilarities between these two forms of speech. Primarily, the pragmatic use of language to achieve specific purposes, by employing recognizable linguistic features, such as a technical jargon and a straightforward, declarative language structuring; prosody-wise, in both forms of speech presenters modulates their voice according to specific prosodic features, such as a higher speaking rate and recognizable intonation patterns, in order to communicate the information being delivered appropriately (Montgomery 2007). Still, the linguistic alignment of these two types of speech does not preclude the possibility of studying the language of weather forecasts in greater depth, whether these are considered as a subtype of the macro-genre of news bulletins, or as a genre in its own right (Moore Mauroux 2016; Romano 2018).

In this paper I summarize some key findings on this topic from an MA thesis I defended last July at

the University of Turin, based on experimental research conducted at LFSAG. For reasons of space, the article will not provide a comprehensive theoretical overview of the existing literature on media language and broadcast news speech. Nor will it be able to expand on how prosody is used in speech analysis (for a review of previous experimental research on television news speech styles see Brignone 2023). Instead, it will focus on the study conducted on some American and Spanish weather reports, first clarifying the materials and methods used in analyzing their lexical features, and then detailing the results of the analysis of the general differences in timing and prosodic parsing.

In particular, since this style of discourse requires reviewing the events of an entire day in different geographic locations and forces utterances to be connected in a limited time with rapid transitions, clear boundaries between intonational units are not realized. Specific sandhi phenomena and focal accents contribute to making prosodic parsing much less easy than in other styles of media discourse, and one of the results of the work was

precisely to illustrate under what conditions these «fusions» occur.

1. Models of reference for the analysis of weather forecasts

Before looking at data collection and analysis procedures, it seems necessary to briefly focus on two studies of weather forecasts, which served as models of reference for conducting my research.

The first study was conducted by S. Moore Mauroux in 2016 and focused on a corpus of UK weather forecasts recordings, which were analyzed by using acoustic analysis software PRAAT. The data collected were then interpreted through a lexical and a prosodic approach.

On the lexical front, text analysis revealed that the forecasts in question were characterized by a «varied register» made up of specialized terms, such as *pressure*, *system(s)*, *front(s)* among the most frequent, and «compound word formations» (multi-word units), like *low/high pressure system*, *cold/warm front*. Other than expectable references to weather events, such as *snow*, *cloud*, *temperature(s)*, other widespread lexical phenomena include geographical references to parts of the UK, most of times

accompanied by «directional or descriptive adjectives» like *southern/northern*, as well as a considerable number of time-related expressions denoting different parts of the day, and prepositions providing specific information about time and location. For instance, the term *through* appears more than 50 times, in expressions like *through the day/night*, and *across* is the tenth most common word in the corpus. Furthermore, there is a noticeable abundance of verbs that depict «movement, change or influence». Despite the use of a specialized jargon, in the weather reports analyzed there is evidence of more informal terms and expressions belonging to an oral register employed in conversational contexts, such as *struggle*, *chilly*, or set expressions like *we're not out of the woods yet*, as well as fuzzy expressions, namely *fairly* and *pretty*. One last characteristic that emerged from the analysis concerns the employment of collocations built through the pairing of one or more weather-related words that occur together repeatedly, thus creating fixed and predictable associations, *chilly temperatures*, or *outbreaks of rain* among the others (Moore Mauroux 2016: 5-6).

On the prosodic front, the focus of the study lay on intonation patterns, which were investigated in terms of pitch movement and nucleus in order to explore their roles in «discourse structure, topic change and highlighting». The examples illustrated by the author show that, when shifting to a new topic, intonational phrases tend to be subjected to a «pitch reset» process, meaning that the first element of the phrase, which is usually a connector like *and* or *but*, is pronounced on a higher pitch than the words coming before it. The initial high pitch then gradually decreases throughout the intonational phrase mirroring the anticipated decline and gradually decelerating towards the conclusion. Throughout the corpus, pitch modulation was also used to highlight certain pieces of information, specifically events, locations and tendencies, and also to create contrast or continuation between significant facts. Significant pitch variations were also associated with the nucleus, that is the central element of the phrase. The pattern illustrated shows a descending pitch on the nucleus beginning from a higher point, emphasizing its significance, whereas

the second nucleus experiences only a slight decline, suggesting it is considered to be less important than the preceding information. Even though many examples are provided in the article, findings clearly revealed that the primary prosodic indicator was a sustained high pitch, employed to signal both a transition and draw attention to a specific item within a given intonation unit¹. The shift in topic was often accompanied by a pitch reset, where the preceding intonation

unit concludes with a low pitch that contrasts with the subsequent intonation unit's initial high pitch. Moreover, inside intonation units themselves, it was common to observe a slower pace and/or a gradual pitch decline toward the end. Lastly, elevated pitch consistently served as a tool for emphasis, by highlighting various aspects such as the information itself, its scope, and degree of relevance. Similarly, high pitch was used to signify on-going or shifting trends, as well as to provide commentary on the information presented (Moore Maurox 2016: 8-11).

The second study, conducted by A. Romano in 2018, compared the speech of British weather forecasts (BBC) and the one of Italian weather forecasts (RAI), through the analysis of 38 audio files, with a total duration of about 22 minutes.

As far as lexical and syntagmatic composition is concerned, the

¹ Much knowledge in this field comes from the results of experiments presented in Gasser et al. (2019). They rely on the use of a corpus made up of sentences originally uttered by radio newscasters and rerecorded by readers with no prior knowledge of broadcast news delivery and instructed to read in a spontaneous and conversational way, and then compared to the original samples in order to identify the main prosodic differences between the two styles (Similar experiments have been conducted in Italy well before by Giannini & Pettorino 1999). A perception-based task was then designed, allowing participants to establish whether the audio recordings used and produced for the production experiment were traceable to news talk or to everyday speech. As regards the production experiment, data showed no significant discrepancies in pitch range and in the total amount of pitch accents, but a higher number of intonation phrases were found in newscasters' recordings (Gasser et al. 2019: 14-15). The results of the production experiment showed that participants were able to establish that the audio clips had been uttered by a newscaster with an average accuracy of 57.83%, and they

showed a higher ability to correctly identify newscasters rather than dismissing non-newscasters from the corpus, which might be due to the fact that recognizing newscasters' voices was an easier task than identifying others, and that other features that were not present in this study, such as discourse structure and lexical content could have been more effective indicators for the identification of newscaster speech (Gasser et al. 2019: 19).

