

# Ironic Gestures and Tones in Twitter

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## Abstract

**English.** Automatic irony detection is a young field of research related to Sentiment Analysis. When dealing with social media data, the shortness of text and the extraction of the statement from his context usually makes it hard to understand irony even for humans but especially for machines. In this paper we propose an analysis of the role that textual information plays in the perception and construction of irony in short texts like tweets. We will focus on the impact of conventional expedients of digital writing, which seem to represent a substitution of typical gestures and tones of oral communication, in figurative interpretation of messages in Italian language. Elaborated computational model has been exploited in the development of an irony detection system, which has been evaluated in the Sentipolc's shared task at EVALITA 2016.

**Italiano.** *Il riconoscimento automatico dell'ironia è un ambito di ricerca giovane, rilevante per la Sentiment Analysis. Quando si tratta di social media data, la brevità del testo e la sua estrazione dal contesto rendono difficile la comprensione dell'ironia anche per l'uomo e in particolare per le macchine. In questo lavoro, si propone un'analisi sul ruolo che l'informazione testuale gioca nella percezione e realizzazione dell'ironia nei tweet. Ci si focalizzerà sull'impatto di elementi convenzionali della scrittura digitale, che sembrano rappresentare una sostituzione dei tipici gesti e toni della comunicazione orale, nell'interpretazione figurativa dei messaggi in italiano. Il modello computazionale elaborato è stato usato in*

*un sistema di irony detection, valutato a Sentipolc, Evalita 2016.*

## 1 Introduction

The growing scientific interest on natural language understanding has been supported in the last decade by a great amount of user-generated texts available on the Web. People usually use social media platforms, such as Facebook and Twitter, to express their opinions on different topics, which can be exploited, for example, by companies for marketing researches. This is one of the motivations which prompted actual research in this direction on automatic analysis of short-texts. Social micro-texts are great examples of rhetorical production due to their shortness, which supports the creativity of linguistic expressions (Ghosh et al., 2015). In fact 140 characters of tweets encourage users to use some creative devices in order to communicate briefly their opinions or their feelings about events, products, services or other individuals. Among creative devices, irony and sarcasm hinder correct sentiment analysis of texts and, therefore, correct opinion mining. Indeed, irony is a figurative language device used to convey the opposite of literal meaning: *contrarium quod dicitur intelligendum est* (Quintiliano, Institutio Oratoria, 9, 22-44). In order to express an ironic utterance in short text, users prefer to use conventional expedients in digital writing or particular linguistic constructs which seem to represent a substitution of typical gestures and tones of oral communication. These reveal themselves as good clues for Irony Detection as demonstrated by results obtained with our system participating in SENTIPOLC's at EVALITA 2016 (Frenda, 2016), where we ranked third on twelve participants. In this paper we present linguistic analysis on ironic tweets extracted from corpora used in SENTIPOLC and computational model elabo-

rated in Master’s thesis upon which our rule-based system is based.

## 2 Related Work

Automatically understanding texts that are susceptible to different interpretations from their literal meaning is a hard task that presents challenging aspects even for humans. Nevertheless, automatic irony detection is becoming one of the biggest challenges of Natural Language Processing (NLP), especially to correctly determine the polarity of texts. Indeed, in the last years several studies arose with the aim of detecting irony and sarcasm by extricating their multiple aspects and exploiting various computational models in different languages: as regards English the research by Utsumi (1996) was one of the first approaches; Veale and Hao (2009) focused on figurative comparisons (“as X as Y”); Reyes et al. (2013) exploited features ranging from textual to stylistic dimensions, and Barbieri and Saggion (2014) considered lexical and semantic features of the words in tweets. Relative to French, Karoui et al. (2015) focused on the presence of negation markers and the implicit and explicit opposition in ironic tweets. Finally, multilingual perspective is proposed by Karoui et al. (2017), which examine the impact of pragmatic phenomena in the interpretation of irony in English, French and Italian tweets. The main work inspiring our researches here is Carvalho et al. (2009) which distinguished eight oral and gestural “clues” for irony detection in Portuguese online newspaper comments. Their attention focused in particular on positive comments: positive sentences are more subjected to irony and it is more difficult to recognize their true polarity. Many of these clues have been used in our analysis on ironic Italian tweets to observe how these textual features are distributed in negative and positive sentences to bring out possible incongruities between literal and real meaning.

