An acoustic analysis of ironic comments

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Abstract: Intonation plays a key role in the communication of irony, nevertheless, the literature dedicated to the prosody of verbal irony is still cross-linguistically scarce. Our study intends to investigate the prosodic differences between irony and sincerity in Bari Italian. Our first aim was to observe the way several types of irony differ from sincerity, in particular we compared ironic criticisms (sarcasm) with sincere comments and ironic compliments (teasing) with their sincere counterparts; our second aim was to verify the prosodic differences between sarcasm and teasing. The data collected so far showed that sarcasm differed from sincerity with reference to most of the acoustic parameters considered. Nevertheless, no statistically significant differences were found between teasing and sincerity. Finally, the research revealed that ironic criticisms were faster and more intense than ironic compliments.

Verbal irony; sarcasm; teasing; wh-exclamatives; acoustic analysis

I. INTRODUCTION

A. Irony

Traditional rhetoric defines irony as a semantic inversion between the primary meaning and the implicated one: a matter of saying one thing and meaning something else. In [1], Grice reviewed this classical figurative interpretation through a conversational point of view: irony is considered as an exploitation of the first Quality maxim (that invites speaker not to say what s/he believes to be false). In some ways, [1] remarked the opposition between what is literal and what is intended. In the last 20 years, this traditional interpretation has been rejected by some new theories that intend to highlight the reason why in some contexts speakers prefer ironic utterances to sincere ones. [2] distinguishes between a provoked irony and a spontaneous irony: in the first case, the speaker repeats back to the audience something which the audience has been previously said adding an ironic intonation; in the second case, the speaker is expressing what s/he means with no reference to previous context or conversation. The idea of provoked irony is revised in the Echoic Account proposed in [3]: in this theory, it is assumed that when a speaker uses an ironic utterance, s/he mentions a thought or a common belief that s/he wants to criticize or reject and that s/he attributes to a person or to a group of people. In this way, the speaker communicates an attitude toward the utterance s/he echoes while the hearer has to consider it a mention and to understand the negative attitude of the speaker toward it. Another interesting point of view is proposed by the Pretence Theory of Irony [4]: an ironist does not perform a speech act but pretends to perform it and the hearer has to detect the pretence and identify the scornful attitude of the speaker.

In everyday speech, speakers tend to use irony with different aims, but basically it is an instrument used to protect social relationships: by means of an ironic utterance a real intention can be hidden under an ambiguous speech. Irony can be expressed in different forms, but two main subtypes can be distinguished: sarcasm (ironic criticism) and teasing (ironic compliment). Sarcasm is used to criticize something or someone using a polite sentence, on the contrary teasing communicates indirectly a positive valuation by means of a verbal criticism. Sarcasm is considered the most common form of irony: by means of it a negative critique strikes in a milder way, this allows speaker to protect her/his personal image and the relationship with the hearer.

B. Ironic Prosody

The set of prosodic aspects that characterize the ironic communication is defined 'verbal irony' [5]: heightened pitch variation, exaggerated stressed syllables, heightened intensity, nasal articulation, slow speech rate, syllable lengthening are some of the prosodic patterns of ironic speech identified so far ([6], [7], [2], [8], [9], [10]). In some cases, verbal irony does not show a heightened pitch variation and it is perceived as flat ([7], [8], [9]). There are some other cues that usually characterize ironical intonation like falsetto, singsong voice, the presence of long pauses between words and exaggerated stress [8], [9]. However, some recent researches have investigated ironic utterances by means of acoustic analysis. In [11] three principal tendencies regarding the pitch detected in some American television shows are delineated: 1) strong within-statement contrast; 2) compressed pitch pattern; 3) pronounced pitch accent. With reference to English, in [12] sarcasm was characterized by reductions in *F*0x, decreases in *F*0 variation and changes in voice quality; furthermore, in some linguistic contexts, sarcastic comments were slower. In [13] the importance of prosody in the identification of irony was tested: the study revealed that both ironic criticisms and ironic compliments were successfully identified by hearers respectively as less and more friendly than their sincere counterparts. Nevertheless, while sarcasm showed wider duration and reduced pitch variability than sincerity, no significant differences between teasing and its literal counterpart were found in terms of the prosodic cues considered in the acoustic analysis. Basically, with reference to English (and German [14], [15], [16]) sarcasm is communicated by a flat intonation. Nevertheless, for what concerns French [17], Japanese
[18] and Cantonese [19], sarcasm shows high fundamental frequency (F0) values and a wide speech range.

