

# Article **Acoustic Correlates of Subtypes of Irony in Chilean Spanish**

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Abstract: Utterances containing verbal irony display prosodic particularities that distinguish them from non-ironic speech. While some prosodic features of irony have been identified in Spanish, previous studies have not accounted for different subtypes, nor have they examined this phenomenon in Chilean Spanish despite the unique intonation patterns in this dialect. This study examined the acoustic and prosodic correlates of five subtypes of irony (jocularity, rhetorical questions, understatements, hyperbole, and sarcasm) spontaneously occurring in the casual speech of sociolinguistic interviews with fifteen Chilean women. We segmented 3907 syllable nuclei from 197 spontaneously occurring instances of irony and compared the syllables within the ironic utterances to those in the pre-ironic utterances, along seven acoustic and prosodic variables: pitch range, duration, F0, F1, F2, H1\*-H2\*, and HNR. The results showed that the speakers favored jocularity and did not produce sarcasm or understatements, and that jocularity, hyperbole, and rhetorical questions significantly differed from the baseline utterances along a variety of acoustic and prosodic measures. We argue that these cues contributed to marking the ironic utterances as salient, allowing these women to talk about difficult real-life events with a touch of humor. Our study provides additional evidence for the connection between prosody and pragmatics in Chilean Spanish and lays the groundwork for further examination of irony and prosody in this and other Spanish dialects.

**Keywords:** conversational humor; irony; prosody–pragmatics interface; spontaneous speech; voice quality

# 1. Introduction

Prosody contributes significantly to our understanding of pragmatic meaning, as utterances can be interpreted in various ways depending on their prosodic features (Escandell-Vidal and Prieto 2020; Wichmann and Blakemore 2006). Speakers' phonological choices provide important contextual information beyond the literal word meaning, including focus or information status, illocutionary force, and affective meaning (Cole 2015). Studies on conversational humor, especially those focusing on verbal irony, have addressed this phenomenon as an intersection between prosody and pragmatics because ironic utterances, which are characterized by being humorous and indirect (i.e., often involving saying something different than what is meant), vary significantly from non-ironic utterances in terms of rhythm, duration, pitch (F0), amplitude, and voice quality (Bryant 2010).

Verbal irony is a form of conversational humor that is recognized as mockery by the audience (Goddard 2018) and involves an inconsistency or contrast between a verbal expression and a situation in which a speaker "directly refers to prior statements, predictions, expectations, or desires in the midst of the current situation that violates those statements" (Colston 2000, p. 98). Such discrepancy between expectation and reality is conducive to a good feeling or laughter, and serves a variety of pragmatic functions, including mitigating criticism or conveying solidarity (Davies 2004; Gibbs 2000; Gibbs and Colston 2007). From a sociocultural perspective, research has also identified that verbal irony can manifest and be interpreted differently based on factors such as the interlocutors' common ground, social



Citation: Bolyanatz, Mariška, Abril Jiménez, and Isabella Silva DePue. 2024. Acoustic Correlates of Subtypes of Irony in Chilean Spanish. *Languages* 9: 22. https://doi.org/10.3390/ languages9010022

Academic Editor: Elena Babatsouli

Received: 29 August 2023 Revised: 8 December 2023 Accepted: 3 January 2024 Published: 10 January 2024



**Copyright:** © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https:// creativecommons.org/licenses/by/ 4.0/). distance, gender, and occupation (Colston and Lee 2004; Dews et al. 1995; Gibbs 2000; Jorgensen 1996; Lee and Katz 1993; Katz and Pexman 1997; Kreuz and Link 2002; Pexman et al. 2000; Pexman and Olineck 2002; Pexman and Zvaigzne 2009).

The aim of the present paper is to contribute to scholarship on the prosody–pragmatics interface and examine how prosody in female talk contributes to the creation of pragmatic meaning of verbal irony in Spanish. That is, this paper offers an acoustic analysis of a pragmatic phenomenon. Our study examines naturally occurring ironic utterances in the casual speech of 15 Chilean women residents of La Pintana, a low-income Santiago neighborhood. The conversations revolved primarily around relationships with friends and family members and talk about the local community, with the aim of eliciting vernacular speech for an unrelated project. However, topics such as neighborhood-based discrimination and drug addiction and violence in the community also arose spontaneously. In this paper, we examine the frequency of the subtypes of verbal irony in our data, namely jocularity, rhetorical questions, understatements, hyperbole, and sarcasm (following Gibbs 2000), and provide a detailed analysis of how each subtype manifests prosodically in contrast to the speech that comes before it.

Though this paper does not compare the use of verbal irony across genders or levels of social distance and status, our findings are representative of conversations between unacquainted women (i.e., interviewer and interviewees). Thus, we would also like to acknowledge up front the positionality of the interviewer (the first author) and the interviewees. Specifically, the interviewer was a white, cisgender, L1 English speaker from the United States, who was privileged to speak to these women during fieldwork in 2015. As we describe later in this paper, the women belong to a marginalized community: they are women of color and find themselves in a precarious socioeconomic situation. Though they received payment in return for their participation, we acknowledge that this interview structure was inherently unequal.

Surprisingly, studies of the prosody–pragmatics interface are relatively uncommon in Spanish, a language which is known to use intonation largely for pragmatic purposes, as suggested by Regan (2016, p. 212). By focusing on Spanish, we address this significant gap in the literature. Furthermore, we chose to work with Chilean Spanish because its prosody is fairly understudied in spite of its unique intonation patterns, such as the "hat patterns" or "intonational plateaus" noted by Rogers (2013) and Rogers et al. (2020). Similarly, little is known about the other prosodic features of this Spanish dialect (Peralta 2021). Additionally, the Chilean dialect that is often represented in linguistics research focuses on the normative variety. Other voices, such as those from marginalized communities in the Chilean capital city outskirts, are invisible. Finally, while scholars working in pragmatics are aware of the important contribution of prosody, to our knowledge, no study has teased apart the different manifestations of irony and characterized the acoustic properties of each type. Our approach to the study of irony enabled us to uncover subtle differences within this phenomenon at the discursive and suprasegmental levels from within naturally occurring instances of irony.

# 2. Background

## 2.1. Social and Pragmatic Aspects of Irony

Irony is a humorous trope with recurrent appearances in conversations (Gibbs 2000; Gibbs and Colston 2007). It encompasses a set of related phenomena that involve a discrepancy or contrast between what is said and what is meant, or between reality and expectations, and hearers must "reconcile the incongruity between what speakers say and imply when using irony" in order for it to be humorous and successfully interpreted (Gibbs et al. 2014, p. 575). Although irony was traditionally regarded as an aggressive form of communication (see Lapp 1992 for reference), it has also been described as a politeness tool to mitigate face-threatening acts (see Barbe 1995; Brown and Levinson 1987). Today, irony is well accepted as a form of conversational humor (Norrick 2003), in which both aggression and politeness may coexist (Kotthoff 2009), and which is only recognizable as

humorous if there is common ground (i.e., shared beliefs, knowledge, and suppositions) between the interlocutors (Clark and Carlson 1981).

Previous research in English and in Spanish has identified different motivations and pragmatic functions of irony. For instance, findings have suggested that irony allows speakers to be humorous and protect themselves by creating distance or dissociating from what was expressed (Jorgensen 1996; Rosales Sequeiros 2011), to reduce threat (Colston and O'Brien 2000), to emphasize the common ground (Kreuz et al. 1999), and to build group closeness (Kotthoff 2009). However, Gibbs (2000) also noted that previous research has failed to recognize the diversity of ways in which irony is used in conversation, and that there is also a lack of quantitative research addressing this topic in detail. Some of the limitations of previous research are related to a lack of consensus on what constitutes irony and what does not. For instance, while some scholars differentiate verbal irony from understatements (e.g., Colston and O'Brien 2000) and sarcasm from irony (e.g., Kreuz and Glucksberg 1989; Lee and Katz 1998), Gibbs (2000) proposed that irony is the umbrella under which sarcasm, understatements, and many other types of figurative language belong.

In his study about ironic talk among English-speaking friends, Gibbs (2000) suggested that there are five main forms of irony: jocularity, rhetorical questions, hyperbole, understatements, and sarcasm (Table 1, below, provides the definition of each subtype). This study also analyzed how ironic utterances were perceived by the hearers. The results revealed that the hearers perceived ironic utterances (regardless of the category to which they belonged) as involving mockery with humor, but only sarcasm was heavily perceived as carrying some level of criticism. The author also pointed to the use of irony to convey a wide range of both blatant and subtle meanings in interpersonal communication, as well as the prevalence of jocularity over other types of irony.