## 3 Methodology

The irony detection task is a very recent challenge in NLP community and in 2014 and 2016 EVALITA, an evaluation campaign of NLP and speech tools for Italian, proposed a battery of tasks related to Sentiment Analysis in tweets, including *Irony detection*. The task of automatic irony detection is treated as a problem of classification of texts in ironic and non ironic ones, and the main

approaches used by previous works are based on the development of supervised machine-learning or rule-based systems.

We developed a rule-based system, implemented in Perl, which, analysing a corpus of Italian tweets, identifies possible ironic clues and distinguishes ironic and non ironic texts. This system is based on computational model that is the result of linguistic research carried out during Master’s thesis redaction. The scope of this analysis is to understand the impact of conventional elements of web writing and syntactic constructions on automatic process of recognition of ironic short-texts.

We tested our computational model with good results participating in SENTIPOLC’s task at EVALITA in 2016.

### 3.1 Corpora of tweets

Tweet corpora used in our works have been provided by organizers of SENTIPOLC task in EVALITA 2014 and 2016: SENTIPOLC 2014 corpus includes 4513 tweets in the training set and 1935 in the test set, and SENTIPOLC 2016 includes 7410 in the training set and 2000 in the test set. The former has been used for linguistic analysis in Master’s thesis and the latter to participate at evaluation campaign. These corpora have been annotated manually and according to a multi-layered annotation scheme where tweets are labelled according to different dimensions: subjectivity, overall and literal polarity (positive/neutral/negative/mixed), irony. These corpora contain a collection of both political and generic tweets, and also a collection of socio-political tweets (concerning topic *la buona scuola*).

### 3.2 Resources and Data Processing

Considering various textual elements of digital writing which make up tweets, that are essential to linguistic analysis of this kind of text, we developed a lexicon of interjections<sup>1</sup> annotated according polarity, a list of emoticons extracted from Wikipedia and annotated as EMOPOS ( = ) , :D ), EMONEG ( as :( , :’( ) and EMOIRO ( ^L , :P ), and a list of ironic hashtags extracted from ironic tweets in corpora analysed<sup>2</sup>.

In order to clean up the texts and avoid hampering syntactic analysis and ironic clues retrieval we replaced emoticons with appropriated labels

<sup>1</sup>Extracted from Morph-it! (Zanchetta and Baroni, 2005) and Treccani (<http://www.treccani.it>).

<sup>2</sup>For more details about resources see (Frenda, 2016).

and removed characters of url from text. Cleaned texts have been processed by TreeTagger (Schmid, 1994) for obtaining POS-tagged and lemmatized corpora, using Italian tagset by Baroni.

#### 4 Irony Detection Model

People in social network use a new kind of language between speech and writing: oral elements are included in writing by means of graphic characters, punctuation and so on. Users express their emotions and opinions with informal language especially in the social network, using interjections or expressing tones with exclamatory expressions. Considering the shortness of text users tend to use conventional marks, like hashtags, to provide additional information (context, emotion, and so on).

In our work we exploit these textual patterns, many of whom are extracted from Carvalho et al. (2009) and adapted to Italian language. Indeed, their results demonstrated that more productive patterns in ironic texts are the ones related to orality and gestures. We considered also regional expressions and other forms of exclamation specifically of Italian language. In Italian texts, like in Portuguese, these linguistic elements, which seem to reproduce oral communication, are the most productive as demonstrated in Figure 1 and 2. In these figures we can observe the impact of our computational model in corpora analysed.

