



Linguistic Expression of Irony in Social Media

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Для моей семьи, которая вдохновляет и верит...

Para a minha família, que inspira e acredita...

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ABSTRACT

This research aims to investigate the linguistic expression of irony in social media. Particularly, this study focuses on the analysis and description of the linguistic and rhetoric devices used to express irony about human entities in a specific domain, politics. The study aims at distinguishing the most representative types of irony and classifying them into different subclasses. The research is performed based on a corpus manually created for this purpose, consisting of short messages (tweets) collected from Twitter. These collections composed of 500 tweets, referencing the presidential candidates that ran for the United States Presidential Election campaign 2012.

In general, our findings prove that irony could be represented with a help of other figurative devices targeting politicians in social media. The results have shown that the most representative categories are exclamation (21.6%), rhetoric question (14%), antiphrasis (11.2%), and metaphor (12.4%). Inter-annotator agreement (IAA) study has been conducted to answer research questions and surveys were carried out for annotation: (i) to validate the reliability of the manual analysis $\alpha = 0.77$, the result has shown “highly tentative” value; (ii) linguistic expression of irony in social media, IAA agreement between the groups A, B and C is $\alpha = .38; .095; .042$; (iii) impact of irony in a political domain of user-generated content has shown the value $\alpha = .172$ and % agr. 73.7.

KEYWORDS: *Corpus, irony, figurative language, linguistic devices, linguistic expression of irony, tweet, Twitter.*

RESUMO

Esta pesquisa tem como objectivo investigar a expressão linguística da ironia nos media sociais, centrando-se particularmente na análise e descrição dos mecanismos linguísticos e retóricos utilizados para expressar ironia sobre entidades humanas num domínio específico, a política. O estudo visa distinguir as classes mais representativas de ironia e classificá-las em diferentes subclasses. Esta investigação foi realizada com base num *corpus* manualmente criado para este fim, composto por mensagens breves (tweets) recolhidas a partir do Twitter. Este corpus é centrado especificamente no tema da campanha eleitoral de um candidato para as presidenciais dos Estados Unidos no ano de 2012. Os resultados provam que a ironia poderia ser representada com a ajuda de outros recursos linguísticos e retóricos no que respeita às expressões de cariz política nas redes sociais. Os resultados mostraram que as categorias mais representativas são as de exclamação (21,6%), perguntas de retórica (14%), antífrases (11,2%) e de metáfora (12,4%). O estudo com base no acordo de *Inter-annotator agreement* (IAA) foi realizado para fins distintos após a implementação das pesquisas para anotação: (i) para validar a fiabilidade da análise manual, com o valor de $\alpha = 0,77$ o que demonstra um resultado "altamente experimental"; (ii) para demonstrar as expressões linguísticas de ironia nos Mídia Sociais em concordância com *Inter-annotator agreement* (IAA), em que obtivemos uma relação de valores entre os grupos A, B e C: $\alpha = 0,38; 0,095; 0,042$; (iii) e finalmente para avaliar o impacto da ironia no domínio político num conteúdo gerado pelo próprio usuário que mostrou o valor: $\alpha = 0,172$ e % agr. 73.7.

PALAVRAS-CHAVE: *Corpus, ironia, dispositivos linguísticos, expressão linguística de ironia, linguagem figurativa, tweet, Twitter.*

RESUMO ALARGADO

Esta pesquisa tem como objectivo investigar a expressão linguística da ironia nas redes sociais. O estudo analisa os mecanismos linguísticos subjacentes à expressão da ironia em mensagens breves, extraídas do Twitter, tendo como alvo uma entidade humana do domínio político. Como na maioria dos recursos figurativos, a ironia é difícil de ser definida em termos formais. Nesta tese, adoptamos o conceito de ironia tal como é definido por Abrams e Harpham, (2011: 165): “*a ironia é uma declaração em que o emissor envia uma mensagem com um sentido nitidamente diferente do significado que é ostensivamente expresso*”. Por outras palavras, é um recurso estilístico baseado na oposição entre a mensagem expressa e a mensagem implícita. Em termos práticos, a ironia é utilizada para expressar o contrário daquilo que queremos realmente dizer, como, por exemplo, na mensagem abaixo:

Irony: #Many, many GodGunsBible Americans WILL vote for President Obama

As expressões “*Many, many*” e “*WILL vote*” são figurativamente usadas para expressar um sentimento negativo e contraditório, que significa acentuadamente o oposto do que é ostensivamente expresso. Além disso, a expressão “*GodGunsBible*” é utilizada para sugerir o contrário do que é veiculado. Assim, a ironia permite a um emissor expressar pontos de vista ricos em sentimento, com brevidade, nitidez e humor. A correta interpretação da ironia está sempre dependente de um conjunto de factores extralinguísticos, da constante mutação do mundo, de questões de ordem social, cultural e

pragmática. Desta forma, torna-se difícil o seu reconhecimento e a representação do processo, sobretudo do ponto de vista computacional.

Este projecto visa analisar os recursos linguísticos e retóricos utilizados na expressão da ironia, em particular nas redes sociais. Tanto quanto sabemos, não existe nenhum estudo sistemático realizado sobre a expressão linguística da ironia nestes meios de comunicações. Este estudo foca-se na identificação de um dos mais relevantes desafios à análise computacional, que envolve a expressão de sentimento sobre alvos humanos, particularmente políticos.

A pesquisa é realizada com base num *corpus* manualmente criado para este fim, composto por mensagens breves (*tweets*) retiradas do Twitter, uma rede social e um serviço de “microblogging”. A colecção de *tweets* tem como alvo dois dos principais candidatos que concorreram às eleições presidenciais dos Estados Unidos na campanha eleitoral de 2012.

Como tal, os principais objectivos desta pesquisa são: (i) identificar os mecanismos utilizados para expressar ironia e classificá-los em diferentes subclasses, tendo em vista o seu reconhecimento automático; (ii) investigar o impacto de ironia nas redes sociais e que tipo de categorias é mais fácil reconhecer; (iii) representar umas categorias de padrões léxico-sintácticos e aplicá-los a um corpus, a fim de avaliar a precisão no reconhecimento deste fenómeno.