Type of Irony	Definition	Pragmatic Function
Jocularity	Teasing of some person, object, or event in a playful way.	To playfully challenge the addressee's mental alertness (Goddard 2006).
Rhetorical question	Questions for which explicit responses are not expected.	To convey a humorous or critical assertion about a person or situation (Gibbs 2000; Leggitt and Gibbs 2000).
Hyperbole	Exaggerating the reality of a given situation.	To express surprise by exaggerating to emphasize the contrast between reality and expectation (Colston and Keller 1998; Claridge 2011; Colston 2017).
Understatement	Stating far less than what the situation obviously merits.	To protect the speaker's face by de-emphasizing a situation (Colston and O'Brien 2000).
Sarcasm	Talking positively to convey a more negative meaning, often involving criticism.	To ridicule a specific victim (Lee and Katz 1998).

**Table 1.** Types of irony and definitions provided by Gibbs (2000), and their pragmatic functions according to several scholars.

In a different study about emotional responses to irony by Spanish speakers from Spain, Tritou (2021) found that different types of verbal irony triggered different reactions. The author asked the participants to read different scenarios that contained five types of ironic utterances (sarcasm, overstatement, understatement, satire, rhetorical questions) as responses to each scenario. The participants then had to report the emotion that each ironic response had evoked in them, ranging from more positive emotions such as amused and warmhearted, to more negative emotions such as sad, angry, fearful, anxious, disgusted, and scornful. The results showed that satire and understatements tend to trigger positive reactions because they employ humor without directly challenging the addressee. In contrast, sarcasm, overstatements, and rhetorical questions are more likely to trigger negative reactions instead, as they challenge the addressee more directly.

Other studies have also addressed the pragmatic functions of different irony subtypes, as synthesized in Table 1. Collectively, these studies show that sarcasm and rhetorical questions seem to be perceived as more aggressive, critical, and negative than jocularity, hyperbole, and understatements, which are generally perceived as funny, playful, and thus, more innocent.

Several studies that have focused on one or more of the aforementioned subtypes of irony have provided valuable examples to distinguish between them. Examples 1–5, taken from several sources, provide sample ironic utterances for each subtype in English, while Examples 6–10 provide examples in Spanish with their respective translations:

## Examples from English:

- 1. *Jocularity*. A speaker calling out loudly at a tennis champion, Martina Hingis, who is performing excellently:
  - "Lift your game, Martina!" (Goddard 2006, p. 65).
- 2. *Rhetorical question.* A speaker who is unhappy about having guests in their house: "Isn't it so nice to have guests here?" (Gibbs 2000, p. 13).
- 3. *Hyperbole*. A speaker having a difficult day and saying:
  - "Oh my gosh, it's the sunniest day of my entire life!" (Aguert et al. 2017, p. 2).
- 4. *Understatement*. A speaker reducing a significant problem, such as forgetting their wallet at a crowded checkout, to a slight dilemma:
  - "Well, this presents us with a slight dilemma" (Colston and O'Brien 2000, p. 1567).
- 5. *Sarcasm.* A speaker noticing that the grass was not cut when it was supposed to be: "I see you mowed the lawn again today!" (Jorgensen 1996, p. 620).

## Examples from Spanish:

6. *Jocularity.* You arrive late to a meeting and ask your co-worker to cover for you. Your colleague says:

*Si fuera por ti, ¡te perderías tu propio nacimiento!* 

- "If it were up to you, you would miss your own birth!" (Tritou 2021, p. 69).
- 7. *Rhetorical question.* Someone accidentally breaks the neighbor's window while playing basketball:

¿No sabes que el cristal se rompe?

"Don't you know that glass breaks?" (Tritou 2021, p. 66).

- 8. *Hyperbole*. A student, who is reasonably clever, is praised for passing all her exams:
  - ¡Ayy qué lista es!
  - Sí, listísima.
  - "Wow, how clever you are!"
  - "Yes, very clever" (Ruiz Gurillo 2008, p. 52).
- 9. *Understatement*. A speaker spills ink all over his pants and comments: *Sólo es una pequeña mancha.*

"It is only a small stain" (Rosales Sequeiros 2011, p. 380).

10. Sarcasm. A person just lost a tennis match, and her sister says:

¡Rafael Nadal te aplaude!

"Rafael Nadal is clapping for you!" (Tritou 2021, p. 53).

Research has also found that irony and other types of indirect and figurative language are susceptible to sociocultural factors, such as social distance and power (e.g., Dews et al. 1995; Jorgensen 1996), occupation (e.g., Colston and Gibbs 2002; Katz and Pexman 1997), gender (e.g., Colston and Lee 2004; Gibbs 2000; Holtgraves 1992), age (e.g., Dews et al. 1995; Jared and Pandolfo 2021), and common ground (i.e., common attitudes and shared knowledge, suppositions, or beliefs) (e.g., Jorgensen 1996; Kreuz and Link 2002; Pexman and Zvaigzne 2009). For example, Dews et al. (1995) posited that the relationship between interlocutors strongly affects the interpretation of irony, and differences in age, sex, and race

might interfere in how ironic utterances are perceived. Similarly, Pexman and Zvaigzne (2009) suggested that social factors, such as the relationship type, determine how irony is used because speakers are more likely to make ironic remarks with interlocutors with whom they have established solidarity. Given that ironic remarks represent a risky behavior, a high level of solidarity in a relationship helps mitigate the risk, making the interpretation of ironic utterances more humorous. Although the role of age, power, occupation, social distance, etc., in the use and interpretation of irony have not been investigated in Spanish yet, previous studies have acknowledged that irony in Spanish is also mainly a contextual phenomenon (Escandell-Vidal and Leonetti 2014) and that it is dependent on cultural knowledge (Rosales Sequeiros 2011). In addition, it has been suggested that self-irony (i.e., ironic remarks directed to oneself) might be more common among Spanish speakers in comparison to speakers of other languages, due to the norms about individuality and acceptable self-image that exist in this language (Rosales Sequeiros 2011). Beyond this point, we can only speculate that other sociocultural factors attested in English also affect ironic utterances in Spanish.

In sum, irony involves a contrast between expected and ensuing events, allowing speakers to convey a variety of attitudes towards people, objects, and events, while distancing themselves from those stances by making use of humor. Furthermore, irony is a term that encompasses different subtypes of figurative language (e.g., jocularity, rhetorical questions, hyperbole, understatements, and sarcasm), each one fulfilling a different pragmatic function that can range from an innocent, playful statement to a deliberate criticism. Moreover, in the study of naturally occurring irony, sociocultural factors, such as social distance, must be taken into account as they determine how irony and other forms of figurative and indirect language may be used.

In addition to identifying ironic utterances based on the pragmatic functions they fulfill, according to Kotthoff (2009), contemporary research on irony has shown that prosody can help identify statements as ironic and humorous. Thus, we review the literature on the suprasegmental aspects of this phenomenon in the next section.

#### 2.2. Prosodic Characteristics of Irony

Scholars have determined that ironic utterances can be differentiated prosodically from non-ironic utterances by examining rhythm, duration, pitch (F0), amplitude, and voice quality, among other characteristics (Anolli et al. 2000; Bryant 2010; Cheang and Pell 2008; Gibbs 2000; Niebuhr 2014). For instance, Anolli et al. (2002) examined sarcastic irony versus playful irony (similar to Gibbs' sarcasm/jocularity distinction adopted in the present study) in Italian male voice actors' speech and found that sarcastic irony tended to have higher mean F0 values (fundamental frequency; perceived as pitch) and standard deviations than playful irony. In a study focused on English, Bryant (2010) examined ironic speech in conversational dyads among friends and examined five acoustic dimensions (mean F0, F0 standard deviation (SD), mean intensity, intensity SD, and mean syllable duration) across three moments: ironic utterance, preceding non-ironic utterance (baseline), and pre-baseline utterance. Bryant (2010) asserted that speakers significantly differentiate their ironic utterances from their baseline utterances, but that they do so in various ways (e.g., some speakers significantly increased their mean F0 over ironic utterances, while other speakers significantly decreased this measure). The only consistent finding across all speakers was that ironic utterances were produced more slowly (i.e., with a significantly higher mean syllable duration) in comparison with baseline utterances.

Niebuhr (2014), additionally, incorporated an examination of voice quality into their analysis of German sarcasm. In Niebuhr's data, sarcastic irony was characterized by more variable voice quality (often breathier) and a higher degree of segmental reduction than neutral speech. Leykum (2021) determined that ironic utterances in standard Austrian German tend to be realized with a slightly creakier, breathier, and/or rougher voice quality than literal utterances, and that these differences were more pronounced in older speakers

and among male speakers. Leykum (2021) also noted that the use of variation in voice quality to communicate irony is language and/or culture specific.