major differences between the two types of weather forecast include a higher frequency of the names of the regions making up the UK territory, among others *England* with 32 occurrences and *Scotland* with 25; whereas, in the highest ranks, RAI data provided evidence of the name of only one region, *Sicilia*, with 6 occurrences. In line with Moore Mauroux's study, the BBC samples are rich in cardinal references (entries of nouns and adjectives referring to the four cardinal points are almost 100) and prepositional phrases constructed with *across* (26), *through* (19) etc.; RAI samples show a limited presence of cardinal directions, due to a preference for more detailed toponyms, linked to mountains, seas, or specific national areas, without preventing the use of more generic terms, such as *regioni* (regions), *parte* (part) and *area* (id.), which also occur in similar number in BBC weather reports. Regarding verb forms, in English, evolution and variation of weather events are primarily signaled by verbs like *see/seeing* (25), *go* and its different forms (18), and *get* (9); whereas in Italian, by *tendere* (tend to) and its different forms (17), *andare* (go) (10), and

arrivare (get) (8). Generally, there is correspondence between the names of the different atmospheric conditions (*rain/s* and *pioggia/e*, etc.), except for *snow*, which occurs 30 times in BBC forecasts, and *neve/nevicate* appearing at far higher ranks, and *sleet*, with no counterpart, as is the case with *temporale/i* (thunderstorm) in RAI forecasts.

On the prosodic front, momentary interruptions in the regular flow of speech are generally attributable to breathing needs or in any case to short and silent pauses, as hesitations and filled pauses are very rare. The number of short pauses is practically equal in the two groups of recordings, whereas long pauses, though rarely performed overall, are more numerous in BBC forecasts. As regards speech tempo, speech rate and fluency rate are higher in Italian weather forecasts (6,56 syll/s and 5,78 syll/s), and have a remarkable difference in numerical value; this incongruence is less marked in English (5,06 syll/s and 4,60 syll/s) due to a more balanced proportion between the expected syllables and those actually articulated. For what concerns intonation, the transcripts of the recordings were

segmented into utterance units and intonation units, in order to highlight potential discrepancies in how speech was structured and enunciated. Results showed that for both BBC and RAI, though more distinctly in English, rhythmic and intonational patterns tend to deviate from the logical and syntactical structure; this is a finding further reinforced by the fact that pauses and breathing-in moments do not recur with regularity, resulting in a performance misaligned with respect to phrasal structures and overwhelmed by discontinuous pausal interruptions. More specifically, Italian utterance units are characterized by a higher number of syllables (24 vs. 16 syllables) and, on average, a longer duration (3,75 vs. 3,24². Besides, BBC's utterance units consist almost entirely of one or three intonation units, whereas

in the RAI data, there is a predominance of utterance units containing four or five intonation units.

In conclusion, the Italian corpus is defined by a higher degree of formality, not only as a result of lexical and syntactic choices, but also of its prosodic structure, with longer utterances and less variable intonation units³; whereas BBC announcers opt for lexical, phrasal mechanisms attributable to a more colloquial style of speaking and prosodic modalities, leading to the general perception of a more effective and pressing rhythm, even though speech rate is higher in the Italian weather forecasts.

2. Methodology of the study

This section will be devoted to the description of data collection, as well as the instruments and procedures employed to conduct the analysis.

² Particularly for Italian, it seemed useful to take into account the diachronic changes reported by Giannini (2004) who was able to observe how, over the course of about thirty years, radio and television speech data showed a higher articulation rate and, consequently, an increase in the percentage of spoken material at the expense of the percentage of silence. This decrease is made even more evident by a consistent lengthening of the utterances, resulting from the practice of limiting «empty» moments to strictly necessary breathing pauses

and of prolonging the articulatory segments when possible. The final perception is that of a faster speech due to increased density and concentration of the verbal flow, as confirmed by a 50% increase in fluency (Giannini, 2004: 59).

³ This does not contradict what Giannini (2004; see previous footnote) observed: a lower silence percentage with fewer and shorter breaks, higher fluency index and speaking rate, indeed corresponds to relatively less intonational variation (see below).

2.1. Data collection and corpus composition

Since the aim of the present thesis is to explore how weather is linguistically reported in Spain and the USA, the material under investigation was divided into two different corpora: one consisting of American English weather forecasts and the other of Spanish ones. The data for this study were obtained online from two news sources: CNN, a major American news network, and RTVE, which is the Spanish national public broadcasting corporation responsible for producing radio and television programs and for operating several channels. The process of data collection covered a time span of about five months, from October 2022 to February 2023, even though the two corpora include four weather forecasts going back to August and September 2022 as well, which were selected at a later date in order to have an overview of the reports that could somehow match seasonal changes. The resulting corpora contains 16 weather-forecast wave (.wav) files, with 8 from CNN and 8 from RTVE. Every recording includes the full content of the weather bulletin, each of which is two to three minutes long in its integral form.

As can be seen from the figures summarized in the Appendix, the total gross time analyzed is 18 minutes and 49 sec of CNN speech and 17 minutes and 36 sec of RTVE speech, divided between eight American and 8 Spanish weather presenters respectively. The choice fell on certain weather bulletins according to two main criteria, the gender of the speakers and the duration of the forecasts. The first criterion allowed for a good variability in terms of gender-related acoustic features, making it easier to achieve a more comprehensive understanding of the results, while ensuring gender balance and avoiding bias; the second criterion resulted in recordings that were not exaggeratedly divergent in terms of time length, so as to ensure standardization and control of the amount of content, and to facilitate analysis, making it easier to compare the different features of the recordings.

2.2. Methods and tools for data analysis

Once the material was collected, all 18 speech samples were transcribed into text format in order to obtain overall visual feedback of the flow of speech and to facilitate

the subsequent transcription on speech-analysis software PRAAT. Afterwards, the actual analysis took place on two fronts, lexical and prosodic.