De acordo com os resultados de anotação do corpus analisado, podemos sublinhar que as categorias mais representativas para criar um efeito irónico nas redes sociais, no domínio político, são: a exclamação (21.6%), as perguntas retóricas (14%), as antífrases (11.2%) e as metáforas (12.4%). No entanto, existem muitas exemplos que combinam vários recursos estilísticos numa mesma frase. Foram reunidos mais de uma centena de casos que continham dois ou mais recursos estilísticos. De acrescentar, porém, que, devido à limitação de 140 caracteres dentro de um “*tweet*”, alguns tornaram-se difíceis de interpretar com precisão.

O estudo do acordo *Inter-annotator agreement* (IAA) foi conduzido para diferentes propósitos após a implementação das anotações da pesquisa:

- (i) Para validar a fiabilidade da análise manual. Desta forma foram recolhidos quinhentos *Posts* e aplicados os distintos dispositivos linguísticos para recolher dados de correspondência irónica. No entanto, a fim de garantir a assertividade das anotações de resultados, foi realizado um teste de fiabilidade do corpus recorrendo a outros anotadores independentes. Os resultados mostraram um valor "altamente experimental", valor: $\alpha = 0,77$;
- (ii) Na segunda investigação foi feita a análise de expressões irónicas nos Mídia Sociais e a observação das categorias que são mais facilmente reconhecidas pelos anotadores como expressões irónicas, desta forma deu-nos recursos para estimar quais dos dispositivos estilísticos são mais óbvios e mais fáceis de aplicar numa identificação automática. Seguindo o acordo *Inter-annotator agreement* (IAA) ficou dividido em três grupos A, B e C sendo a diferença: $\alpha = 0,38; 0,095; 0,042$.
- (iii) O objectivo da terceira investigação foi estimar o impacto da ironia gerada pelos usuários dentro de um domínio estritamente político. Foi apresentada uma amostra diversificada de *Tweets* onde o anotador não tinha conhecimento da presença de ironia. Todos os *Tweets* que foram recolhidos visavam exclusivamente as eleições Presidenciais dos Estados Unidos da América, os resultados demonstraram % agr. 73,7, embora o valor do teste *Krippendorff* tenha sido bastante baixo $\alpha = 0,17$.

Vale ainda ressaltar que a linguagem figurativa implica um grande desafio para o seu reconhecimento, porque esta aponta para conhecimento extralinguístico, difícil de ser linguisticamente representado. Nesta tese, o nosso objectivo é analisar profundamente os recursos figurativos usados para produzir um efeito irónico, de forma a tornar possível a sua identificação automática, essencial para uma correta análise semântica do texto em que surgem.

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GLOSSARY OF TERMS

Corpus - a collection of writings, conversations, speeches, etc., that people use to study and describe a language.

Figurative device - a technique that the addresser uses to convey to the addressee a meaning with the goal of persuading him/her towards considering a topic from a different perspective. This study considers *rhetoric*, *figurative* and *stylistic* device under the same definition within the scope of the research.

Figurative language - refers to words, and groups of words, that exaggerate or alter the usual meanings of the component words.

Figurative Language Processing (FLP) - may be deemed as a subfield of NLP in which the major goal is not only focused on modeling natural language but on finding formal elements to computationally process figurative usages of natural language.

Irony - a statement in which the meaning that a speaker employs is sharply different from the meaning that is ostensibly expressed.

Literal language - refers to words that do not deviate from their defined meaning.

Natural Language Processing (NLP) - a field of computer science, artificial intelligence, and linguistics concerned with the interactions between computers and natural languages.

Sentiment Analysis - (also known as opinion mining) refers to the use of natural language processing, text analysis and computational linguistics to identify and extract subjective information in source materials.

Social media - a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content.

Twitter - an online social networking service that enables users to send and read short 140-character messages called "tweets".

User-generated content (UGC) - a range of media content available in a range of modern communications technologies, such as question-answer databases, digital video, blogging, podcasting, forums, review-sites, social networking, social media, etc.

User-generated tag (hashtag) - a non-hierarchical keyword or term assigned to a piece of information. In this study terms *user-generated tag* and *hashtag* are synonymized. Hashtag allows it to be found again by browsing or searching. Tags are generally chosen informally and personally by the item's creator.

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1. INTRODUCTION

*Irony regards every simple truth
as a challenge.*

Mason Cooley

The modern world cannot be imagined without *Homo Communicans* – a man who communicates, *Homo Artifex* – a man who creates, *Homo Ludens* – a man who plays and *Homo Ridens* – a man who laughs – four anthropocentric features on which irony is based. Obviously, no one can deny that irony is one of the most amazing characteristics that defines us as human beings and social entities. That is why the question of a comprehensive study of irony remains relevant until today.

Language, in all its forms, is the most natural and important mean of conveying information. However, given its social nature, language cannot be only conceptualized in terms of grammatical issues. In this respect, according to Perez “*while it is true that grammar regulates the language in order to have a non-chaotic system, it is also true that language is dynamic, and therefore can be considered as a live entity*”(Reyes, 2012: 11). This means that language is not static; rather there is a constant interaction between grammar and pragmatics, over time. For example, ironic expressions about human entities in user-generated content nowadays are quite different from the ones used by Shakespeare, in the Renaissance period. Irony, unlike literal language, figurative one supposes a deeper

insight into several areas such as linguistics, psychology and/or philosophy. The phenomenon of irony helps to project more complex meanings, which usually represent a real challenge not only for computers but also for human beings. These differences may arise from diversities in personal views on pragmatic interpretation of the same utterance.

According to Antonio Reyes Pérez “*figurative devices [...] entail cognitive capabilities to make abstractions as well as to interpret the meaning beyond literal words*” (Reyes, 2012: 1-2), i.e. figurative language reflects patterns of thought within a communicative and therefore social framework. In this respect, “*communication is more than sharing a common code, but being capable of inferring information beyond syntax or semantics*”(Reyes, 2012: 2); i.e. figurative language implies some information that is not grammatically expressed.

However, regardless of the uneasiness that figurative language involves, from an NLP perspective, recent research has shown that some figurative devices can be automatically generated and recognized with fair success. For example, the research works concerning automatic irony detection (Carvalho, 2009); (Hao, 2010); (Reyes, 2012); automatic humor recognition (Mihalcea, 2006); satire detection (Baldwin, 2009); and sarcasm detection (Tsur, 2010) have revealed the potential of approaching figurative language computationally.