Only a few of the studies examining this prosody-irony connection have relied on naturally occurring speech, and even fewer have explored irony in Spanish. One exception to this is Ruiz Gurillo et al. (2004), who analyzed different types of irony in conversational Peninsular Spanish and who took as their primary F0 measure a speaker's deviation from their own mean F0. They suggested that ironic intonation (i.e., rising final inflectional patterns) is habitually present in ironic utterances, but it is not required for an utterance to be understood as ironic, as speakers lay out several linguistic and kinetic cues for irony that accompany the changes in prosody. These findings are in line with Escandell-Vidal and Prieto (2020, p. 157), who asserted that while speakers tend to use prosodic modulations in their ironic speech in Spanish, these modulations are not mandatory, "thus showing that the notion of a systematic 'ironic tone of voice' is oversimplified" (p. 157). Escandell-Vidal and Prieto (2020) advocate for the discovery of more systematic correlations between prosody and irony, while taking into account more specific speaker intent (p. 157). For this reason, one of the aims of the present paper is to examine the acoustic and prosodic correlates of a wide array of spontaneously occurring ironic utterances in Chilean Spanish, a previously unstudied connection.

## 3. The Study

Our study is similar in many respects to Bryant (2010), such as, for example, including the five irony subtypes proposed by Gibbs (2000). However, it differs in three important ways. First, instead of conversational dyads among friends, our data derive from casual conversations via informal sociolinguistic interviews, in which the interviewer and the interviewees were unacquainted. Second, our data derive from conversations in Chilean Spanish, allowing us to contribute to the body of work on the prosody–pragmatics interface in Spanish. Third, we examined more acoustic features than Bryant (2010), such as voice and vowel quality, to potentially discover additional systematic correlations between prosody and irony in Spanish (cf. Escandell-Vidal and Prieto 2020, p. 157).

To identify the most prevalent subtypes of irony and to determine what prosodic correlates of irony are obtained in Chilean Spanish, our study examined verbal irony in the casual speech of 15 female lifelong residents of the La Pintana neighborhood in Santiago, Chile. The research questions that guided our study were the following:

- 1. Which of the subtypes of irony (jocularity, rhetorical questions, hyperbole, understatements, and sarcasm) occur in our Chilean Spanish data?
- 2. How are these subtypes conveyed prosodically?

We posit that jocularity will be the most common form of irony in our data. Even though many studies on irony have generally suggested that sarcasm is the most common subtype in oral discourse (as noted by Gibbs 2000), we predict that given the nature of our speech sample, which involved an informal, conversational tone between two unacquainted women (interviewer and interviewee), sarcasm and the critical tone that accompanies this subtype might not be the one that arises the most in our data. In contrast, and following Gibbs (2000) and Brown and Levinson (1987), we expect that jocularity will be used as a mechanism that brings the speaker and the hearer closer together, allowing them to discuss serious real-life events with a touch of humor. We acknowledge that the interviewer is a foreigner from a privileged racial group, and an L2 Spanish speaker, who is not from the immediate local community. Thus, because the interviewer is an outsider in the community in multiple ways, this might affect the way in which irony is used.

The second hypothesis states that ironic utterances will be prosodically differentiated from non-ironic utterances via several measures. First, we expect longer syllable durations in all ironic utterances (cf. Bryant 2010). We also expect lower F0 (Rao 2013; Cheang and Pell 2008; Attardo et al. 2003) and differences in voice quality (Niebuhr 2014; Cheang and Pell 2008) in sarcastic utterances. Rhetorical questions are one of the subtypes of speech acts used by Gazdik (2022) in her examination of the use of the tag question *¿No?* in Peninsular

Spanish, and the author finds that nearly all occurrences of ¿No? as a tag question use a rising contour. For this reason, we expect to observe rising intonation (increased F0 toward the end of the utterance) in rhetorical question irony types. As previous work in Spanish has not explicitly included other irony subtypes, we generally expect that we may find differences along each of the five acoustic measures examined here (F0, F0 range, syllable duration, and two measures of voice quality, namely H1\*–H2\* and HNR, explained below). We also expect that some of these measures may overlap. That is, given that humor may be signaled in myriad ways, it is possible that the same measures may act in similar ways across different types of verbally ironic utterances, since prosody is a paralinguistic feature that "helps speakers communicate a wide array of affect and intentions" (Bryant 2010, p. 548).

#### 4. Methods

#### 4.1. Participants

The women featured in this paper all reside in La Pintana, a low-income community on the southernmost edge of the city of Santiago. The speakers (ages 18–66, M = 34.27; SD = 15.57) were recruited via previous connections with two local area NGOs, and all participants were compensated CLP 4000 (approximately USD 8) for their time. The community of La Pintana was officially established in 1981, and the majority of its residents were forcibly displaced from encampments located in higher-income communities between 1979 and 1989, during the Pinochet dictatorship (Gurovich 1989), which a few of the speakers alluded to in their conversations. La Pintana is one of the lowest-income communities in Chile, has a high poverty rate, and is relatively homogeneous, socioeconomically speaking (Agostini 2010).

Much of this background is represented by the speakers themselves. Nearly all of the speakers spoke about the socioeconomic challenges they have confronted in their lifetimes in La Pintana. For instance, one speaker spoke of not revealing where she lived to potential employers because of others' prejudices about the community relating to violence. Another mentioned issues with safety, and several spoke of the need to work multiple jobs in order to make ends meet. We include this information to reinforce why their voices matter to us: they are not typical participants in the broader Chilean discourse, nor are they represented by linguistic studies based in Chile, which primarily feature university educated professionals. Rather, it is our aim to amplify these voices, elevate their experiences, and epitomize their linguistic and pragmatic creativity.

#### 4.2. The Interview

Semi-structured interviews were conducted individually with the 15 Chilean women. Though the form of the interview represents a semi-structured elicitation protocol, we argue, similar to Eisenbeiss (2009, 2010), that this type of data collection encourages the production of spontaneous speech. The ironic utterances extracted from the interviews were considered to be produced spontaneously, since the interview was not designed to elicit this type of speech. In fact, the interview resembled an informal conversation between two unacquainted interlocutors. We follow Prins and Bastiaanse (2004, p. 1077), who defined the term spontaneous production as "speech that is elicited by an interview with open questions, in which the interviewer maintains a normal, informal, conversational mood".

The interviewer, who was in her late 20s, conversed with each participant for approximately 45–75 min on a variety of topics, including work, family and relationships, holidays, cooking, and personal history. According to Labov (1966), these topics contribute to reducing the observer's paradox by "emotionally involving" the speakers, thereby helping them to forget that they are being interviewed or recorded. Additionally, the participants were asked questions about local and timely events, such as Chilean Independence Day, as well as questions about the local context. For instance, all speakers were asked if they had ever been discriminated against, and how the local community had changed over the years. The original aim of the interviews was to create a corpus of variation of a particular consonantal feature of this Spanish dialect, and humor was not the focus of this data collection. All the recordings were carried out using an Olympus LS-14 Linear PCM recorder via an Audio Technica ATR 3350 lapel microphone, digitized at 44.1 kHz and a 16-bit rate, and all the recordings were carried out in quiet rooms at local community centers. Any portions of the recordings with ambient noise (such as car alarms) were excluded from the analysis, and the first 10 minutes of each interview were omitted to avoid speech produced during the potentially less comfortable initial stages of the recording session (Nagy and Sharma 2013).

# 4.3. Data Coding

All utterances coded as ironic involved a mitigated criticism of the self or others, some form of teasing, or a humorous statement in reaction to a negative reality. For example, in our data, instances of jocularity included playful teasing, banter, and softened insults. Example 11a shows a speaker's classmate playfully using an insult to express her envy, while example 11b illustrates a speaker jokingly addressing her emotionally detached son as her "prodigal son". Rhetorical questions are questions to which explicit responses are not expected but convey a level of criticism or mockery. In Example 12a, a rhetorical question is utilized to emphasize the absurdity of the interviewer's question, but the question itself softens the criticism. In Example 12b, another speaker reacts to a series of attacks carried out by her neighbor, asking herself what the purpose of the neighbor's actions was. Hyperbole is the exaggeration of the reality of a given situation with a humorous purpose. In Example 13a, a speaker mockingly exaggerates the feelings of extreme love, while in Example 13b, another speaker exaggerates the commotion she and her sisters cause at home by saying that they cause an earthquake. Interestingly, we did not find any sarcastic ironic utterances, in which the literal and intended meanings are opposite to some degree and mostly convey a criticism, nor did we find any examples of understatements, in which speakers convey their ironic messages by using a statement with far less weight than what the situation obviously merits.