On the lexical front, weather forecast texts of the same language were merged into a single *MS Word* file (one for Spanish and one for American English) that was then screened out by using Antconc, which is a free and open-source corpus analysis software designed to explore language data through a range of text analysis tools (Anthony 2022). In the case of our research, *AntConc's Word Tool* made it possible to generate a word-frequency list equipped with multiple markers, including the rank and the total number of occurrences for each word, among others; it also enabled an efficient identification of co-occurring terms, common word patterns and expressions, through the *Cluster Tool*, the *N-Gram Tool*, and the *Collocate Tool*. Although this freeware allowed for a thorough level of text analysis, it was still combined with the use of the *Find* function on *MS Word*, as it facilitated the distinction procedure between tokens and types, the highlighting of larger portions

of texts, as well as enabling further proof regarding the presence of set expressions and collocations considered to be characteristic of the weather forecast genre.

On the prosodic front, the analysis was carried out with PRAAT, which is a widely-used software equipped with a range of tools that allow users to perform many types of acoustic analyses on audio data (Boersma & Weenink 2023). Consequently, the 18 wav-format recordings were uploaded one at a time onto the software, listened to and processed according to different modalities, depending on what elements were to be visualized.

Once uploaded, each audio file was listened to and processed according to a two-pronged approach: on the one hand, since a specific computer and acoustic tool was used, it seemed right to take on an experimental approach, especially with regard to more objective measurements, such as pause duration and different speaking rates; this, however, did not prevent to complement the analytical modality by resorting to a perceptual approach when this was needed or more suitable, e.g., for the detection of breathing or silent pauses, and

pitch patterns, always taking into account the risk of making choices based on evaluative arbitrariness or impressionistic assessments. Before illustrating the phenomena considered, some methodological and terminological clarifications are required. Firstly, as anticipated above, speech was segmented and annotated into three levels, or tiers. The first one, labelled UTT (utterance tier), entailing a subdivision into interpausal units, intended as a stretch of speech preceded and followed by silence; since there was only one speaker, the boundaries (/ /) were established either by breathing pauses (<bp> = <inspiration>), short pauses (<sp>) or, though rarely, by long pauses (<lp>). Care was taken to detect, thus not to consider as pause, the holding phase of plosive consonants, and to distinguish short from long pauses by calculating the duration of the two following syllables: if this value was greater than the duration of the interruption, a short pause was established; conversely, if the value was lower, then the pause was labeled as a long one (De Iacovo et al. 2020). The second tier, labelled INT (intonation tier), was created to divide the pho-

netic content of the utterances into intonation units, the boundaries of which were established according to auditory discernment by evaluating audible pitch changes and, if in doubt, by observing the pitch curve or, in cases of correspondence between perceived melodic movements and syntax, the semantic content of the utterances. The third and last tier, labelled SYLL (syllable tier), contains the syllabic scansion of the intonation units. The number of syllables was determined by following the traditional criteria of syllable division and by deciding, as a general rule, to count only the ones actually pronounced by the speaker. So called filled pauses were regularly transcribed and taken into account into the syllabic count, both those uttered due to momentarily poor speech planning and the ones linked to articulation phenomena (e.g., schwa realizations). On the contrary, syllables pronounced in an elongated manner were not counted because, algebraically speaking, it seemed reasonable to consider them as single even though they took up more time than expected in a given utterance context, and also because very few cases were found. Turning

now to the content of the analysis, by taking as a reference the studies already addressed before, the focus was placed on the rates at which speech occurred, the number of pauses made by different speakers and the intonational structure, with the ultimate aim of comparing the ways weather is reported in the US and in Spain; these, then, are the phenomena considered:

- speech rate: calculated by dividing the number of syllables by the total duration of the speech, excluding moments of noise and conversation between the weather presenter and other professionals, both found at the beginning and end of some recordings;
- articulation rate: obtained by dividing the number of syllables by the duration of all the utterance units, thus avoiding pauses;
- number of pauses and silence percentage within the whole speech;
- number of utterance units and number of intonation units they are composed of;
- syllabic composition of the intonation units;
- considerations regarding the most recurrent intonational patterns;

3. Results and discussion

3.1. Analysis of lexical findings

As far as lexical composition is concerned, the two corpora observed exhibit the following features. Focusing on the first 100 entries, in CNN texts, the content words with 10 or occurrences are weather, found at rank 19 and with 27 occurrences, followed by *degrees* (17), *storm* (17) at rank 29, *temperatures* (15) ranked 34, *snow* (13) in position number 39 and *rain* at rank 65. Other words related to weather or, more specifically, to atmospheric events occupy lower positions with very few occurrences. In RTVE texts, the highest-ranked content words are *temperaturas* (24), *día* (22), *mañana* (22), *nubes* (19), *grados* (18), *precipitaciones* (15) and many others among the ones with more the 10 occurrences, thus indicating a different composition and distribution of the words carrying semantic content if compared to the texts in American English.

Terms belonging to the specialized jargon of weather forecasting like *inches*, *system*, *front(al)* and *pressure* do not stand out within the corpus, since they are found at rank 39, 45, 128, 146, with 13, 12, 6, and 5 occurrences respectively, and are

usually found in multi-word formations such as *low-pressure system*, *storm system*, *cold front*, *low/high pressure*. Spanish counterparts, *sistema* (4), *frente* (5), *presiones* (1), are scarce, as can be seen from the number of their occurrences.

Direct references to geographical areas are sporadic as well, names of US states and cities can be found but with less than 10 occurrences (*Texas* is the highest one with 8). Similarly, indirect geographical references do not occupy high positions; cardinal points, adjectives or compounds including them are relatively low. For example, *North* reaches 17 occurrences in units like *northern*, *Northeast* and *Northwest*; we also have *eastern* (8) and *Midwest* (7). More general references like *area(s)*, *region(s)*, *part(s)* are detectable with, respectively, 12, 8, 6 occurrences are usually paired up with frequent prepositions like *across* (34). For what concerns Spain, names of geographical areas are not highly significant as well: within the first 100 entries, *Cantábrico*, *Canarias*, *Mediterráneo* occur 10 times, *Galicia* (9), *Baleares* (8); though, some cardinal points are slightly more frequent: *norte* (16), *sur(este/oeste)* (9), *este* (7). Gen-

eral references like *área(s)*, *región(es)*, *parte(s)* are, however very rare.