In this research, we present a study carried out on a specific domain of figurative language – *irony*. Like most figurative devices, irony is difficult to be defined in formal terms. According to Wilson and Sperber, “*irony is a communicative act that expresses the opposite of what is literally said*” (Wilson and Sperber, 2007). Research performed by Carvalho restricts the usage of this term to “*a specific case where a word or expression with prior positive polarity is figuratively used for expressing a negative opinion*” (Carvalho, 2009: 1). For example, in the message below:

(1) #Obama that Nobel peace prize is well deserved. #irony

The expression ‘*well deserved*’ is figuratively used for expressing opposite of what is being said in terms of antiphrasis, using a positive word for conveying a negative meaning to it. This device allows the speaker to express sentiment-rich viewpoints with concision, sharpness and humor.

1.1 RESEARCH QUESTIONS AND OBJECTIVES

The study aims at answering following **research questions**:

- What are the main linguistic devices used to express irony on human targets in social media?
- Is it possible to distinguish such linguistic devices and group them into different subclasses?
- Which are the most representative classes of irony in such type of data?
- What types of irony are easier to identify manually?
- What is the significance of irony in social media, specifically in tweets targeting politicians?
- What types of irony may be possible to identify automatically, using a rule-based approach?

The methodological approach adopted to answer these questions required:

- Creating a corpus composed of ironic messages targeting human entities; in particular we selected a collection of tweets that mention a political entity, which were explicitly marked by users as expressing irony;
- Identifying the mechanisms used to express irony in the above mentioned corpus and classifying them into different subclasses;
- Creating surveys in order to investigate which subclasses are easier to recognize and the significance of irony targeting politicians in user-generated content;
- Design lexico-syntactic patterns able to identify specific cases of irony in short messages from user-generated content , namely the ones provided by Twitter, if time allows;

1.2 MOTIVATION AND CONTRIBUTIONS

Different approaches adopted by Carvalho et al. (2009), Veale and Hao (2010) and Reyes (2012) have proved that irony can be recognized by computational means. However, those approaches have not exhausted the topic and there is still much to be done, especially regarding the creation of an insightful feature model capable of identifying more complex cases of irony expression in short messages (Carvalho, 2009: 4). Therefore, in this study we aim to determine a set of linguistic and rhetoric devices used for the expression of irony in a specific type of content, mentioned above, particularly in Twitter¹. Twitter allows users (140 characters) to post short messages which do not follow the expected rules of the grammar, social media users tend to truncate words and use specific punctuation. That's why automatic detection of irony in Twitter requires specific linguistic tools and is not trivial. As the result, we expect that this study will contribute to a better understanding of the mechanisms for irony expression as well as provide a clear picture of how irony on human targets works in social media and impacts this type of content.

1.3 DISSERTATION OVERVIEW

This dissertation is organized as follows: **Chapter 2** describes the background regarding linguistic expression of irony, rhetoric and figurative language. Additionally, this chapter defines the concept of irony adopted in this study. **Chapter 3** introduces the state of the art concerning the computational treatment of figurative language processing. **Chapter 4** presents the methodology adopted in the dissertation. It describes aspects related to creation of the corpus and sampling techniques used in the research. This chapter also introduces the analysis procedures which were employed to define the most representative classes of irony in the analyzed data. **Chapter 5** describes linguistic resources created in the research. Introduces the criteria of manual annotation process,

¹ <https://twitter.com/> [Last access 03.11.2014]

illustrates linguistic and rhetorical devices used in the analysis. **Chapter 6** presents the results of the experiments, analysis and discussion, respectively. Finally, **Chapter 7** outlines the main conclusions of this work, as well as its contributions and areas for future research.

2. FIGURATIVE LANGUAGE

Irony is the hygiene of the mind.

Elizabeth Bibesco

This chapter will be focused on describing the figurative language background. In particular, a deep insight into chronology of investigation the phenomenon of irony will be presented in this chapter. We will concentrate on discussing different approaches in investigation of irony. Finally, this chapter will illustrate different types of irony.

2.1 FIGURATIVE LANGUAGE

The term “figurative” could be regarded as an antonym of “literal”. Figurative language is the language that one must figure out. In literal language the words convey meaning exactly as defined, whereas in figurative language there is room for interpretation. The interpreter is required to determine the speaker or writer’s intended meaning. The listener or reader must “figure out” what is meant². For instance, the word *lion*, which literally refers only to the concept of animal, speaking figuratively can refer to several concepts, which not necessarily are linked to animals. Therefore, it can be used instead of concepts such as strength, power, danger, and so on. “*In such a way its literal*

² Available at: <http://www.ereadingworksheets.com/figurative-language/> [Last access 03.11.2014]

meaning is intentionally deviated in favor of secondary interpretations” (Reyes, 2012: 16). Figurative language could be regarded as a type of language that is based on literal meaning, but is disconnected from what people learn about the world based on it (Bergen, 2005). Thus, literal meaning loses its primary referent in figurative language and, accordingly, the interpretation process becomes senseless. For example, Chomsky’s (1965) famous sentence explains this phenomenon:

(2) “*Colorless green ideas sleep furiously*”

This example helps us to understand the decoding process; either phonologically or orthographically, Chomsky’s example is fully understandable in terms of its linguistic constituents. However, its literal meaning is completely senseless; for instance, *colorless green* or *green ideas* are disconnected from their conventional referents for being able to produce a coherent interpretation. Thus, in order to understand this example, secondary interpretations are needed. If such interpretations are successfully made, then figurative meaning is triggered and, accordingly, a more coherent interpretation can be achieved. Based on this explanation, literal meaning could be considered denotative, whereas figurative meaning is viewed as connotative and must be implicated.

According to Katz et al. (1998), much figurative meaning is based on learned convention. Therefore, its use is not lexicalized (Li and Sporleder, 2010), although it is pragmatically motivated. In this respect, figurative language plays an important role in communication due to the need of performing mental processes such as reasoning and inferencing (Peters, 2004), which require additional cognitive effort (Gibbs, 2001). Moreover, Lonneker-Rodman and Narayanan (2008) point out that figurative language can use conceptual and linguistic knowledge (as in the case of idioms, metaphor, and some metonymies), as well as evoke pragmatic factors in interpretation (as in indirect speech acts, humor, irony, or sarcasm). In accordance with these assumptions, “it is obvious the processes of interpreting figurative language are much more complex than the ones performed when interpreting literal language” (Reyes, 2012: 17).