- 11. Jocularity
  - a. From a speaker who traveled internationally, while her classmates were at school: [Pre-ironic utterance] Y yo subía fotos en el volcán y me decían [Ironic utterance] maldita y nosotras acá en clase.
    'And I was posting photos from the volcano and they were saying to me "damn you, and here we are in class!"
    A speaker retelling an instance in which she responded to one of her children who called
  - b. A speaker retening an instance in which she responded to one of her children who called her out of the blue after ignoring her for weeks:
     [Pre-ironic utterance] ¡Oh! Le digo yo.
     [Ironic utterance] Mi hijo pródigo. ¡Apareció mi hijo pródigo!
     'Oh, I said to him.'
    - 'My prodigal son. My prodigal son has appeared!'
- 12. Rhetorical question
  - A speaker after being asked whether she had neighbors near her remote dwelling: [Pre-ironic utterance] No, porque es cerro po.
     [Ironic utterance] ¿Qué vecinos voy a tener? (risa)
    - 'No, because it's a mountain.
    - What neighbors would I have?' [laughter]
    - A neighbor thinks the speaker's mother told the police that he (the neighbor) was abusing
  - b. his wife, so he throws these things at the speaker's house:
    - [Pre-ironic utterance] Animales muertos, muñecas sin cabezas, o las
    - cabezas solas de las muñecas. El techo lleno de caracoles.
    - [Ironic utterance] ¿Qué significarán? No tengo idea.
    - 'Dead animals, headless dolls, or just the heads without the dolls. The roof full of shells.' 'What might they mean? I have no idea.'

- 13. Hyperbole
  - a. A speaker after saying that she doesn't believe in love: [Pre-ironic utterance] No porque es cosa como mental, así como [Ironic utterance] "Aay me voy a morir si no está al lado mío". 'No because it's like a mental thing, like "Ay, I'm going to die if he's not by my side".'
  - b. A speaker discusses her relationship with her younger sisters:
    [Pre-ironic utterance] No hay como roce porque tenemos como casi como el mismo genio cuando nos enojamos.
    [Ironic utterance] Entonces como que "¡Ay, hacemos un temblor en la casa!".
    There is no like tension because we have like almost like the same temperament when we get mad.
    So, like "Ay you" accurate an carth gualka in the house!"

So, like "Ay, we're causing an earthquake in the house!"

Using interview transcripts and the audio recordings, ironic utterances and their preceding baseline utterances were coded by the first two authors, following the 10 min mark. After coding the data separately, the authors arrived at an agreement rate of over 95% for both the presence of an ironic utterance, as well as the subtype of irony. Any utterances on which there was disagreement were interrogated, and any further utterances which were not agreed upon by all the authors as ironic were excluded (n = 3). All remaining ironic utterances and their preceding neutral utterances (which we term "pre-ironic", n = 197) form our dataset.

After classifying the utterances into their irony subcategories, each vowel nucleus within the ironic and pre-ironic utterances were segmented in Praat (Boersma and Weenink 2022) on an interval tier. At times, the pre-ironic utterances and the ironic utterances were part of the same breath group, while on other occasions, utterances were separated by pauses. Then, each syllable nucleus in the pre-ironic and ironic utterances were segmented by hand on a second tier, relying on both the waveform and the spectrogram.

Vowel segmentation involved the simultaneous consultation of the waveform and wideband spectrogram in Praat (Boersma and Weenink 2022). The vowel onset was located at the waveform zero crossing, before the first positive peak in the periodic waveform. The vowel offset was placed at the last zero crossing, before the abrupt reduction in amplitude and/or cessation of periodicity in the waveform prior to the next segment. Due to the high degree of consonantal reduction present in the interviews, which is common in Chilean Spanish (Rogers and Mirisis 2018), there were many cases of adjacent vowels with no intervening consonant. In these cases, both the waveform and the spectrogram were consulted to determine the point at which a clear shift in the formant height and/or vowel amplitude delineated a differentiation between the two adjacent vowels.

## 4.4. Data Analysis

The acoustic analysis resulted in a total of 3961 segmented syllable nuclei (from both the pre-ironic and ironic utterances), which were additionally coded for several features. First, each syllable was coded for the variable of interest, or the subtype of irony (jocularity, hyperbole, and rhetorical questions), or whether it was derived from a pre-ironic baseline utterance. Additionally, each syllable was coded for nucleus type or vowel identity (i.e., the five Spanish vowel phonemes of /a/, /e/, /i/, /o/, and /u/). F1, or the first formant, is inversely correlated with vowel height (so /i/, a high vowel, has a low F1), while F2, the second formant, is correlated with vowel frontness/backness (so /i/, a front vowel, has a high F2, while /u/, a back vowel, has a low F2). Vowel quality was included in the models because previous work has shown relationships between the first and second formants, F1 and F2, and voice quality in multiple languages (Esposito et al. 2021). Syllable stress was also coded and included in the models, following Bolyanatz (Forthcoming) who showed that stress in Chilean Spanish co-occurs with voice quality variation. The phonological segment preceding and following the vowel nucleus was coded to account for prosodic boundary effects and other potential context effects (Chong et al. 2020). The predictor of speaker age was also included given that some studies have found relationships between

acoustic measures, such as F0 and HNR, and age; these studies tend to find that HNR and F0 tend to decrease as speakers age (Ferrand 2002). Finally, the identity of the word was included to account for potential random effects. Each syllable was also numbered, and the syllables were later assigned a coefficient delineating their position in the ironic utterance (a proportion of the syllable number over the total number of syllables in the utterance, following Podesva (2013)), which we refer to as "ratio" in the models below. However, it is not the case that the final syllables in the utterance are necessarily in prepausal position: some of the ironic utterances span two sentences or multiple clauses with pauses in between.

Following the coding procedure, the data were submitted to VoiceSauce (Shue 2010; Shue et al. 2011), a MatLab application that provides automated voice measurements over time. We used VoiceSauce instead of Praat because measurements derived from VoiceSauce include corrections for formant frequencies and bandwidths. Indeed, Shue et al. (2009) demonstrated that VoiceSauce measurements were much closer to acoustic measurements derived by hand than to measurements derived from Praat.

Following Keating (2014), the F0 was derived from STRAIGHT (with the maximum frequency set to 900 Hz to account for falsetto voice tokens), and the formants were derived from Praat within VoiceSauce and then subsequently corrected. Following the procedures described in Garellek (2019) and Garellek (personal communication, 21 June 2022), the F0 outliers outside 3 standard deviations were removed (N = 54), leaving a total of 3907 tokens for analysis. Also, similarly to Keating (2014), the middle fifth of each vowel token (that is, the center 20% of the vowel) was analyzed to avoid potential edge effects that may affect our measurements.

Aligned with previous work on voice quality, we used the H1\*–H2\* measure as a correlate of phonation type (Garellek 2019; Esposito and Khan 2020). The H1 measure is the amplitude of the first harmonic in the sound spectrum (which is also the fundamental frequency or F0). H2 is the amplitude of the second harmonic, and the difference between these two is related to the open quotient (OQ), the proportion of a glottal cycle in which the glottis is open (Keating and Esposito 2007). Higher values for H1–H2 signal breathier phonation, while lower values are associated with creakier phonation. The asterisks on H1<sup>\*</sup> and H2<sup>\*</sup> signal that the values have been corrected for the potential influence of formants. Additionally, to account for noise, a second important dimension of voice quality (cf. Garellek 2019), the harmonics-to-noise ratio (HNR), was derived (de Krom 1993). This measure refers to the difference in amplitude between the harmonic and inharmonic components of the source spectrum. Increased HNR values signal more modal voice, while decreased HNR values signal higher rates of noise, which signals breathier (cf. Gordon and Ladefoged 2001) or creakier (Keating et al. 2015) tokens. Given Keating and Garellek's (2015) observation that the 0–500 Hz range is most sensitive to irregular F0 values, we use this range for the HNR measures.

As Garellek (2019) describes, a combination of spectral tilt measures (such as H1\*–H2\*), as well as noise measures (HNR), provide the most accurate configuration of voice quality. A token with a higher H1\*–H2\* and also higher HNR values is more likely to be modally voiced.

All of the models were constructed using the lmer function within the lme4 package (Bates et al. 2015) in RStudio (RStudio Team 2023), with ggplot2 (Wickham 2009) used for the data visualization. We constructed two types of models. The first, a linear regression model taking pitch range as its dependent variable, was at the utterance level. The values for the pitch range measure were derived by taking the maximum and minimum pitch over the entire pre-ironic and ironic utterances and finding the difference between them (maximum – minimum). There were two predictors, namely the irony type (with "pre-irony" as the baseline value, so the pitch range values of each irony subtype would be compared to the pitch range values of the pre-ironic baseline utterances) and speaker age, and two random effects, namely one random intercept per speaker, and one random intercept for each pairing of the pre-ironic and ironic utterances nested within each speaker.

This accounts for any potential clustering or grouping effects per speaker as they produce their utterances. The remaining variables (syllable stress, vowel, etc.) were not included in the model because the pitch range measure derived from the utterance as a whole, rather than from each syllable.