With reference to Italian, there is currently little available research focused on the suprasegmental level of verbal irony. In [20] sarcasm and teasing are both characterized by a combination of high and changeable pitch, strong energy and a slow rate of articulation (in most cases the latter was characterized by a "smoother" and a more attenuated pitch than the former). Nevertheless, in some instances the tendencies changed: a few speakers tended to express teasing with a monotone pitch; furthermore, sometimes sarcasm was realized with a combination of low pitch and slow rate of articulation. Finally, the prosody of ironic criticisms is observed from the perspective of the interplay between intensity and politeness in a section of [21].

The data collected so far suggest that ironic prosody is the result of a combination of intonational cues that is known as "bantering voice" [5]. Nonetheless, the prosodic profile of irony changes according to the attitude, the speaker and the context. This extreme variability does not allow identifying a prototypical prosodic profile of ironic speech.

II. THE PRESENT STUDY

A. Research questions

The present study has two main research questions: 1) to what extent does the attitude affect the prosody of an utterance? Specifically: a) which are the phonetics indexes that differentiate sarcastic and sincere utterances? b) Which are the phonetics indexes that differentiate teasing from sincerity? 2) Does the type of irony affect the suprasegmental level of an utterance? To what extent do ironic criticisms and ironic compliments differ in terms of acoustic parameters?

The present research is focused on Bari Italian: to date, no specific studies about the prosodic cues of ironic expression of this variety have been developed. Specifically, we opted for the exclamative that opens with a wh-modifier because it is widely used in spoken Italian to communicate the ironic attitude. Our hypothesis is that both ironic types do differ from

their sincere counterparts with reference to F0, intensity and speech rate; secondary, we assume that ironic compliments and ironic criticisms can show some differences in terms of pitch.

B. Methods

A corpus of 12 texts was designed: each text described a contextual situation ending with an ironic wh-exclamative; 6 of these were sarcastic while the other 6 were ironic compliments. As a scheme for our inducing texts we adopted the fencing game model of irony elaborated in [22]: first the description of the assumptions – that corresponds to the cultural, social and personal background shared by the interlocutors – then the description of the focal event that stimulates the ironic comment (for sake of brevity of our texts we avoided to described the ironic effect yielded by the comment). As a control, 12 more texts were constructed each of which followed by a sincere wh exclamatives. Each ironic utterance has its sincere counterpart. The stimuli were presented to 5 male speakers of Bari Italian (raging from age 23 to 33). The digital recordings were run by means of a TASCAM DR-40, frequency sample of 44kHz/24-bit resolution. The test provided 120 stimuli total: 60 sincere and 60 ironic wh-exclamatives (30 ironic compliments and 30 sarcastic comments). The stimuli were analysed by means of PRAAT considering the variables employed in this field of study: average *F*0 mean (*F*0x), *F*0minimum, *F*0maximum, *F*0 range; onset and offset *F*0 values (respectively the *F*0x value measured on the first and on the last 30 ms of the utterance); mean intensity; overall duration; duration of the last stressed and unstressed vowels (FSV, FUV); speech rate. Statistical significance was examined by means of Paired-Samples T Test.

III. RESULTS

A. Irony vs Sincerity

The results showed that, with reference to some acoustic parameters, sincere and sarcastic exclamatives presented statistically significant differences. As shown in table I, the most interesting results regard the F0max: sarcastic wh-exclamatives values were significantly higher than sincere ones in a statistically significant way; as a consequence, also the pitch range is slightly wider in sarcastic comment. Furthermore, while onset values were quite similar, the difference between offset values of sarcastic and sincere comments was statistically significant. Sarcasm showed also a wider intensity than sincerity. Sarcastic exclamatives were also longer than sincere ones; this discrepancy is probably related to the FSV. Differently, with reference to the FUV duration the results were comparable. As for the speech rate, sarcasm comments were slower than their sincere counterparts.

In Fig. 1 and 2 are shown the waveforms, the broad spectrograms and the F0 curves of the two versions of the sentence “Quanto mi piace quel vestito” (“I like that dress so much”) uttered by speaker 1. The sarcastic comment in Fig. 1 showed the highest values with reference to all the parameters considered (F0x= + 6.1 ST; F0min= + 3.1 ST; F0max= + 8.6 ST; PR= + 5.4 ST; Onset= 6.1 ST; Offset= + 2.9 ST; Intensity= + 4.9 dB; Overall duration = + 89 ms; FSV duration= + 70 ms; FUV duration= + 40 ms; SR= - 0.21 syll/s). In this particular case, the two attitudes also differ in terms of the Onset that is aligned with the wh element. Finally, the F0 curve of the sarcastic wh-exclamative fig.2) is more changeable and presents two prominences aligned with the two content words “piace” and vestito”.