Differentiating between literal language and figurative language is an issue to address. “Despite the fact the figurative language requires much more cognitive efforts to correctly interpret its meaning, in the end, both languages are sequences of words with semantic meaning” (Reyes, 2012: 18). Such meaning is usually very clear in literal language and could be senseless in figurative. This difference could be explained in terms of performance and competence, or even as a matter of correctness. However, in a more comprehensive conception of language, this difference would be motivated by the need of maximizing a communicative success (Sperber and Wilson, 2002). This need would be then the element that will determine what type of information has to be profiled.

Thus, intentionality is one of the most important mechanisms to differentiate literal from figurative language. It is worth noting that language on its own provides specific linguistic devices to deliberately express different types of figurative contents: metaphor, allegory, analogy, and so on. These devices will be discussed and exemplified later in this work. To sum up, figurative language refers to the use of linguistic elements (words, phrases, sentences) and to the possibility of figuring out the secondary meaning, and then interpreting it within a specific frame. “*Frame refers to the notion of context: linguistic in terms of semantics, social in terms of pragmatics*” (Reyes, 2002: 18). In our research the object under consideration is *irony*, a specific device in figurative language. Below a brief overview of linguistic expression of irony is presented.

2.2 LINGUISTIC EXPRESSION OF IRONY

The study of irony has a long tradition in philosophy, rhetoric, literary criticism and linguistics. The study of linguistic category of irony requires consideration of the term etymology in the context of historical and cultural conditions. Interest in irony is easily explicable since it has various connotations. Throughout the development of society irony acquired different categorial status: from *trope* in the ancient world to the way of thinking and *attitude towards reality* nowadays.

2.2.1 A BRIEF HISTORY OF IRONY

The origin of the term *irony* (εἰρωνεία, *eirōneía*) arises in ancient Greek philosophy and literature meaning ‘*feigned ignorance, dissimulation*’ (Liddell & Scott, 1996: 2438). Marika Müller discusses the ancient origin of this phenomenon arguing that the roots of ironic expression originate from Aristophanes, Socrates and Homer’s works. Irony was widely used by ancient philosophers to describe the rhetorical reception ‘*cheat a friend*’, when “*a man calls things with opposite names*” (Müller, 1995: 5). According to **Aristotle’s** definition, *irony is a statement containing a mockery of those who really think in such a way*. For Aristotle, irony is extreme, which is also far from the truth, as well as boasting.

Throughout the centuries, historical and contemporary studies of irony can also be found in fields as diverse as anthropology, literature studies, linguistics, cognitive-, social, language-, and even clinical- psychology, philosophy, cultural studies and more (Colston, 2007). In the course of time irony gained wide acceptance in rhetoric, when speakers actively used this technique to enhance the effect produced on the listener. Irony created a considerable impact on the listener when the speaker did not simply paraphrase opinion of the opponent but brought together the last word with his own statement and it completely changed the meaning within the new context. This technique demanded from the speaker high-level eloquence and declamation qualities, ingenuity and serious preparation for the debate, thus, as a result, had a significant impact on the audience. Traditional stylistic interpretation considers irony as a secondary notation that follows on the principle of substitution. For this reason it sets it apart from stylistic means such as metaphor and metonymy, that are based on the use of opposites. Akhmanova views irony as a trope, which consists in the use of words to mean the opposite to the literal purpose of the small and hidden mockery-“mockery, consciously embodied in the form of positive characteristic or praise” (Akhmanova, 1969: 67). According to Potebnia, the term of irony is, firstly, in a narrower sense, the use of words which usually express a positive evaluation for the conveyance of negative opinion. Secondly, in a broader sense, irony is a

so-called construction expressed as a whole, as if indicating a positive or neutral attitude of the speaker to the reality (Potebnia, 1974: 345).

Another research, by Harald Weinrich (Weinrich, 1966: 271) refers to '*a standard elementary model of irony*'. This model is developed from the dialogues of **Plato**, in which the speaker (**Socrates**) carries on a conversation with the listener (his 'opponent'), while the curious audience listens to the conversation. According to this pattern, the 'victims' of the irony often become those who are unable to understand the true meaning of ironic utterances, i.e. the opponents of Socrates. Today this view is not widely shared among researchers, since in most cases the aim of criticism expressed ironically is to make the audience understand the disapproval.

Similarly, Michael Clyne, an Australian linguist and scholar, also believed that a 'victim' of irony is not aware of implicit meaning of the utterance (Clyne, 1975: 23). However, Clyne was the first who designated a mismatch between different levels of communication as a constitutive feature of irony and also pointed out the need for 'non-linguistic information' (knowledge about the world, context, particular situation, etc.), without which perception of irony is impossible.

A distinctive feature of Henry Loffler's study, which was limited to rhetorical irony, relates a common language with the common spiritual, cultural and ethical background knowledge as an essential precondition for irony comprehension. As a consequence, he believes that one of the main functions of ironic statements is 'linguistic groups separation mechanism' (Loffler, 1975: 120). Analogously, William D. Stempel draws attention to the close connection between irony and humor, since their main functions are to create a joke, or sharpness. In his study the author relies on the Freudian analysis of biased jokes, according to which the tendentious (biased) jokes are the most effective compared to any other types of jokes (Stempel, 1984: 205).

Clark and Gering, for example, analyze verbal irony as a pretense (Clark and Gering, 1984); Glucksberg and Brown (1995) see allusion in irony through the theory of speech acts; Salvatore Attardo (2000) offers to view irony as a significant incongruity in the study "Irony as Relevant Inappropriateness", and finally, Wilson and Sperber (2004)

suggest considering irony as an echo of what has already been written or said by somebody else (The Echoic Theory of Irony).

Clark and Gering analyze verbal irony as a pretense; this theory is based on the ideas that irony derived from the ancient Greeks and classic ideas of Paul Grice as well. The authors believe that irony is a way to implement a particular communicative role: to address the uninitiated, naïve audience and to be interpreted correctly. Recognition of the role by the addressee is the main condition for understanding the speaker's ironic intentions (Clark and Gering, 1984: 46).

Another pragmatic concept of verbal irony, the theory of irony as allusion, has been examined in the article "How About Another Piece of Pie: The Allusion Pretence Theory of Discourse Irony" by Glucksberg and Brown. The key idea is that irony is a reference to the expected, but not implemented situation. From a pragmatic point of view, an ironic statement abuses the maxim of sincerity, and this violation makes the addressee to interpret the statement as ironic (Glucksberg and Brown, 1995).