Temporal deixis is linked to words like *day(s)* occurring 20 times, *week-end* (11), *afternoon* (10), whereas the days of the week have, on average 3 occurrences. In RTVE's samples, *día* (22) and *mañana* (22) and *tarde* (15) rank high positions, week days occur 2 times on average.

Geographical and temporal items are usually paired up with frequent prepositions, like *across* (34), *through* (26) in English; in Spanish similar phrases are built up with, *durante* (16), *a lo largo de* (9).

In the context of verb forms, the evolution of atmospheric events is marked by verbs like *see/ing* (14), *go/ing/es* (11), *expect/ed* (10), *look/ing* (8), *come* (4), *pick (up)* (4). Focusing on Spanish, *ir (irán/va/van)* (33), *ver/vemos* (22), *dejar (dejarse/dejará/dejarán)* (13), *esperar (espera/mos)* (12).

Finally, it is worth pointing out that the American weather forecasts, from a lexical and syntactic point of view, were perceived by the author as intentionally more informal and spontaneous than the Spanish ones. In fact, constructions belonging to a more colloquial type of speech were found; among the most recurrent

ones, *keep an eye on, we could pick up...* and *let's time things out for you*; playful expressions were found in special occasions, with the intention of entertaining, such as *it will have impacts there for trick or treaters* in the Halloween forecast (see Brignone 2023: App. 3), and somehow creating a bond with the viewer, like *Many of us traveling home at the end of the week-end* in the Thanksgiving bulletin (see Brignone 2023: App. 6).

3.2. General timing

For a general representation of timing (speech rate and pause) we rely on a number of measures and assessments summarized below.

As shown in Figures 1, 2 and 3,

Spanish forecasters have a higher speaking rate than the American ones, both if taken individually and if averaged, and with a fairly considerable difference (RTVE: 6,34 syll/s, CNN: 5,12 syll/s); the same observations can be made if pauses are not counted, regarding the articulation rate (RTVE: 6,94 syll/s, CNN: 5,67 syll/s).

As regards pauses, it can be observed that, as expected, the largely prevalent pauses are the ones taken for physiological reasons (breathing pause <bp>), which are present in almost equal proportions in the American and in the Spanish weather bulletins (see Table below). Immediate-

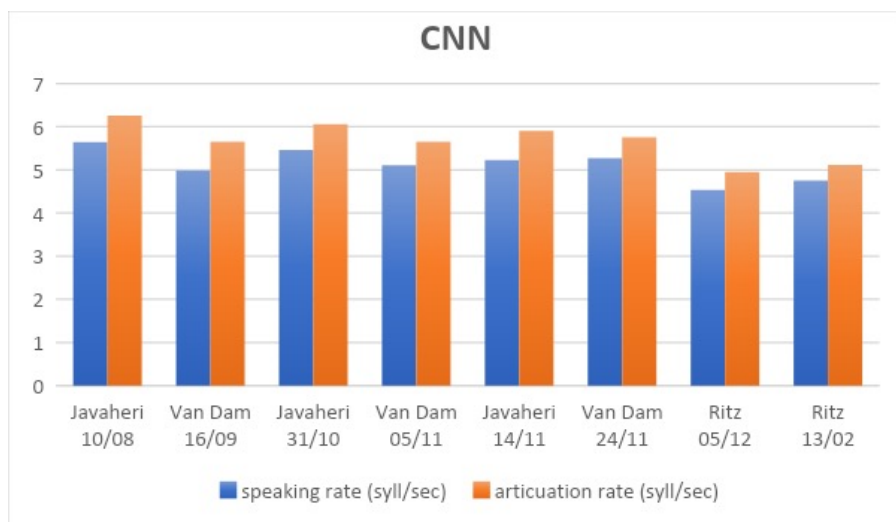


Figure 1 – Histogram: speaking rate and articulation rate of CNN's data.

ly following in numerosity, are short pauses, which are slightly more numerous in the US data (CNN: 67 vs. RTVE: 52). Long pauses are very sporadic, as are pauses containing hesitations in the form of mumbling (as already explained, so-called full pauses – *uh*, *uhm* – were considered as (non-)lexical entities and, therefore, regularly transcribed as parts of speech).

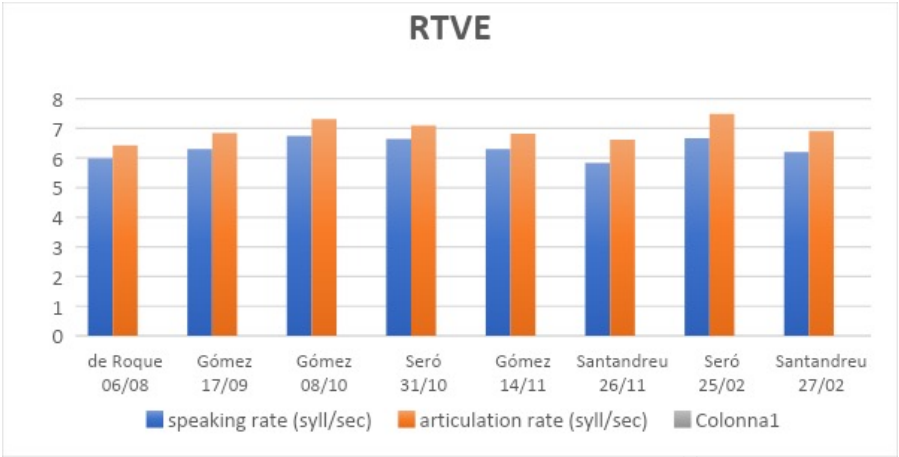


Figure 2 – Histogram: speaking rate and articulation rate of RTVE’s data.

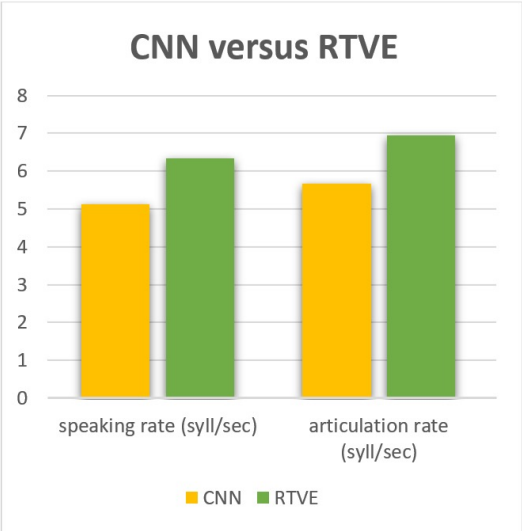


Figure 3 – Histogram: average speaking rate and average articulation rate of CNN’s data and RTVE’s data.