TABLE I. F0, INTENSITY AND TIME DIFFERENCES BETWEEN SARCASM AND SINCERITY AND T TEST VALUES

Sarcasm/Sincerity	Mean	t	df	p
F0x (ST)	1.2	2.144	29	< .05
F0min (ST)	1.1	3.209	29	< .01
F0max (ST)	2.2	2.867	29	< .01
Pitch Range (ST)	1.1	2.288	29	< .05
Onset (ST)	0.6	.936	29	> .05
Offset (ST)	1.8	4.082	29	< .01
Intensity (dB)	2.1	3.402	29	< .01
Duration (ms)	87.3	2.610	29	<.05
FSV duration (ms)	27.5	3.808	29	< .01
FUV duration (ms)	8.5	1.662	29	> .05
Speech Rate (syll/s)	- 0.6	- 3.732	29	< .01

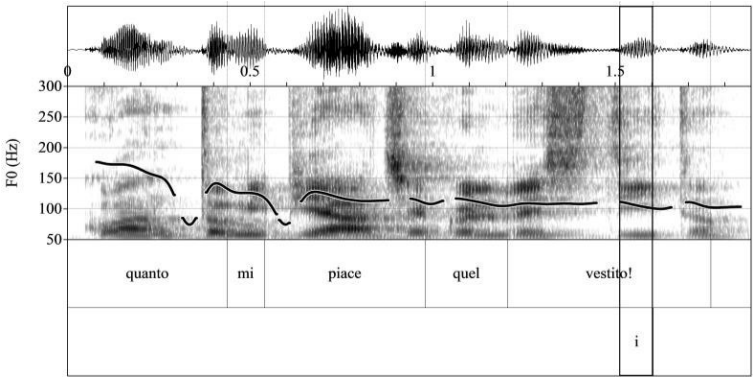

Figure 1. *Waveform, broad spectrogram and f0 contour of the sincere wh-exclamative "Quanto mi piace quel vestito!" by speaker 1*

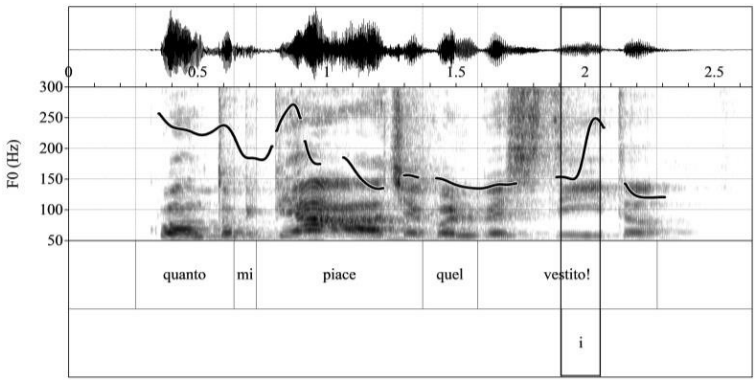

Figure 2. *Waveform, broad spectrogram and f0 contour of the sarcastic wh-exclamative "Quanto mi piace quel vestito!" by speaker 1*

A further analysis was conducted in order to compare teasing and sincerity. Nevertheless, with reference to the majority of the parameters considered the two attitudes were quite comparable. As shown in table II, no significant differences were found between teasing and sincerity except for the FSV duration.

TABLE II. F0, INTENSITY AND TIME DIFFERENCES BETWEEN SARCASM AND SINCERITY AND T TEST VALUES

Teasing/Sincerity	Mean	t	df	p
F0x (ST)	0.2	.222	29	> .05
F0min (ST)	0.2	.445	29	> .05
F0max (ST)	0.3	.565	29	> .05
Onset (ST)	- 1.4	- 1.344	29	> .05
Offset (ST)	1.1	1.958	29	> .05
Pitch Range (ST)	0.6	.048	29	> .05
Intensity (dB)	0.35	.386	29	> .05
Duration (ms)	44.5	1.175	29	> .05
FSV duration (ms)	25.7	4.171	29	< .001
FUV duration (ms)	3.5	.692	29	> .05
Speech Rate (syll/s)	- 0.1	- .871	29	> .05

B. Sarcasm vs Teasing

Finally, we analysed the phonetic indexes that characterize sarcasm compared to teasing. As shown in table III, contrary to what was previously predicted, our findings did not show some significant differences between the two attitudes, with the exception of the parameters of intensity and duration; ironic criticisms revealed a wider intensity and tended to be faster than ironic compliments.