The other models were linear regressions at the syllable level, examining the acoustic and prosodic measures of each syllable nucleus within three datasets: jocular irony utterances and their corresponding pre-ironic baseline utterances (n = 2480); hyperbolic irony utterances and their corresponding pre-ironic baseline utterances (n = 830); and rhetorical question ironic utterances and their corresponding pre-ironic baseline utterances (n = 597). We used the six acoustic and prosodic measures as the dependent variables for each subset of syllables (F0, F1, F2, H1\*–H2\*, HNR, and syllable duration), creating a total of 18 models. Each of the continuous variables were centered and scaled using the scale function in R in order to account for potential differences in vocal tract sizes among the speakers. All the linear models included the predictors of the irony subtype (with the pre-ironic level as the baseline or control level), syllable stress, vowel, the ratio of the syllable through the utterance, and speaker age as fixed effects. All the models also included random intercepts for participant and word. A more complex random effect structure (including a random slope for the effect of order (pre-ironic utterance preceding the ironic utterance)) resulted in a singular fit (i.e., a random effects structure too complex to be supported by the data). The best fit for each model was determined by adding independent variables, one at a time, and comparing the two models via the anova function in R. The predictors were kept in the models if they significantly improved the model's fit, so the models presented below are the best-fit models. All the model summaries are presented in Appendix A, and those with significant effects for irony type are shown in the paper itself.

#### 5. Analysis and Results

The participants produced a total of 197 ironic utterances, with an average of 13.06 ironic utterances per speaker (ranging from 3 to 30 per speaker; SD = 7.41). In response to research question one which asked which of the subtypes of irony occurred in our data, we found that 66% of the ironic utterances produced were coded as jocularity, described by Gibbs (2000) as playful ironic teasing. Approximately 16% of the data were comprised of rhetorical questions, while hyperbolic utterances represented 19% of the utterances. This difference is represented visually in Figure 1. Interestingly, the speakers did not produce any instances of understatements or of sarcasm.



Figure 1. Frequency of observations by subtype of irony.

#### 5.1. Pitch Range

A linear mixed model, taking F0 range as the dependent variable and the speaker age and irony type as the independent variables, showed that two irony categories resulted in a wider pitch range as compared to pre-ironic utterances: jocularity and hyperbole. These differences are visualized in Figure 2, with the model summary presented in Table 2.



Figure 2. Pitch range by irony type.

**Table 2.** Model summary for linear regression model, taking F0 range as the dependent variable (N = 375).

Predictor	Estimate	Standard Error	Z-Value	р
Intercept	156.37	10.95	14.29	< 0.001
Irony type				
Pre-irony	Reference	-	-	-
Jocularity	22.99	9.53	2.41	< 0.05
Rhetorical questions	13.78	15.84	0.84	0.39
Hyperbole	57.78	15.36	3.76	<0.001

There were no significant differences in pitch range for the rhetorical questions irony type as compared to the pre-ironic baseline utterances, and no significant differences according to the speakers' age.

#### 5.2. Jocularity

For the first six linear models taking the acoustic and prosodic measures as dependent variables, we first subset the data into only jocular irony utterances and their corresponding pre-ironic utterances (n = 2480). In the first model, taking F0 as the dependent variable, only the ratio variable significantly contributes to the outcome. Specifically, this finding demonstrates that the pitch increases over the utterance in both pre-ironic and ironic utterances. No other predictors in this model significantly affected the outcome of the pitch variable, including whether the syllable was located in the pre-ironic baseline utterance or in the jocular irony utterance.

The second model taking F1 as the dependent variable shows that jocular irony vowels have a significantly higher F1 than the vowels in the pre-ironic baseline utterances.

That is, when speakers produced jocular irony utterances, they did so with significantly higher F1s (lowered vowels; consistent across all five vowels). This effect is visualized in Figure 3, below.





Additionally, as expected, F1 significantly differs according to the vowel's identity. Vowels' F1s also differ according to stress: stressed vowels have a significantly higher F1 (are lowered).

The model taking F2 as the dependent variable shows that, as expected, F2 significantly differs according to the vowel identity. However, there were no differences in F2 according to the irony type.

Only the ratio variable significantly conditioned H1\*–H2\*. That is, as the ratio increased (signaling syllables later in the utterance), H1\*–H2\* decreased. Decreased H1\*-H2\* is associated with creakier phonation, providing additional evidence for increased creaky voice toward the end of utterances.

According to the model taking normalized HNR as the dependent variable, irony category, vowel, and ratio significantly affect HNR. The best-fit model summary is shown in Table 3, below. Similar to the results from the H1\*–H2\* model, as ratio increased, HNR decreased. This suggests that syllables produced later in the utterance are noisier (i.e., less modally voiced) in both pre-ironic utterances and in jocular irony utterances. There were also significant differences in HNR according to the identity of the syllable nucleus (i.e., the vowel).

Importantly, there was also a significant difference according to the irony category. That is, the syllables produced within jocular irony utterances had a significantly lower HNR than syllables produced in the pre-ironic utterances, indicating increased noise. This difference is represented visually in Figure 4.

Finally, in the model taking duration as the dependent variable, only the identity of the vowel and stress affected duration in expected ways. Certain vowels were longer than others, and stressed vowels were significantly longer than unstressed vowels. There were no effects for the irony type, signaling that there were no differences in duration based on whether the syllables were found in the pre-ironic baseline utterances or the jocular irony utterances.

In sum, only HNR was found to be significantly different between the jocular irony utterances as compared to the pre-ironic baseline.

Predictor	Estimate	Standard Error	Z-Value	p
Intercept	0.27	0.15	1.82	0.08
Irony type				
Pre-irony	Reference	-	-	-
Jocularity	-0.13	0.04	-3.75	<0.001
Vowel				
a	Reference	-	-	-
e	-0.20	0.05	-3.84	<0.001
i	-0.21	0.06	3.35	<0.001
0	-0.13	0.05	-2.48	< 0.05
u	-0.27	0.10	-2.69	<0.01
Ratio	-0.27	0.10	-2.69	< 0.01

Table 3. Jocular irony dataset (N = 2480). Dependent variable: HNR.



Figure 4. Normalized HNR by irony type; jocular irony dataset only.

#### 5.3. Hyperbole

We then created a subset of the data comprised of only the syllables from the hyperbolic irony utterances and the corresponding syllables from the pre-ironic utterances (n = 830). According to the best-fit model taking F0 as the dependent variable, only syllable stress and ratio significantly affected the outcome. That is, stressed syllables were associated with a significantly higher pitch, as were the syllables farther along in the utterance (i.e., there was increased pitch over later syllables in the utterance), for both the pre-hyperbolic and hyperbolic utterances. No results were found for the hyperbolic irony type as compared to the pre-ironic baseline, signaling that there is no difference in pitch in the syllables in the hyperbolic utterances as compared to the baseline.

According to the best-fit model taking F1 as the dependent variable, only the syllable stress and vowel identity significantly affected the outcome variable. That is, as expected, the identity of the vowel significantly affected the value of the vowel's F1. Addition-

ally, stressed vowels were produced with a significantly higher F1 (or as lowered in the vowel space).

Similarly, the vowel identity affected the outcome of the model taking F2 as the dependent variable. That is, as expected, there is a significant difference between a vowel's F2 and its identity. Additionally, there was an effect for the ratio predictor: over the course of both the hyperbolic irony and baseline types of utterances, speakers produced their syllables with a decreased F2.

The results of the best-fit model, taking H1\*–H2\* as the dependent variable, also showed effects for ratio and syllable stress. In stressed syllables, H1\*–H2\* was significantly higher than for unstressed syllables, signaling a breathier-like voice quality. Similarly, speakers' syllables got creakier (H1\*–H2\* decreased) over the course of the utterance. There were no effects for the irony type.

Importantly for the purposes of the present paper, the irony category was also selected as significantly affecting the HNR (as seen in the model summary in Table 4).

Predictor	Estimate	Standard Error	Z-Value	p
Intercept	0.30	0.17	1.80	0.10
Irony category				
Pre-ironic	Reference	-	-	-
Hyperbole	-0.20	0.06	-3.33	< 0.001

Table 4. Hyperbolic irony dataset (N = 830). Dependent variable: HNR.

HNR was significantly lower for syllables within hyperbolic utterances, signaling higher rates of noise, or increased non-modal voice quality, as compared to syllables in the pre-ironic baseline. This effect is shown below in Figure 5.



**Figure 5.** Effect of irony type on normalized HNR within the hyperbolic irony dataset (*n* = 830).

In the final model for the hyperbolic irony dataset, in which normalized duration is used as the dependent variable, vowel duration is shown to be significantly shorter for syllables within hyperbolic utterances as compared to the pre-ironic baseline (see Table 5 below for the model summary). This effect is represented in Figure 6.

Predictor	Estimate	Standard Error	Z-Value	p
Intercept	0.07	0.05	1.38	0.21
Irony category				
Pre-ironic	Reference	-	-	-
Hyperbole	-0.15	0.07	-2.22	< 0.05

Table 5. Hyperbolic irony dataset (N = 830). Dependent variable: duration.