Table – Types and number of pauses
in the two corpora.

Type of pause	CNN	RTVE
<bp>	293	299
<sp>	67	52
<lp>	3	3
<sp hesitation>	3	1
<lp hesitation>	2	2

Ultimately, despite the differences just described, the time occupied by pauses and the time occupied by actual articulation are almost identical in both corpora: in the entire utterance, the percentage of silence is 10%, that of speaking is 90%.

It is worth making a few observations about the position of pauses within the speech, to understand how they contribute to its structure. As regards CNN weather speech, slightly more than a third of the breathing pauses are placed in the spots where, in written texts, a full stop would be placed, signaling a change in topic (see Brignone 2023: Appendix 6):

(1) *Don't drive over any flooded roads if some of that ponding does occur. <bp> Here's a look for the day on Sunday. / Many of us traveling home at the end of the weekend. <bp> And we do have*

a larger storm system that will be impacting the East Coast.

In RTVE's samples, the same phenomenon is present but to a lesser extent, in fact affecting about one-sixth of the total cases (see Brignone 2023: Appendix 13):

(2) *Como les decía, durante las próximas jornadas <bp> el tiempo seguirá revuelto, / sobre todo mañana con lluvias en prácticamente toda España. <bp> Durante la jornada del miércoles un nuevo frente <bp> entrará por el oeste del país, <bp> y el jueves parece que las lluvias <bp> también se extenderán / a prácticamente todo el territorio.*

The same occurs for short pauses; in American English, this affects about a third of the occurrences, as with breathing pauses (see Brignone 2023: Appendix 4):

(3) *You can see the Winter Weather alerts in place for so many / Americans at the moment, <bp> with uh lots of snowfall / with the series of storms moving through <bp> and, again, the heavy rainfall impacting places like Seattle <bp> as well as Portland. <sp> Here's a quick look at your temperatures for today.*

As far as Spanish is concerned, short pauses placed after a full stop to signal topic change are, on the contrary, quite uncommon, affecting only 10% of the total occurrences.

Moreover, in the CNN data <bp> + *uh* associations are very common: out of 26 occurrences of *uh*, the association appears 17 times, albeit concentrated in recordings of the same speaker. This leads to claiming that it is more likely a trait of the speaker's personal style rather than a general trend (see Brignone 2023: App. 2 and 6):

(4) *So <bp> uh we are going to look for some replenishing rains for that area, <bp> uh not necessarily a drought buster, but certainly, we'll take what we can get. / The rest of the country right now, <bp> looking nice / along the eastern seaboard, <bp> uh the Midwest OK as well. We do have se- / the potential for some <bp> uh heavier rainfall across the upper Midwest, particularly into Minnesota.*

(5) *The Pacific Northwest also anticipating <bp> uh some wet weather with high-elevation snowfall <bp> uh for places like Seattle to Boise to Billings as well. <bp>*

Temperatures for the day today, upper fifties / to around sixty degrees, depending on where you're located. <bp> And then taking you through the course of the weekend, <bp> uh that is where we anticipate / temperatures to remain / into the upper fifties to around sixty degrees for <bp> many of the East Coast cities.

In the rest of the cases and in both corpora, the different positions of the pauses are quite variable, which makes it possible to presume that there is no precise correspondence with a syntactic structuring of the discourse.

Through the calculation of the two speech rates, the laying-out of speech composition in terms of silence and speaking time, and the exemplification of the most recurrent positions of the pauses, the intention was to determine which of the two groups of speakers reported the weather faster and to understand how the scanning of pauses affected the structuring of speech and thus a listener's perception. In this respect, pauses, precisely because they are not always present in expected positions, contribute to the formation of a perceptually-irregular speech, a factor that will be further

developed by also considering the number of intonation units, their syllabic composition, and the pitch movements that characterize them.

3.3. *Types of units and prosodic construction*

Regarding the prosodic organization of the texts in American English and Spanish, our analysis and labeling yielded a quantitative sketch as follows.

Through the histogram of Figure 4 an attempt was made to relate two layers of speech structuring: the first is that of utterance units, and the second concerns the sub-level of intonation units.

As can be seen from the graph, most utterances are formed by 1, 2, and some of 3 intonation units, in both CNN and RTVE samples. The major differences are as follows: in the CNN data, 70% of utterances (270 out of 383) consist of a single intonation unit, whereas in the RTVE data, the percentage amounts to 40% (166 out of 369); in addition, Spanish utterances are segmented into 2 INTs in more than 40% of cases (120 out of 369) and into 3 INTs with a frequency of about 15%, whereas in American English, scanning into 2 or 3 units is more sporadic, in the former case 20% of UTTs are affected, in the latter case less

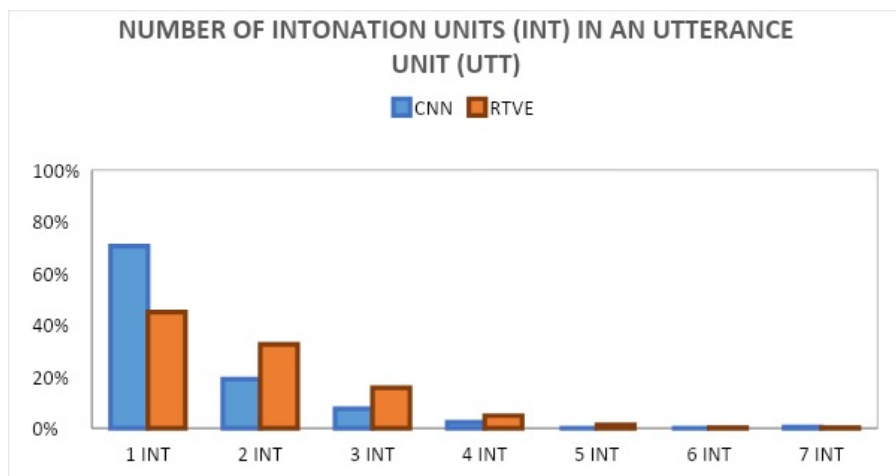


Figure 4 – Histogram: Percentage of utterance units formed by 1 to 7 intonation units in the two corpora.