TABLE III. F0, INTENSITY AND TIME DIFFERENCES BETWEEN SARCASM AND TEASING AND T TEST VALUE

Sarcasm/Teasing	Mean	t	df	p
Fox (ST)	0.6	.887	29	> .05
F0min (ST)	0.5	.876	29	> .05
F0max (ST)	1.2	1.252	29	> .05
Pitch Range (ST)	0.7	.708	29	> .05
Onset (ST)	1.4	1.695	29	> .05
Offset (ST)	0.04	.230	29	> .05
Intensity (dB)	1.9	.552	29	< .05
Duration (ms)	-172	- 1900	29	> .05
FSV duration (ms)	10	.856	29	> .05
FUV duration (ms)	- 8.5	- 1.078	29	> .05
Speech Rate (syll/s)	.048	2.455	29	< .05

IV. DISCUSSION AND CONCLUSIONS

Irony is a widespread instrument used by speakers for covering the truth under a shallow of false kindness. The means used to communicate this attitude are extremely variable. Specifically, in order to reach the goal, an ironist can rely on contextual references, facial expressions, gestures and intonation. In the present study, we specifically focused on the role played by prosody in the correct expression of irony, with particular reference to sarcasm and teasing. Specifically, we aimed to verify if wh-exclamatives of Bari Italian related to different attitudes presented discrepancies on a prosodic level. To date, no other studies on irony is explicitly focused on wh-exclamative sentences.

The results collected so far showed that sincere and sarcastic wh-exclamatives did differ in terms of prosody, while teasing and sincerity were quite comparable. Our data revealed that sarcastic wh-exclamatives were characterized by a higher F0max, a slightly wider pitch range, a higher intensity and a longer duration. These findings are aligned with the data collected for French, Japanese and Cantonese ([17], [18], [19]) but also with the studies focused on Italian verbal irony [20]. Nevertheless, differently for what pointed out by [20], in our study the ironic compliments and their sincere counterparts did not show significant differences. These data do not confirm our hypothesis but are aligned with the results collected by [13] with reference to English. We agree with [13] in affirming that the difference between teasing and sincerity probably relies on other cues not included in our set of acoustic parameters.

The present research, however, highlighted for the first time the role played by the final stress vowel duration in ironic speech. The data revealed that ironic compliments were characterized by the lengthening of the FSV, an aspect that differentiates both teasing and sarcasm from sincerity. This discrepancy is easily perceptible in our stimuli: speakers probably tended to extend the FSV in order to emphasize the bantering voice.

As for the possibility that ironic type affect prosody, our study showed that ironic compliments tended to be slower and less intense than ironic criticisms. No significant differences in terms of pitch were found. According to [20] a change in context (conflict vs cooperation) should affect the prosody of the ironic comments. We confirmed this tendency, but in our data the most influenced parameters were related to energy and time. The speakers involved in our research probably rely on these cues in order to distinguish the several ironic types.

At the light of these issues, we can conclude that sarcasm is communicated by the activation of several acoustic parameter way more than teasing. The speaker tends to emphasize her/his intention in order to avoid any conflict that the literal content of the utterance could cause. Social relationships could be damaged by a direct criticism, for this reason, in some contexts speakers opt for an instrument of indirect speech, used to hide the real inconvenient truth under a friendly cover. Our study focused on the wh-exclamative, because in the complex machine of non-literal communication an important role is played by emotions that can connote the cues of ironic speech in many different ways. In most cases, when speakers want to express their strong opinion in an indirect but effective way, they opt for the short-circuit between context and content and choose to package this attitude in the form of an insincere exclamative sentence. Exclamatives are a direct result of the overflowing of emotions, the sense of surprise and the expectations subversion; when exclamatives meet irony a very fascinating product of language is realized.

The present research constitutes a basis for deeper investigations on the role played by prosody in the communication of irony. Our knowledge of verbal irony is however still partial. In future we aim to focus particularly on sarcasm, investigating the way modality can affect verbal irony. Furthermore, our purpose is to validate our data by a perceptual analysis in order to identify the role played by the prosodic cues in the correct interpretation of irony.

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