**Figure 6.** Effect of irony type on normalized duration within the hyperbolic irony dataset; observations above 2 standard deviations not shown for readability (n = 24).

In sum, syllables in utterances of the hyperbolic irony type are associated with decreased HNR, signaling more noise or less modal phonation, and significantly shorter durations as compared to the pre-ironic baseline.

# 5.4. Rhetorical Questions

Finally, we created a subset of the data using only syllables from rhetorical question irony utterances and their corresponding syllables from the pre-ironic utterances (n = 597). According to the best-fit model taking normalized F0 as the dependent variable, only the irony category significantly affected the outcome (see Table 6 for the model summary).

**Table 6.** Rhetorical question irony dataset (n = 597). Dependent variable: normalized F0.

Predictor	Estimate	Standard Error	Z-Value	р
Intercept	-0.09	0.12	-0.75	0.46
Irony category				
Pre-ironic	Reference	-	-	-
Rhetorical questions	0.20	0.06	3.18	< 0.01

That is, for syllables within the rhetorical questions irony subtype, F0 (heard as pitch) was significantly higher than for syllables in the pre-ironic baseline (as seen in Figure 7

below). Interestingly, there was no effect for ratio, suggesting that instead of a rising terminal as might be expected in a rhetorical question intonational pattern, syllables within the rhetorical question utterance had a higher pitch overall than those within the pre-ironic baseline utterances. No other independent variables were selected by the model to affect the pitch.



Figure 7. Effect of irony type on normalized F0 within the rhetorical questions irony dataset.

The results of the model taking normalized F1 as the dependent variable reveal several significant effects (see Table 7 for the best-fit model summary).

Predictor	Estimate	Standard Error	Z-Value	р
Intercept	0.80	0.12	6.72	< 0.001
Irony category				
Pre-ironic	Reference	-	-	-
Rhetorical questions	-0.19	0.08	-2.42	< 0.05
Vowel				
a	Reference	-	-	-
e	-0.71	0.10	-6.97	< 0.001
i	-1.00	0.13	-7.99	< 0.001
0	-0.66	0.11	-6.00	< 0.001
u	-0.83	0.21	-4.04	< 0.001
Syllable stress				
Unstressed	Reference	-	-	-
Stressed	0.27	0.07	-3.77	< 0.001

**Table 7.** Rhetorical question irony dataset (*n* = 597). Dependent variable: normalized F1.

Specifically, as expected, the vowels' F1 varied according to vowel identity, since F1 is inversely correlated with vowel height. Additionally, stressed syllables had a significantly

higher F1 (signaling lowered vowels) than unstressed syllables. Finally, and importantly, vowels within the rhetorical questions irony subtype were produced with a lower F1 (signaling raised vowels) than syllables within the pre-ironic baseline utterances. This effect is visualized in Figure 8.



**Figure 8.** Effect of irony type on normalized F1 within the rhetorical questions irony dataset; observations above 2 standard deviations not shown for readability (n = 17).

Only the vowel identity significantly affected the normalized F2 variable, as expected, due to the correlation between F2 and vowel frontness. There was no effect on the F2 for the rhetorical questions irony subtype.

For syllables within the rhetorical questions utterances, H1\*–H2\* was significantly lower than for syllables within the pre-ironic baseline (see best-fit model results in Table 8).

Predictor	Estimate	Standard Error	Z-Value	p
Intercept	0.14	0.09	1.62	0.12
Irony category				
Pre-ironic	Reference	-	-	-
Rhetorical questions	-0.18	0.09	-2.12	< 0.05

Table 8. Rhetorical question irony dataset (N = 597). Dependent variable: normalized H1\*–H2\*.

This signals a creakier-like voice quality in the rhetorical questions utterances as compared to those in the pre-ironic baseline utterances. This difference is visualized in Figure 9.

The results of the model evaluating HNR as the dependent variable reveal that HNR is significantly lower for syllables within rhetorical questions utterances as compared to the pre-ironic baseline (see the best-fit model summary in Table 9, and the figure of this effect in Figure 10).

![](_page_18_Figure_2.jpeg)

Figure 9. Effect of irony type on normalized H1\*–H2\* within the rhetorical questions irony dataset.

Predictor	Estimate	Standard Error	Z-Value	р
Intercept	0.41	0.18	2.27	< 0.05
Irony category				
Pre-ironic	Reference	-	-	-
Rhetorical questions	-0.17	0.07	-2.51	< 0.05

**Table 9.** Rhetorical question irony dataset (n = 597). Dependent variable: HNR.

![](_page_18_Figure_6.jpeg)

Figure 10. Effect of irony type on normalized HNR within the rhetorical questions irony dataset.

Taken together with the previously mentioned finding that H1\*–H2\* is significantly lower for syllables within the RQ irony subtype, these findings provide evidence that rhetorical questions are produced as creakier than the pre-ironic baseline utterances.

Duration was only found to be conditioned by the syllable stress (with stressed syllables associated with longer duration, as expected); there was no effect for duration in the comparison of rhetorical questions versus pre-irony baseline utterances.

In sum, syllables within utterances of the rhetorical questions irony subtype are associated with an increased F0, a decreased F1 (or raised vowels), and creakier voice quality (as indicated by both a lower H1\*–H2\* and a lower HNR).

#### 6. Discussion

In this section, we discuss our findings, overall and according to the subtype of irony, and engage with the discussion on prosody and pragmatics more generally. Our analyses revealed both expected and unexpected results related to irony.

Our first research question focused on uncovering the subtypes of irony that were more prevalent in our data, which consisted of casual speech samples from Chilean women extracted from informal sociolinguistic interviews. We hypothesized that jocularity (i.e., the teasing of a person, object, or event, in a playful way) was going to be the most common form of irony, and we confirmed our hypothesis. Jocularity was strongly favored by the speakers in our study, followed by hyperbole and rhetorical questions. Interestingly, sarcasm and understatements were not found in the data.

The speech samples in this paper were extracted from interviews conducted by the first author, who, despite her efforts at maintaining an informal, conversational mood, was a stranger to the interviewees. While we agree with Davies (2004, p. 224) in that "irony assumes extensive shared knowledge, including concerning participants' attitudes, and for that reason might be considered too risky for sociable conversation (e.g., small talk) among strangers", we also propose that this might not be the case for all subtypes of irony and for all types of conversational encounters, based on our results. That is, jocularity, which seems to be the least face-threatening form of irony, might be appropriate in certain sociocultural contexts even among strangers and during brief conversational encounters. According to Davies (2004), in some languages (such as English), using playful irony in conversations is a form of solidarity behavior that assumes shared knowledge, assumptions, and attitudes that might be expected between two individuals who know each other well. This might not be the case in Spanish.

In the context of the present study, rapport was developed through the conversation via the willingness of the interviewees to discuss the sensitive nature of the topics that arose, and the empathetic listening of the interviewer, as well as smiling, nodding, and the use of other verbal and nonverbal communication on the parts of both parties. We posit that the frequent use of jocularity in our data occurs as an outgrowth of the resulting established rapport, since it signals some level of comfort and closeness between the interlocutors. Jocular irony is then used as a mechanism to allow speakers to discuss serious real-life events in a humorous way without engaging in risky behavior. Jocular irony (and other subtypes of irony seen here) can therefore be seen as a form of interpersonal stance taking (Kiesling 2009).

On the other hand, sarcasm can be much more face threatening and, therefore, is less likely to occur between two unfamiliar interlocutors, as it can be potentially perceived as carrying some level of criticism (Gibbs 2000). The finding that sarcasm did not spontaneously occur in our data between unfamiliar interlocutors is especially salient given that many studies of verbal irony (and its prosodic correlates) specifically address sarcasm.

With regard to understatements, it is possible that we simply did not have enough background knowledge shared with the speakers in order to recognize understatements when they occurred. For instance, one speaker said the following when asked what her hobbies were, saying that she and friends play in a band:

[Pre-ironic utterance] va a la casa y toca guitarra

[Ironic utterance] intentamos de tocar (risa)

He goes to the house and plays guitar

We try to play (laughter)

We did not have the background information about this speaker's and their friends' skills at playing in their band. If they were actually very talented, this utterance could be categorized as an understatement. However, we did not have sufficient knowledge to make this claim.