The theory of irony as a significant irrelevance has been represented by Attardo (2000) in the article "Irony as Relevant Inappropriateness". The logical concept of relevance shapes a core idea of the theory - a statement is considered to be relevant if all its assumptions are compatible with the hypotheses of the context in which the statement is used. Irony occurs when a statement or its element are contextually inappropriate. Such elements inevitably attract attention and hence carry more information compared with relevant elements. Thus, a mismatch between assumptions conveyed by the statements and the context provide a basis for irony interpretation.

Wilson and Sperber offer their own version of theoretical understanding of irony. It is based on the importance of the distinction between primary use and iterative repeatable mentioning of the utterance. Wilson and Sperber believe that irony emerges, like an echo, as a result of reference to what has been said before, but in the new context. In this case, the speaker distances himself from the statements referred to and emphasizes his negative attitude to it (Wilson and Sperber, 2004).

Giora and Fein (1999) in the article “Irony: Context and Salience” reveal that salience of meaning is the sole criterion for interpreting the utterance as ironic. An example of how a certain theory is used in empirical studies of verbal irony is demonstrated in the article “Irony: Negation, echo, and metarepresentation” by K. Curco (Curco, 2000). The author compares the explanatory power of the two theories: the theory of irony as echo proposed by Sperber and Wilson and the theory of irony as a hidden negation introduced by Giora and Fein (1999). The question “what cognitive abilities are necessary to understand verbal irony” is a ‘test’ criterion used for comparison. Curco concludes that Sperber and Wilson’s theory has more significant explanatory power as it describes more accurately the cognitive operations necessary for understanding irony in discourse.

The work of Sperber and Wilson (2003) “Irony and the Use-Mention Distinction” has evoked a lot of intense discussions among linguists. The authors propose a new approach, a theory of relevance, according to which any ironic statement is a kind of echo mentioning. The speaker uses the phrase with the ironic component not in the conventional sense but as a quote. It assists in expressing a negative attitude towards the source of the quote, which can be a person, an event or a certain situation.

In the works by Gibbs, it has been argued that the process of ironic meaning generation according to Griesche and Searle’s standard pragmatic model is not experimentally confirmed (Gibbs, 1991). A three-stage procedure of perception arising from the theory by Griesche – 1) understanding of the literal sense; 2) awareness of the discrepancy in the specific context; 3) creating an appropriate meaning – would require much more time consumption compared with the experimental data of Gibbs, according to which ironic statements are understood even faster than statements with literal meaning. R. Gibbs concludes that ironic utterances are understood directly, without formulating a literal meaning. In his opinion, in most cases it is more difficult to convey the literal meaning than to paraphrase the ironic one. R. Gibbs relies on the theory of relevance and suggests that ironic statement which explicitly expresses the context element is easier to perceive. In addition, he concludes that the ironic utterance is better retained in memory due to ‘echo’ structure (Gibbs, 1991).

It should be noted that many studies have been trying to define the nature of irony by understanding the pragmatic intentions underlying ironic communication. Balconi and Amenta (2008) suggested that irony is a complex pragmatic phenomenon involving specific communicative, linguistic and cognitive abilities. The authors examined the pragmatic comprehension of not only ironical but also non-ironical language by analyzing event-related potentials of irony in the decoding process. Scientists asked 12 subjects to listen to 240 sentences with a counterfactual and non-counterfactual content and also spoken with ironical and neutral prosody. Event-related potentials of morphological analysis showed a negative deflection peaking in central and frontal areas. Statistical analyses applied to peak amplitudes and also showed no statistically significant differences between the conditions as the content of ironical sentences and a function of the type of sentence. As a result the irony is not determined as a semantic anomaly. The observed differences could be probably attributed to a higher requirement for the cognitive system in order to integrate contrasting and complex prosodic, lexical and contextual clues.

2.2.2 TYPES OF IRONY

In “The New Princeton Encyclopedia of Poetry and Poetics”, Preminger and Brogan (1993) officially determined the following types of irony: *classical, romantic, tragic, dramatic, verbal, situational, and poetic* (Preminger and Brogan, 1993: 633). However, this classification can vary, for example Scott distinguishes the following types of irony (Scott, 1979: 212):

1) *Socratic irony* as concealment of innocence and ignorance;

2) *Dramatic or tragic irony* - double vision of what is happening in art and in real life. According to Attardo (1994), dramatic irony is when the reader of the novel or the viewer of the film knows more about a fictional character than the character himself;

3) *Linguistic irony* - the realization of two logical values: vocabulary and context (classical form of irony);

4) *Structural irony* – the use of a naïve protagonist who interprets events in ways different from the author's;

5) *Cosmic irony*, which is used to determine the views of people who have been severely deceived or dispossessed;

6) *Romantic irony*, in which the writer forces readers to share a double understanding of what is happening in the story.

Obviously, due to the fact that casual speakers rarely recognize the pragmatic boundaries concerning the types of irony outlined above, i.e. texts by non-experts who use an intuitive and unspoken definition of irony rather than one stated by a dictionary (Reyes, 2012), in our research we are interested mainly in **verbal irony** instances that are expressed in social media. Verbal irony is a linguistic phenomenon in which there is a contrast between what is literally being said and what is figuratively engaged (Gibbs, 2007). For example, one person looks out of window at a rain storm and asks a friend, 'Nice weather, huh?'³ In this linguistic expression the contradiction between the implied description and the facts expresses the irony.



Fig. 2.1. Example of verbal irony.

One of the best verbal irony examples in songs in popular media is Stay Awake from the Julie Andrews starrer Mary Poppins, where she sings a song about staying awake to put her wards to sleep. This is also one of the most common irony examples for kids used by teachers to explain the concept.

³Available at: <http://www.pinterest.com/wugwugs/verbal-irony/>

Mary Poppins: *[singing] Stay awake, don't rest your head. Don't lie down upon your bed. While the moon drifts in the skies... Stay awake, don't close your eyes. Though the world is fast asleep, though your pillow's soft and deep, you're not sleepy as you seem; stay awake, don't nod and dream... Stay awake... don't nod... and... dream⁴.*

In verbal irony, a speaker uses a form of speech that is superficially more appropriate to a very different context or meaning.