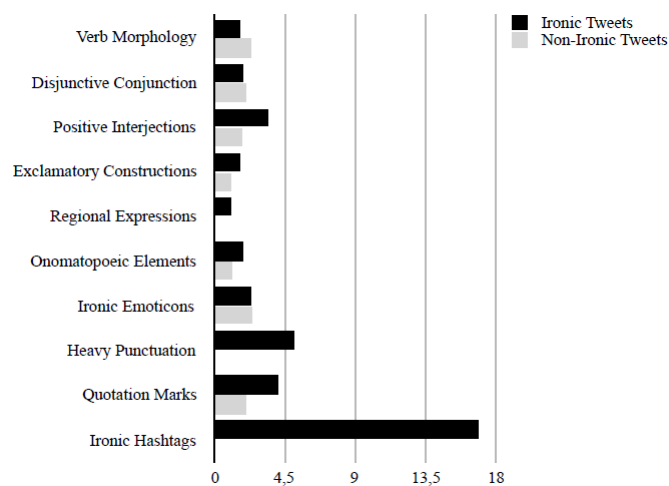


Figure 1: Ironic clues in SENTIPOLC 2014 corpus (in percentage)

Although in ironic tweets most of the frequencies of these patterns are promising for irony recognition task, these corpora contain an imbalanced data distribution (564 ironic tweets on 4513

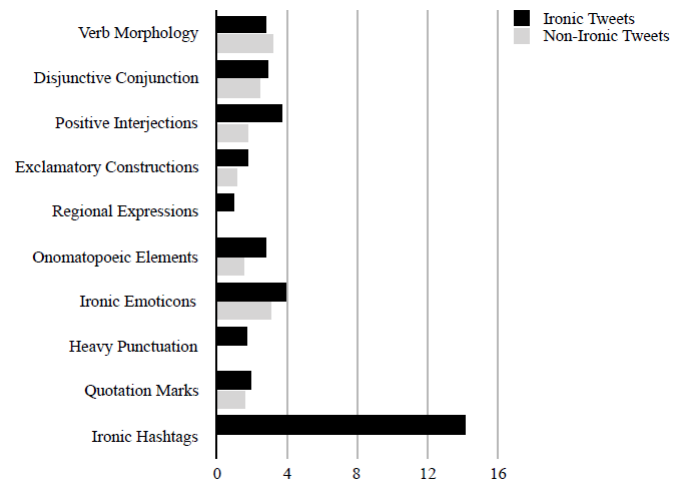


Figure 2: Ironic clues in SENTIPOLC 2016 corpus (in percentage)

in SENTIPOLC 2014 and 865 ironic tweets on 7410 in SENTIPOLC 2016) that hinder the possible generalization of model.

Below, we summarily describe linguistic features considered in our model and their frequencies in positive and negative sentences (Figure 3 and 4), observing specifically in texts how user express ironic utterance:

- Verb morphology: the use of pronoun *tu* and, in a pro-drop language like Italian, morphological inflection of the verb *essere* for second singular person allows to express a certain proximity also artificial or false if interlocutor is a well-known person.
- Disjunctive conjunctions (*o, oppure*) sometimes introduce strange combinations that surprise the readers and encourages an ironic interpretation.
- Positive interjections and exclamatory expressions, like expressions with an emphasised use of pronoun or adjective *che* (like *Che sorpresa!*, *Che bella giornata!*), represent a simple way for users to communicate emotions, feelings, mental states or reactions to specific situations, reversing also the literal meaning of statement.
- Regional expressions, like exclamatory expressions and interjections, are a way for users to express immediately and informally their moods or opinions, especially in ironic

perspective. In corpora analysed, it is prevalent the use of expressions of dialect from central Italy, such as: *annamo bene, ce vuole* or *ce sta*.