We now turn to our second research question, targeting how irony is conveyed prosodically. Our first set of findings demonstrated that utterances from the jocularity and hyperbole irony subtypes co-occur with a wider F0 (pitch) range than the pre-ironic baseline utterances, while the rhetorical questions subtype did not. Sentences with a wide pitch range in Spanish are usually interpreted as lively or involved, or perhaps overexcited or urgent, while utterances with a narrow pitch range are usually interpreted as detached, sad, or bored (Estebas-Vilaplana 2014). Hidalgo Navarro (2011) argued that spontaneous humorous utterances in Peninsular Spanish are accompanied by increased intensification, which has the purpose of contributing to the affinity between the speaker and hearer (p. 275). We posit that this pitch range widening serves a similar purpose in our data, as well as indicating that the utterance should be somehow salient to the listener. By differentiating these ironic utterances prosodically from the speech that precedes them, the speakers attempt to make the mismatch between reality and expectation salient, while also conveying their attitudes towards a given situation. In future research, it would be interesting to interrogate listener perceptions of these three irony types, given that sarcasm and rhetorical questions have been shown in English to be perceived as more aggressive, critical, and negative than jocularity, hyperbole, and understatements, which are generally perceived as funny, playful, and innocent.

The most frequent subtype of irony in our data, jocularity, was distinguished at the syllable level from its pre-ironic baseline in only one way: our findings showed that syllables in the jocularity utterances were associated with a lower HNR (additional noise in the speech signal, or less modal phonation).

Hyperbolic utterances were also produced with a lower HNR, indicating the production of syllables with noisier phonation. Interestingly, syllables in hyperbolic utterances were also shorter than those in baseline utterances. This differs from the findings by Bryant (2010), who found that syllables in all five types of ironic utterances were longer than pre-ironic baseline utterances. Bryant (2010) claimed that this lengthening was related to the increased cognitive load needed for decoding ironic utterances. That is, in order for the utterances to be recognized by the interlocutor as ironic, the speaker produced them more slowly. However, we find the opposite, and only for this one subtype of irony. We posit that this particular characteristic of hyperbole in our data may be related to its nature. Hyperbole, unlike rhetorical questions and jocular irony, can be lexically identifiable as ironic in both English and Spanish due to the speaker's choice of adjectives and adverbs, such as quantifiers (e.g., all, every, none), numerals (e.g., millions, thousands), superlatives (e.g., sunniest, worst), adverbs of frequency (e.g., always, never), and other extreme language choices. In contrast, other types of irony may have different interpretations based on the conversational context. For instance, some structures such as statements or commands, such as "Lift your game, Martina!" (in Example 1), are only jocular if they are interpreted within a certain context. Otherwise, they can be mistakenly taken at face value (i.e., not going beyond the literal meaning and ignoring the context). Perhaps, then, since hyperbole is already indicated via lexicogrammatical cues, increased duration is not necessary for the speaker to mark the statement as ironic and, in fact, speakers can articulate hyperbolic utterances even more quickly given the presence of these cues. We acknowledge that this finding might be particular to Spanish, since marking hyperbole lexicogrammatically happens in both languages.

Rhetorical questions were associated with several acoustic and prosodic differences in comparison to the pre-ironic baseline: increased F0, decreased F1, lower H1\*–H2\*, and

lower HNR. Regarding the increase in F0, Ortiz et al. (2010) indicated that in Chilean Spanish elicited utterances, rhetorical questions tend to be produced with a rising pitch movement ( $L + H^*$  pitch accent). However, we did not find a rising pitch movement (or an increase in F0 over the course of the utterance), but rather, that the pitch values were higher overall in the rhetorical question utterances as compared to the baseline. Interestingly, rhetorical questions were the only irony subtype that were not produced with a wider pitch range as compared to the pre-ironic baseline utterances. Rather, each of the syllables in the rhetorical questions utterances were produced with a higher (if less variable) pitch than the baseline utterances. This could be related to the findings of Tritou (2021), who found that rhetorical questions were more likely to trigger negative reactions among Peninsular Spanish speakers because they challenge the addressee more directly than other subtypes of irony (Gibbs (2000) reports a similar finding in English). Perhaps speakers, when using rhetorical questions, articulate them with a higher F0 in order to mitigate those potentially negative reactions. Escandell-Vidal and Prieto (2020) review the literature on the increased F0 in Spanish and posit a direct connection to politeness, invoking Ohala's (1984, 1994) frequency code, postulating a universal relationship between prosodic features and politeness.

Additionally, vowel F1 was found to decrease in rhetorical questions, suggesting that these questions are less prominent than pre-ironic utterances. An increase in F1 has been associated with stress (Romanelli et al. 2018; Torreira and Ernestus 2011), suggesting a relationship between the F1 increase and prominence. Wennerstrom (2013) argued that de-accenting of the prosodic features of utterances (or reducing them) creates a humorous effect. Essentially, they argue, humor arises from the "unexpected incongruity that occurs between the hearer's initial mental model of the joke discourse and a humorous alternative" (p. 121). It is also possible that reducing or de-accenting rhetorical questions serves as an additional way to lessen or mitigate their result.

Finally, rhetorical questions were also found to have lower H1\*–H2\* and lower HNR than their pre-ironic baseline utterances. These two findings taken together offer compelling evidence that rhetorical questions are produced with creakier phonation than pre-ironic baseline utterances.

Interestingly, we found that all three subtypes of irony share one characteristic: all three consistently exhibited lower HNR as compared to the pre-ironic baseline utterances. While we are not advocating for HNR to be thought of as "an ironic voice quality", meaning that not everything that has low HNR will be ironic, we are suggesting that speakers use lowered HNR to differentiate their ironic utterances from regular, baseline, non-ironic utterances. To explain why speakers do this, we can turn to Bolyanatz (2023) who recently examined spontaneously occurring creaky voice in sociolinguistic interviews in Chilean Spanish. Bolyanatz (2023) determined that creak was primarily used to invoke alignment with the listener via ensuring that their messages or stances (Du Bois 2007) were understood and potentially endorsed. Similarly, we posit that the decreased HNR in the present study (which may signal either increased creaky or breathy phonation) found for syllables in all three subtypes of ironic utterances may serve the same purpose: that of aligning the speaker and hearer via a combination of humor and prosody.

While we are not the first to posit connections in Spanish between voice quality and affective or attitudinal states (cf. Gil 2007, p. 219), this study does contribute to laying the groundwork for further exploration of the connection between pragmatics and voice quality (among other types of acoustic and prosodic features).

Finally, we did not find any acoustic differences relating to age. This may be due to the fact that our "older" age speakers ranged from 42–66 years old, and previous work has found that normal aging in voices may begin in the 40s and 50s (Ning 2019). We also acknowledge that the sample size differences across the three subtypes of irony may contribute to differences in the findings. That is, our jocularity dataset was about four times larger than our rhetorical questions dataset, but this was due to the spontaneously occurring nature of the ironic utterances. As previously mentioned, we also cannot know

based on this particular study whether irony production would be similar or different with interlocutors from different genders, more local backgrounds, or other native Chilean Spanish speakers, but this is a potential consideration for future research.

### 7. Conclusions

Our study addressed the prosody of ironic speech in Chilean Spanish, a phenomenon lying at the prosody–pragmatics interface. By examining the acoustic correlates of different subtypes of verbal irony that occurred in our data, we were able to outline the prosodic characteristics of speech practices that carry a heavy pragmatic component.

First, our findings uncovered that jocularity, rhetorical questions, and hyperbole spontaneously occurred in our data, which involved casual conversations with an unfamiliar interlocutor. Of these three subtypes, jocularity was the most commonly used. Jocular irony involves a playful teasing or mockery, without necessarily involving criticism, minimization, or exaggeration like sarcasm, understatements, and hyperbole do. In future work, we would like to examine whether jocularity and its co-occurring prosodic features could be conceptualized as a linguistic resilience strategy. That is, might the women in our study be using jocular irony as a strategy for coping with difficulties related to their socioeconomic realities, such as the ones shared in their interviews (e.g., being forcibly relocated by the government, or the prevalence of drug addiction in the community affecting many families)?

Second, each of these three types of irony were prosodically distinct from the preceding non-ironic utterances. Syllables in all three subtypes of irony were found to have lower HNR, which we posit may help to make the ironic utterance salient and potentially align the speaker and hearer via a combination of humor and prosody. Jocularity and hyperbole also have wider pitch ranges from the pre-ironic baseline utterances, which may similarly be related to marking salience or developing an affinity between the speaker and hearer. Rhetorical questions were not significantly different from the baseline utterances in terms of the pitch range, but rhetorical questions did exhibit a higher overall pitch than the baseline utterances. We posit that this may be due to the more negative or critical nature of rhetorical questions, and that the higher pitch for these utterances helps to mitigate that negativity.

Finally, a large number of ironic utterances were categorized as representing jocular irony in our data. It is possible that, upon incorporating more targeted subdivisions such as dividing the jocularity category according to topics of conversation, additional pragmatic and prosodic distinctions may be revealed.

In sum, our data offer insight into spontaneous verbal irony between two unfamiliar interlocutors in a casual speech situation and contribute to the connection between prosody and pragmatics in Chilean Spanish. This study also lays the groundwork for further examination of irony and prosody in this and other Spanish dialects.