2.3 SUMMARY

In this study we consider the term of irony according to a glossary of literary terms by Abrams and Harpham (2011: 165): *irony is a statement in which the meaning that a speaker employs is sharply different from the meaning that is ostensibly expressed.* In other words, it is a figurative device based on opposition between *the thing* “named” and *the thing* “implied”. A thing is seemingly characterized in a good light, but in fact the opposite is meant. There are, however, examples of irony that do not rely on saying the opposite of what one means, and there are cases where all the traditional criteria of irony exist and the utterance is not ironic. Therefore, irony as a figurative device that may produce a humorous effect but it does not necessarily mean that irony is always amusing.

Moreover, it is worth to note that there is no clear distinction about the boundaries between irony, sarcasm and/or satire. Colston (2007) considers sarcasm as a term that is commonly used to describe an expression of verbal irony. Gibbs points out that “*sarcasm, combined with devices such as jocularity, hyperbole, rhetorical questions, and understatement, are just types of irony*” (Gibbs, 2007). On the other hand, Gibbs and Colston (2007) suggest that irony is often compared to satire and parody. According to definition of Reyes: “*while irony courts ambiguity and often exhibits great subtlety,*

⁴ Available at: <http://www.imdb.com/title/tt0058331/quotes> [Last access 03.11.2014]

sarcasm is delivered with a cutting or withering tone that is rarely ambiguous” (Reyes, 2012: 32).

As we may see, irony remains a complex communicative and pragmatic phenomenon whose correct decoding requires specific linguistic, communicative and cognitive abilities. While trying to explain how irony is used by speakers, linguistics and pragmatics elaborated different theories exploring the nature of ironic communication and of its production and comprehension processes. Within analyzed frameworks, irony has been considered a form of semantic anomaly or as a pragmatic construct involving forms of pragmatic insincerity, pretense, echoic elements or context-inappropriateness; or again it has been considered as a form of indirect negation. On a cognitive level it has been conceptualized as a form of thought involving different grades of contrast between linguistic representation and the reality domain it refers to. Finally, with a communicative approach, we can consider irony not as a semantic or pragmatic anomaly, but as a form of communication involving different levels of representation and complex communicative intentions.

It is widely recognized that study of irony cannot fit within the framework of linguistics only. It also remains the subject of research interest to psychologists, logicians, and those who deal with semiotics and communication theory, realizing in this way the principle of modern linguistics expansion. Thus, considerable diversity of approaches to irony interpretations in linguistics allows not only to prove or disprove the postulates of general linguistic theories, but also shed light on the psychology of human communication.

3. FIGURATIVE LANGUAGE PROCESSING

Irony is an insult conveyed in the form of a compliment.

Edwin P. Whipple

Irony is an extremely challenging form of communication since it implies ingenuity that can help artfully camouflage the expression of negative sentiment in opinion mining, making it a relevant and hot topic for the research nowadays. Recent investigations have focused on the automatic detection of irony in user-generated content (UGC) – blogs, news comments and microblogs, aiming to reduce the number of errors while mining opinions from social media.

For example, Mihalcea and Strapparava (2006) presented a study for automatically detecting humorous phrases. Specifically, the investigation is focused on the analysis of particular funny structures, one-liners, as illustrated by the following example:

(3) "Infants don't enjoy infancy like adults do adultery".

This sentence produces a funny effect with a help of a pun. *Pun*, also called *paronomasia*, is a form of word play, which suggests two or more meanings by exploiting multiple meanings of words, or of similar-sounding words, for an intended humorous or rhetorical effect. This trick helps to produce humor and plays an

oppositional role between the meanings of the words⁵. In the example above, the pun is based on the morphologic relation between the pair *infant, infancy* and the pair *adult, adultery*, and in the overt parallelism established between the two pairs.

The authors started the investigation of humorous short sentences by building a corpus for their sample data set, containing 16,000 humorous one-liners and an equal number of proverbs from an on-line proverb collection. The corpus also includes sentences from British National Corpus (BNC), sentences with similar word content to the humorous one-liners, and sentences from the Open Mind Common Sense (OMCS) collection. Then, several classification experiments were made using (i) humor specific stylistic features, such as the presence of alliteration, lexical antonymy and colloquial language, (ii) content-based features (unigrams) and (iii) a combination of both features. Most of the elements they reported are alliteration, antonymy or colloquial language. In addition, they suggested semantic spaces, which are triggers of humor: human centric vocabulary, e.g. *"Of all the things I lost, I miss my mind the most"*; negative orientation, e.g. *"Money can't buy your friends, but you do get a better class of enemy"*; and professional communities, e.g. *"It was so cold last winter that I saw a lawyer with his hands in his own pockets"*.

The study applied machine-learning techniques to identify humorous patterns in one-liners in order to recognize humour. Results show that a classification tree based on humor specific features is capable of differentiating one-liners from Reuters titles and BNC sentences, but does not separate one-liners from proverbs and OMCS sentences. Content-based classification using Support Vector Machines and Naive-Bayes classifiers showed that it was possible to clearly differentiate one-liners from all other types of sentences (except BNC sentences, which were chosen for being similar in content to the one-liners). The combination of features provided slight or no improvement. Performance analysis based on humor-specific features showed that individual features lead to precision between 61% and 65%, with alliteration having the highest presence in the examples (52%).

⁵Available at: <http://en.wikipedia.org/wiki/Pun> [Last access 03.11.2014]

Another approach, by Kreuz and Caucci (2007), shows the importance of several lexical factors in the identification of ironic and/or sarcastic statements. The research contains randomly selected corpus from the Google Book Search, a set of 100 hundred sentences containing the phrase “said sarcastically”, and then removed from the sentence the adverb “sarcastically” to eliminate any explicit clue about the ironic content of the statement. The study manually analyzed each sentence to check if it contained one of the following previously identified linguistic clues: (i) presence of adjectives and adverbs, (ii) presence of interjections, and (iii) use of punctuation, such as exclamation points or question marks. Then, 101 participants were asked to evaluate these sentences according to how likely they seem to be ironic without providing any additional contextual information. Ratings were made using a seven-point Likert scale (0 – not at all likely; 7 - very likely to be ironic). Later on, regression analysis has been performed in order to determine which lexical features could be used for predicting participant ratings: only the presence of interjections was considered a good predictor.