- Onomatopoeic expressions for laughter are used by users like markers to suggest an ironic interpretation of text.
- Ironic emoticons: emoticons allow to express briefly the user's moods (happiness, sad, laughter, ect) or to communicate to the reader ironic or humorous intention, for instance, with wink (;).
- Heavy punctuation is used to set a tone in writing, in particular in short texts, where the verbal components are essential to express concisely the feelings.
- Quotation marks, also imitated in gestures of speaking, are used to quote what has been said by others or to emphasize the content suggesting a possible additional interpretation of text.
- Ironic hashtags: the hashtag complies with necessity of simplification and containment (Chiusaroli, 2014) and plays a special role since it is employed by Twitter's users as digital extralinguistic equivalent of non-verbal expressions (Liebrecht et al., 2013), sometimes affecting also the sentiment of tweets (Maynard and Greenwood, 2014).

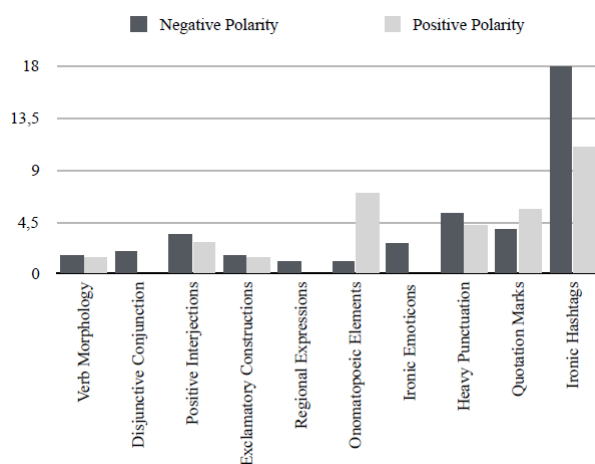


Figure 3: Distribution in positive and negative sentences in SENTIPOLC 2014 corpus (in percentage)

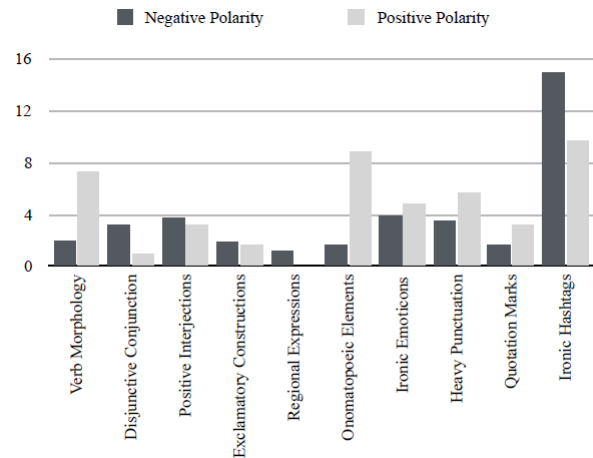


Figure 4: Distribution in positive and negative sentences in SENTIPOLC 2016 corpus (in percentage)

## 5 Discussion and Conclusions

Although limited amount of Italian ironic examples, this analysis and the results of developed computational system (Frenda, 2016) show that people tend to use textual and conventional expedients of oral communication to express irony in informal context as social networks. We can observe this in Figure 1 and 2, where some linguistic constructions expressing tone and accent of user-speaker, like regional expressions and heavy punctuation, are used mainly in ironic tweets. With respect to ironic hashtags we can observe that same hashtags are mentioned in different ironic tweets in both corpora, revealing their important role of established conventional elements in communication in social networks. Finally, in Figure 3 and 4 we can observe that there are cases of incongruity between literal and real meaning, for example there are sentences with negative polarity that contain positive interjections or exclamatory constructions used, indeed, in ironic manner. It is interesting to underline that most of ironic tweets are negative in both corpora: 493 negative ironic tweets on 564 ironic tweets in SENTIPOLC 2014 corpus and 742 on 865 in SENTIPOLC 2016 corpus.

In this scenario where automatic irony detection is still challenging for Italian, pragmatic analysis of ironic texts allows to take a closer look at how people use the language and his expedients to express irony.

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