than 10%. As the number of INTs goes up, the percentages decrease, with very few occurrences in the case of 5, 6, 7 INTs in Spanish data, almost none in American English. In general, it can be argued that the distribution of the different INTs is more spread out in Spanish texts, on the contrary, English texts predispose a more exponential decrease since the UTs are formed in the vast majority of cases by a single INT, and in a few cases by 2 or more INTs. Moreover, it is important to note that, contrary to expectations, the average intonation unit in American English is shorter than in Spanish (15,6 syllables in American English and 17,7 in Spanish). In this case, although Spanish intonation units tend to be slightly longer in terms of syllables, the overall speaking and articulation rates are higher in Spanish. This could indicate that a better spread-out distribution of utterances in more intonational units, and the fact that Spanish forecasters may pronounce individual syllables faster or speak with less pause between them might contribute to an overall higher speech rate.

3.4. *Recurrent intonational patterns*

Given the difficulties that will be highlighted in the following paragraphs, a systematic quantitative study was not conducted to bring out indices of differentiation between the two samples. However, as pointed out in Romano (2018) for Italian and British English, it immediately became apparent how the most recurrent phenomena in the analyzed speech data are not common to the two corpora.

3.4.1. *Continuation rise in Spanish*

From the analysis of pitch contour (blue line in the screenshots of the PRAAT graphic window), rising intonational patterns are frequently observed, thus establishing intonational boundaries by scanning the subdivision of utterances into continuative intonational units.

An example of an expected parsing is in Figure 5, where three rising pitch contours, albeit with different degrees of slope, correspond to four intonation units.

Another example is shown in Figure 6, where it can be seen, in particular, that the first part of the third interpausal unit (highlighted) is characterized by a clear rising intonational movement that makes it

possible to establish an intonational boundary, clearly visible on the spectrogram, as well as audibly per-

ceptible. However, within this unit, the first word – which has been separated from the preceding ele-

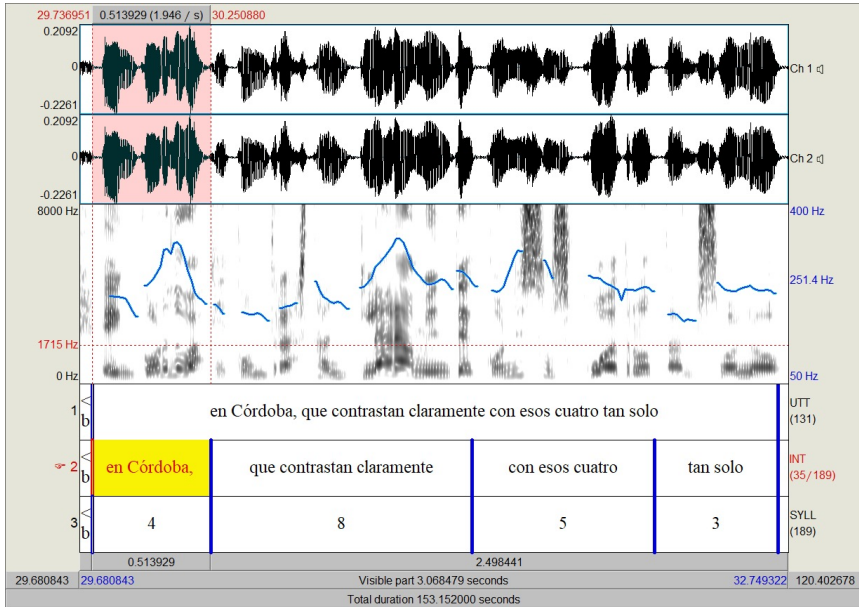


Figure 5 – Nùria Seró 25/02: rising pitch contours in RTVE data

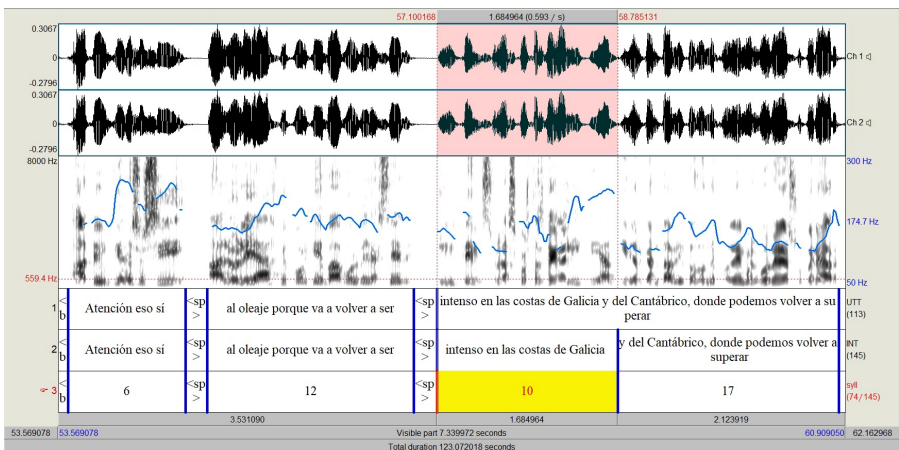


Figure 6 – Marc Santandreu 26/11: rising pitch contours in RTVE data

ments of the syntactic phrase on which it depends – is realized with a specific intonation contour that is well connected to the following pattern.

The same phenomenon is found in the unexpected fusion between *Cantábrico*, on which a residual continuation function is perceived, and the following unit.

3.4.2. *Downstepping and non-terminal units in English*

Rising intonational patterns do apply to American forecasters as well, but to a lesser extent, as intonational boundaries are signaled by pitch phenomena that are quite variable depending on their position and, therefore, not recurrent enough to establish a general trend. Below are some examples of pitch profiles variation.

In these examples, the highlighted utterance is characterized by a pitch that goes downward, underscoring a depletion of energy as one approaches the end of the unit (a phenomenon also reported in Moore Maroux 2016 and well documented in more general intonation studies). However, focusing on the sub-level of the intonation units, it is clearly visible that they

downstep as well. On a perceptual level, this phenomenon gives rise to an initial higher pitch segment followed by units collapsing without clear boundaries (on a lower pitch) (Figures 7 and 8).