In comparison, the research presented by Carvalho et al. (2009) suggested some clues for automatically identifying ironic sentences, based on specific syntactic and morphological patterns, emoticons, onomatopoeic expressions, punctuation and quotation marks. Some of those clues are specific to Portuguese (e.g. morphological patterns), while others seem to be language independent and are present everywhere in social media (e.g. emoticons). Several experiments have been carried out on a collection, of news comments, extracted from a popular Portuguese newspaper, Público⁶. This collection is composed of 8,211 news and corresponding comments posted by on-line readers. All the patterns in this study restrict somehow the polarity of possible matching sequences, since the researches were particularly interested in recognizing irony in apparently positive sentences involving human named-entities (NE) (Table 3.1).

⁶Available at <http://www.publico.pt/> [Last access 03.11.2014]

Pattern	Match:	Examples
<i>Pdim</i>	(4-Gram+ NEdim NEdim 4-Gram+)	“Socratezinho”
<i>Pdem</i>	DEM NE 4-Gram+	“Este Sócrates é muito amigo do Sr. Jack”
<i>Pitj</i>	ITJpos (DEM ADJpos)* NE (?!!...)	“bravo”, “força”, “muito obrigado/a”,
<i>Pverb</i>	NE (tu)* ser2s 4-Gram+	“tu” vs. “você”
<i>Pcross</i>	(DEM ART) (ADJpos ADJneut) de NE	“O comunista do ministro”
<i>Ppunct</i>	4-Gram+ (!!!?!?!)	“!!!?!?”
<i>Pquote</i>	“(ADJpos Npos){1,2}”	“Que bom, Sócrates”
<i>Plaugh</i>	(LOL AH EMO+)	“lol” “ah”, “eh” and “hi” “.”“;,-)” “:P”

Table 3.1. Patterns used in the experiments by Carvalho et al (2009).

The pattern *Pdim* (diminutives) is widely used in Portuguese, often with the purpose of expressing positive sentiments, like affect or intimacy. However, they can also be used ironically. Demonstrative forms (*Pdem*), – “this”, “that” – before a human NE usually indicate that such entity is being negatively mentioned and it is a clue for the presence of irony.

This research showed that some interjections *Pitj* can also be used as potential clues for irony detection. The type of pronoun used for addressing people, signaled by the feature *Pverb*, can also be an important clue for irony detection, especially in languages like Portuguese or Russian, where the choice of a specific pronoun or way of addressing someone (e.g. “tu” vs. “você”, both translatable by “you”) may depend on the degree of proximity/familiarity between the speaker and the NE it refers to.

In Portuguese, evaluative adjectives with a prior positive or neutral polarity usually take a negative or ironic interpretation whenever they appear in cross-constructions (*Pcross*), where adjectives relate to the noun they modify through the preposition “de” (of). This pattern *Pcross* recognizes cross-constructions headed by a positive or neutral adjective (ADJpos|ADJneut, respectively), which modifies a human NE. Adjectives are preceded by a demonstrative (DEM) or an article (ART) determiner.

In user-generated content, punctuation (*Ppunct*) is used with the purpose of verbalizing the user’s immediate emotions and feelings, and intentionally signaling humorous or ironic text. The study assumes that the presence of a sequence composed of more than one exclamation point and/or question mark in a sentence can also be used as a clue for irony detection. Also, quotation marks (*Pquote*) are frequently used to emphasize an ironic content, especially if the expression delimited by these marks has a priori positive polarity (e.g. positive adjective qualifying an entity). Internet slang contains a variety of widespread expressions and symbols that typically represent a sensory expression *Plough*, suggesting different attitudes or emotions, such as acronyms “lol”, onomatopoeic expressions such as “ah”, “eh”) and prior positive emoticons “:)” “;-)” and “:P” (EMO+). In this particular case, the study assumes that laugh (*Plough*) expressions are intrinsically positive or ironic.

The results are shown in Table 3.2. The most productive patterns are directly related to the use of punctuation marks and keyboard characters, which are the way of representing oral or gestural expressions in written text. The most productive patterns involve (i) emoticons “☺” and onomatopoeic expressions for laughter “lol”, (ii) heavy punctuation marks “!?!?”, (iii) quotation marks “” and (vi) positive interjections “bravo”, “força”, “muito obrigado/a”. Notably, all these patterns are somehow related to orality, which shows that ironic constructions are frequently signaled by oral clues. In terms of polarity distribution, 55.5% of the entries have negative prior polarity, 21.8% have positive prior polarity and the remaining 22.7% are considered neutral.

	<i>ironic</i>	<i>not ironic</i>	<i>undecided</i>	<i>ambiguous</i>
<i>Pitj</i>	44.88 %	13.39 %	40.94 %	0.79 %
<i>Ppunct</i>	45.71 %	27.53%	26.75 %	0.00 %
<i>Pquote</i>	68.29%	21.95 %	2.73 %	7.03 %
<i>Plough</i>	85.40 %	0.55 %	11.13 %	2.92 %

Table 3.2. Results for the patterns used in the experiments by Carvalho et al. (2009).

Veale and Hao (2010), in contrast, concentrate on the most common form of ironic representation – the humorous simile – and develop a multi-pronged approach to separating ironic from non-ironic instances of similes. The study has analyzed a large quantity of humorous similes of the form “*as X as Y*” to explain the cognitive processes that underlie irony. According to Merriam-Webster Encyclopedia ⁷, a *simile (or comparison)* is a figure of speech that directly compares two different things, usually by employing the word “like” or “as”. It is different from a metaphor, which compares two unlike things by using one word in the normal distribution of another word, unlike the simile that uses comparative conjunctions (like, as) or comparative adjectives (similar, etc).

Annotating each simile by hand, the study finds that 15,502 simile-types (76%) are ironic while just 4,797 simile types (24%) are non-ironic. To determine whether ironic similes possess a clearly-defined affective signature, the researchers use Whissel’s dictionary to automatically classify each simile into one of three categories: those words with clear positive meanings (such as “beautiful”, “brave”, etc.); those with clear negative grounds (such as “ugly”, “dumb”, etc.). A ground is considered negative if it possesses a pleasantness score less than one standard deviation below the mean (≤ 1.36), and positive if it has a pleasantness score greater than one standard deviation above the mean (≥ 2.28). A breakdown of similes that match these criteria is shown in Table 3.3.

	Straight	Ironic
Positive Ground	9%	71%
Negative Ground	12%	8%

Table 3.3. Similes categorized by irony and affect by Carvalho et al. (2009).

From Table 3.3 it is clear that ironic similes have a strong preference for disguise negative sentiments in positive terms, while only a small minority of similes (8%) attempt to convey a positive message in an ironically negative content.