Author Contributions: Conceptualization, M.B. and A.J.; methodology, M.B. and A.J.; formal analysis, M.B., A.J. and I.S.D.; investigation, M.B.; resources, M.B. and A.J.; data curation, M.B.; writing—original draft preparation, M.B. and A.J.; writing—review and editing, M.B., A.J. and I.S.D.; visualization, M.B.; project administration, M.B.; funding acquisition, M.B. and A.J. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research was funded by the Ben and Rue Pine Travel Award, UCLA Department of Spanish and Portuguese.

**Institutional Review Board Statement:** The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board of UCLA (approval code 15-001231, 20 August 2015).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data are not publicly available due to IRB restrictions.

**Acknowledgments:** We are indebted to the participants for sharing their time and personal stories with us. Many thanks also to Raymond Gibbs for feedback on an earlier version of this paper, and to the anonymous reviewers and editors of *Languages* for their insightful feedback.

Conflicts of Interest: The authors declare no conflict of interest.

# Appendix A. All Best-Fit Model Summaries

**Table A1.** Jocular irony dataset. Dependent variable = F0.

Predictor	Estimate	Standard Error	Z-Value	<i>p</i> -Value
Intercept	-0.16	0.08	-2.14	< 0.05
Ratio	0.12	0.06	2.16	< 0.05

Predictor	Estimate	Standard Error	Z-Value	р
Intercept	0.56	0.10	5.90	< 0.001
Irony type				
Pre-ironic baseline	Reference	-	-	-
Jocularity	0.06	0.04	2.39	< 0.05
Vowel				
a	Reference	-	-	-
e	-0.75	0.05	-14.25	< 0.001
i	-1.27	0.06	-20.05	< 0.001
0	-0.60	0.05	-11.20	< 0.001
u	-1.02	0.10	-9.94	< 0.001
Syllable stress				
Unstressed	Reference	-	-	-
Stressed	0.14	0.04	3.92	< 0.001

**Table A2.** Jocular irony dataset. Dependent variable = F1.

**Table A3.** Jocular irony dataset. Dependent variable = F2.

Predictor	Estimate	Standard Error	Z-Value	p
Intercept	-0.09	0.08	-1.17	0.26
Vowel				
a	Reference	-	-	-
e	0.41	0.05	7.48	< 0.001
i	0.65	0.06	10.33	< 0.001
0	-0.48	0.06	-8.60	< 0.001
u	-0.77	0.11	-7.28	< 0.001

**Table A4.** Jocular irony dataset. Dependent variable = H1\*–H2\*.

Predictor	Estimate	Standard Error	Z-Value	<i>p</i> -Value
Intercept	0.12	0.08	1.49	0.15
Ratio	-0.22	0.07	-3.22	< 0.01

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Predictor	Estimate	Standard Error	Z-Value	p
Intercept	0.27	0.15	1.82	0.08
Irony type				
Pre-irony	Reference	-	-	-
Jocularity	-0.13	0.04	-3.75	<0.001
Vowel				
a	Reference	-	-	-
е	-0.20	0.05	-3.84	<0.001
i	-0.21	0.06	3.35	<0.001
0	-0.13	0.05	-2.48	< 0.05
u	-0.27	0.10	-2.69	<0.01
Ratio	-0.27	0.10	-2.69	<0.01

 Table A5. Jocular irony dataset. Dependent variable = HNR.

 Table A6. Jocular irony dataset. Dependent variable = Duration.

Predictor	Estimate	Standard Error	Z-Value	р
Intercept	0.31	0.07	4.63	< 0.001
Vowel				
а	Reference	-	-	-
e	-0.23	0.06	-3.86	< 0.001
i	-0.15	0.07	-2.03	< 0.05
0	-0.10	0.06	-1.58	0.11
u	-0.35	0.12	-3.01	< 0.01
Syllable stress				
Unstressed	Reference	-	-	-
Stressed	0.32	0.04	-8.04	< 0.001

**Table A7.** Hyperbolic irony dataset. Dependent variable = F0.

Predictor	Estimate	Standard Error Z-Value		р
Intercept	-0.27	0.10	-2.56	< 0.05
Syllable stress				
Unstressed	Reference	-	-	-
Stressed	0.13	0.05	2.78	< 0.05
Ratio	0.50	0.11	4.69	< 0.001

**Table A8.** Hyperbolic irony dataset. Dependent variable = F1.

Predictor	Estimate	Standard Error	Z-Value	р
Intercept	0.73	0.10	7.34	< 0.001
Vowel				
а	Reference	-	-	-
e	-0.87	0.09	-9.90	< 0.001
i	-1.30	0.12	-11.08.	< 0.001
0	-0.69	0.09	-7.86	<0.001

Table A8. Cont.

Predictor	Estimate	Standard Error	Z-Value	p
u	-1.17	0.18	-6.38	< 0.001
Syllable stress				
Unstressed	Reference	-	-	-
Stressed	0.22	0.06	3.71	< 0.001

**Table A9.** Hyperbolic irony dataset. Dependent variable = F2.

Predictor	Estimate	Standard Error	Z-Value	р
Intercept	0.18	0.10	1.75	0.08
Vowel				
a	Reference	-	-	-
e	0.48	0.09	5.50	<0.001
i	0.52	0.11	4.52	< 0.001
0	-0.53	0.09	-6.20	< 0.001
u	-0.68	0.18	-3.81	< 0.001
Ratio	-0.40	0.11	-3.60	<0.001

 Table A10. Hyperbolic irony dataset. Dependent variable = H1\*-H2\*.

Predictor	Estimate	Standard Error Z-Value		p
Intercept	0.40	0.09	4.33	< 0.001
Syllable stress				
Unstressed	Reference	-	-	-
Stressed	0.23	0.07	3.32	< 0.001
Ratio	-0.42	0.12	-3.55	< 0.001

**Table A11.** Hyperbolic irony dataset. Dependent variable = HNR.

Predictor	Estimate	Standard Error	Z-Value	p
Intercept	0.30	0.17	1.80	0.10
Irony category				
Pre-ironic	Reference	-	-	-
Hyperbole	-0.20	0.06	-3.33	< 0.001

 Table A12. Hyperbolic irony dataset. Dependent variable = duration.

Predictor	Estimate	Standard Error	Z-Value	p
Intercept	0.07	0.05	1.38	0.21
Irony category				
Pre-ironic	Reference	-	-	-
Hyperbole	-0.15	0.07	-2.22	< 0.05

Predictor	Estimate	Standard Error	Z-Value	р
Intercept	-0.09	0.12	-0.75	0.46
Irony category				
Pre-ironic	Reference	-	-	-
Rhetorical questions	0.20	0.06	3.18	< 0.01

**Table A13.** Rhetorical question irony dataset. Dependent variable = F0.

**Table A14.** Rhetorical question irony dataset. Dependent variable = F1.

Predictor	Estimate	Standard Error	Z-Value	р
Intercept	0.80	0.12	6.72	< 0.001
Irony category				
Pre-ironic	Reference	-	-	-
Rhetorical questions	-0.19	0.08	-2.42	< 0.05
Vowel				
a	Reference	-	-	-
е	-0.71	0.10	-6.97	< 0.001
i	-1.00	0.13	-7.99	< 0.001
0	-0.66	0.11	-6.00	< 0.001
u	-0.83	0.21	-4.04	< 0.001
Syllable stress				
Unstressed	Reference	-	-	-
Stressed	0.27	0.07	-3.77	< 0.001

Table A15. Rhetorical question irony dataset. Dependent variable = F2.

Predictor	Estimate	Standard Error	Z-Value	р
Intercept	-0.11	0.10	-1.19	0.25
Vowel				
а	Reference	-	-	-
e	0.44	0.10	4.53	< 0.001
i	0.88	0.12	7.46	< 0.001
0	-0.55	0.11	-5.24	< 0.001
u	-0.54	0.20	-2.63	< 0.01

 Table A16. Rhetorical question irony dataset. Dependent variable = H1\*–H2\*.

Predictor	Estimate	Standard Error	Z-Value	p
Intercept	0.14	0.09	1.62	0.12
Irony category				
Pre-ironic	Reference	-	-	-
Rhetorical questions	-0.18	0.09	-2.12	< 0.05

Predictor	Estimate	Standard Error	Z-Value	р
Intercept	0.41	0.18	2.27	< 0.05
Irony category				
Pre-ironic	Reference	-	-	-
Rhetorical questions	-0.17	0.07	-2.51	< 0.05

**Table A17.** Rhetorical question irony dataset. Dependent variable = HNR.

**Table A18.** Rhetorical question irony dataset. Dependent variable = duration.

Predictor	Estimate	Standard Error	Z-Value	р
Intercept	0.15	0.09	1.73	0.10
Syllable stress				
Unstressed	Reference	-	-	-
Stressed	0.25	0.08	3.03	< 0.01

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