Very long utterances depend on such a general attitude to connect intonation units (and sub-units) without any clear boundary marker. A progressively downstepping intonational pattern is associated to a depletion of energy, but it is regularly marked by more or less pronounced pitch accents confined to smaller units. Pitch movement is here associated with the nuclei of the utterance, as a way for prosodic prominence to pointing out significant parts of the information. In Figure 8, H* pitch accents are aligned with *pressure*, *mid-Atlantic*, *snowfall*, *early* and *morning*, thus emphasizing all the essential elements for understanding the content of the message.

In Figure 8, the first intonational unit has a rising pitch that creates a suspended intonational movement, which is then followed by a second closing unit: the pitch drops sharply to signal the end of the information produced up to that point. However, despite the end of the

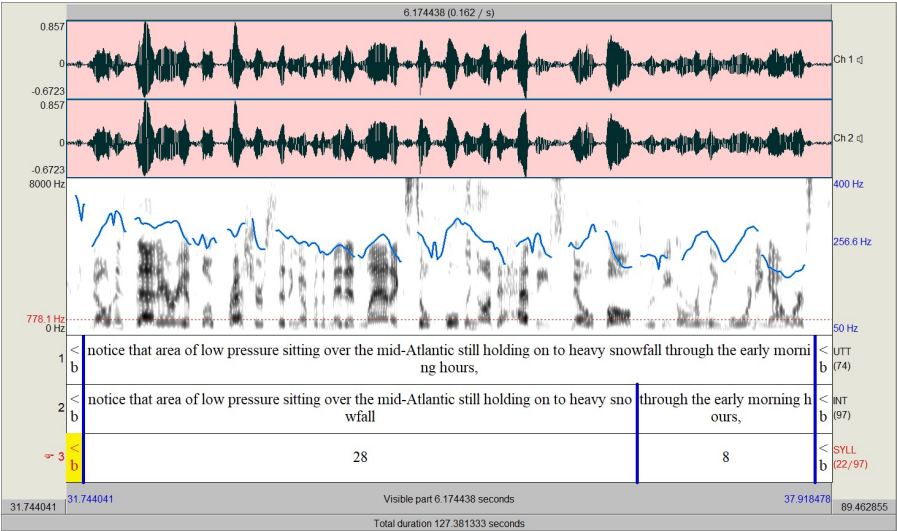


Figure 7 – Britley Ritz 13/02: Pitch contours in CNN data.

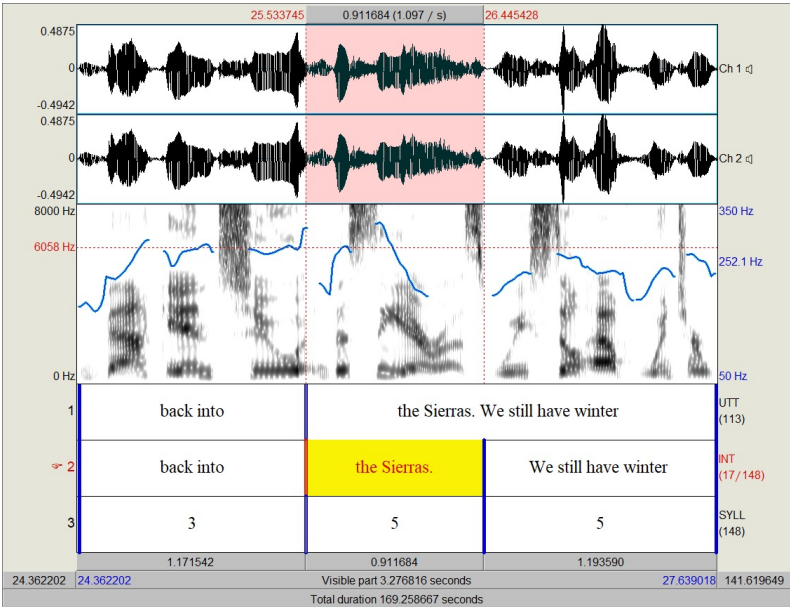


Figure 8 – Britley Ritz 05/12: Pitch contours in CNN data.

subject signaled by a full stop, the utterance does not yet end, but has a third intonational unit in which the new piece of information is already introduced, and will be developed in the next utterance.

3.4.3. Unit connection in Spanish

As for the Spanish data, it is necessary to report some examples, in which a similar intonation sandhi phenomenon may be illustrated at even major textual boundaries. It was difficult to establish intonational boundaries, which were discernible by ear, but not clearly placeable because of articulatory phenomena involving contiguous words and arising precisely on those supposed boundaries. Some of them are illustrated below. Figure 9 shows an example of a vowel encounter between two items – *repite* and *En* – at an expected terminal intonation boundary. The highlighted segment identifies the two vowels, instead of being pronounced separately, collide and merge into one, thus hindering the boundary between two audible intonational movements, signaled at the level of punctuation by the full stop, which could have been useful for clearer speech scansion, also in

view of the following topic change.

In Figure 10, the perceived change in intonation between *lluvias* and *ya* does not correspond to a separation at the segment level, since the speaker does not completely realize the two separate sounds corresponding to the voiceless fricative /s/ and a /ʎ/-type approximant: the continuation profile signalled by the rising-falling pitch movement on the first syllable of the word *lluvias* dissolves into the initial profile of the following parenthesis unit (Figures 9 and 10).

With these examples I tried to show how intonation parsing interacts with segmental phono-syntactic phenomena and affect the prosodic patterning of utterances: intonation boundaries are many and varied within the Spanish data. In any case, since these phenomena are subject to perceptual and subjective interpretation, I chose, as a general rule, to establish only one intonational unit, rather than two.

From a prosodic standpoint, the analysis of speech rates showed that both CNN and RTVE weather presenters tend to speak fast, but, with an almost equal number of pauses, the latter are characterized by higher speaking and articulation

rates, thus leading to the perception that Spanish is a faster language. Moreover, the acoustic analysis conducted through Praat demonstrated that American forecasts feature utterances largely formed by a single intonation unit. This holds true for Spanish forecasts as well, but with a more equally spread-out distribution, as, in comparison, they display a higher number of utterances including multiple intonation units. The more melodically-cadenced proceeding of the latter is not to be found, however, in the syllabic composition, since

Spanish intonational units consist, on average, of a higher number of syllables than American English ones. Nevertheless, although Spanish intonation units tend to be slightly longer in terms of syllables, the overall speaking and articulation rates are higher in Spanish. This could indicate that a better spread-out distribution of utterances in more intonational units, and the fact that Spanish forecasters may pronounce individual syllables faster or speak with less pause between them might contribute to an overall higher speech rate.

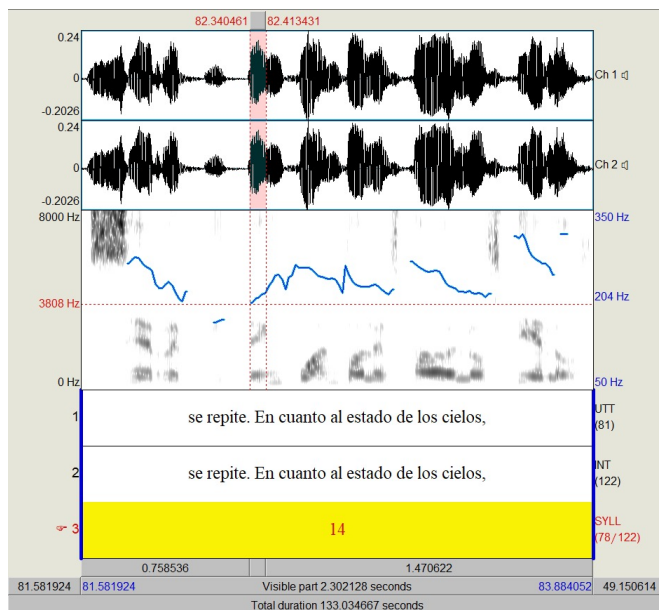


Figure 9 – Ana de Roque 06/08: Intonation sandhi phenomenon avoiding the realization of a boundary.

Focusing on intonation, Spanish forecasters modulate speech and, consequently, information through a higher number of final rising intonational contours, whereas international boundaries in CNN texts are signaled by more variable pitch phenomena. Finally, the acoustic analysis highlighted varied phono-syntactic phenomena involving contiguous linguistic items in close proximity to intonational boundaries, thus making it difficult to establish clearly-distinguished intonation units, especially in RTVE weather forecasts.

Conclusions

As a result of the analysis of a corpus of recordings related to the weather forecasts of TV networks CNN and RTVE in the period August 2022-February 2023, we were able to detect, with the same time of organization of the broadcast and under conditions of minimal textual genre variability, interesting differences in lexical choices and spatio-temporal references (only partly attributable to the two different territories involved).

Even more interesting proved to be the study of the different modes

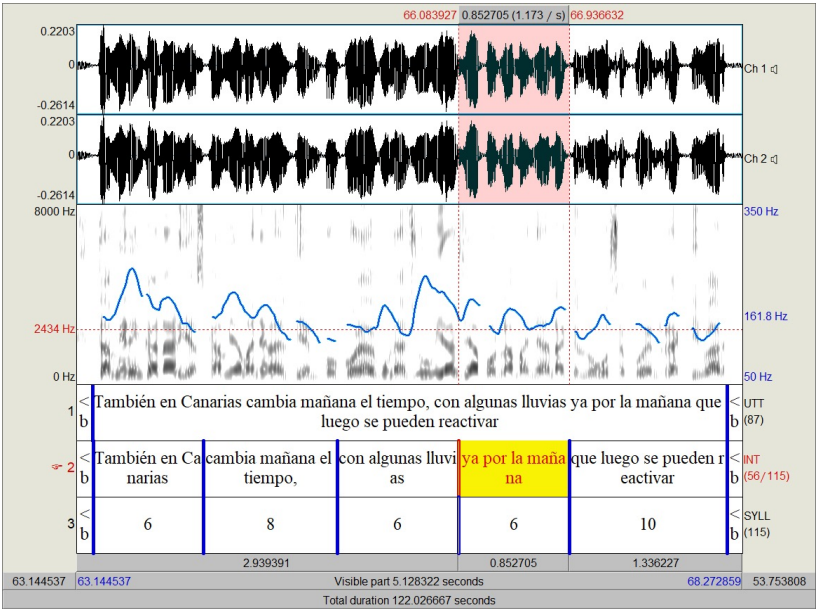


Figure 10 – Andrés Gómez 17/09: Difficult placement of the intonational boundary.

of enunciation adopted by the studied speakers. While the two groups of announcers did not presented relevant differences in terms of fluency, the recorded eloquence speeds suggest that Spanish speakers are generally faster. This is reflected in interesting prosodic contact fusion phenomena between units, making it difficult to measure an index of utterance construction in terms of intonation units along the lines of the study conducted by Romano (2018). While there is a frequent use of continuation units as a typical strategy used in Spanish (with a dominance therefore of non-terminal rising contours), a connection strategy by American speakers is also asserted that leads them to articulate longer and less articulate utterance units. Within the regular downstepping that occurs in these cases, there are thus lower-level units signaled by pitch accents that recur with greater regularity (cf. Moore Mauroux 2016).

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APPENDIX

Table 1 – Corpus of CNN’s weather forecasts.

SPEAKER	DATE	DURATION [s]
Pedram Javaheri	August 10, 2022	121,173
Derek Van Dam	September 16, 2022	164,779
Pedram Javaheri	October 31, 2022	109,888
Derek Van Dam	November 5, 2022	127,381
Pedram Javaheri	November 14, 2022	141,227
Derek Van Dam	November 24, 2022	168,277
Britley Ritz	December 5, 2022	169,259
Britley Ritz	February 13, 2023	127,381

Table 2 – Corpus of RTVE’s weather forecasts.

SPEAKER	DATE	DURATION [s]
Ana de Roque	August 6, 2022	133,035
Andrés Gómez	September 17, 2022	122,023
Andrés Gómez	October 8, 2022	125,312
Nùria Seró	October 31, 2022	140,715
Andrés Gómez	November 14, 2022	132,523
Marc Santandreu	November 26, 2022	123,072
Nùria Seró	February 25, 2023	153,152
Marc Santandreu	February 27, 2023	126,823