The research by Antonio Reyes Pérez (2012) aims at the identification of the

⁷Available at: <http://www.merriam-webster.com/dictionary/simile> [Last access 03.11.2014]

linguistic-based patterns for figurative language processing in the case of humor recognition and irony detection. The study specifies two tasks in which the automatic processing of figurative language was involved. Each task was undertaken independently by means of a linguistic pattern representation. In this respect, two models of figurative language were proposed:

- (i) HRM (Humor Recognition Model);
- (ii) IDM (Irony Detection Model).

Both models, HRM and IDM, go beyond surface elements to extract different types of patterns from a text: from lexicon to pragmatics. Since the target of the study focused on representing figurative language concerning social media texts, each model was evaluated by considering non-prototypical texts that are laden with social meaning. Two goals were highlighted while evaluating the models: representativeness and relevance. When evaluating representativeness, the study concentrated on whether individual features were linguistically correlated to the ways in which the users employ words and visual elements (i.e. emoticons and punctuation marks). The classification task, in contrast, evaluated the capabilities of the models as a whole, focusing on the ability of the entire system of patterns to accurately discriminate figurative from non-figurative texts. According to the results, the initial assumptions concerning the usefulness of this type of information in characterizing figurative language were confirmed. Finally, the patterns were better used as part of a coherent framework rather than used individually; i.e. no single pattern was distinctly humorous or ironic, but all of them together provided a valuable linguistic inventory for detecting these types of figurative devices at textual level

4. METHODOLOGY

*Irony is a gaiety of reflection and
the joy of wisdom.*

Anatole France

In this study we aim to identify specific aspects and forms of irony, expressed with a help of linguistic or figurative devices, and understand if they can be susceptible to computational processing. The methodology chapter is presented in several sections, which describe in detail data collection and corpus creation process, annotation and analysis procedures.

4.1 DATA MANAGEMENT

This study focuses on identifying some aspects of linguistic expression of irony in social media when targeting media personalities, namely politicians. Creating a social media strategy to be used during political campaigns has become an essential part of every candidate's pre-electoral campaign.

Hubert “Sonny” Massey, a Business instructor and advisor at South University Savannah, says: *“The use of social media in today’s campaign is not only important — it is critical [...] Millions of people are involved in using social networks daily. It is the opportunity to be in touch with large numbers of voters quickly, constantly*

and at a low cost.”⁸ Thus, such technologies provide a rich source of information. That is why social media has a huge impact on any kind of elections. This impact is getting even more significant due to the speed of communications and the numbers of people registered and involved hourly. For example, Chris Saad, a chief strategy officer at Echo, says, “*The use of social media was pivotal during the 2008 presidential election, when U.S. President Barack Obama became the first candidate to use it successfully*”⁹.

4.1.1 TARGETS

In our research, we focus on a restricted set of political named entities, specifically Barack Obama and Mitt Romney (Fig 4.1), the two key politicians of the 57th US quadrennial Presidential election campaign in 2012, who, according to the official poll⁹, were the most frequently mentioned candidates in user-generated content. In the context where social media becomes an increasingly important tool in political campaigns, it can serve for benefit and detriment, as a “*double-edged sword*”. Hence, both two politicians were often mentioned negatively and/or ironically.

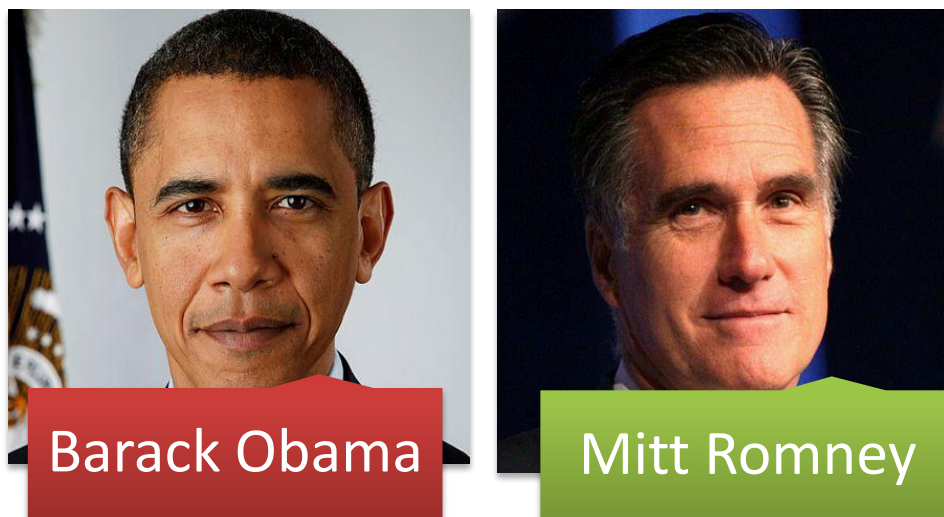


Fig. 4.1. Nominees for the United States presidential election of 2012.

⁸Available at: <http://source.southuniversity.edu/political-campaigns-and-social-media-tweeting-their-way-into-office-106986.aspx> [Last access 03.11.2014]

⁹Available at: <http://blog.hootsuite.com/election-tracker-results/> [Last access 03.11.2014]

4.1.2 DATA COLLECTION

Internet-based technologies have become an essential source of data in a variety of academic and scientific fields. Thus, user-generated content (such as text, audio and images) provides knowledge that is topical, task-specific and dynamically updated to broadly reflect changing trends, behavior patterns and social preferences. Therefore, in order to sort out the data for the research, a real-time social analytics provider has been applied. Topsy¹⁰ is partnered with Twitter, which is a daily measurement of Twitter users' feelings towards different topics (Fig 4.2). It is a social media search engine that allows collecting easy the messages from Twitter, based on keyword and/or hashtag in a given period of time. Twitter Political Index was co-developed by Twitter and Topsy. It debuted in August 2012 and, originally, it compared social sentiment for the two primary American presidential candidates.

Topsy contains tweets, numbering in hundreds of billions, dating back to Twitter's inception in 2006. This provider allows searching, analyzing and drawing insights from conversations and trends on the public social websites, including Twitter and Google+.¹¹

Twitter contains an impressive number of ironic tweets expressed by social media users every minute. In general, the property of a message being ironic or not depends not only on the writer's intention, but also on the reader's interpretation. Moreover, personal factors such as mood, stress, culture or even linguistic competence, have impact on the final interpretation. Twitter allows users to assign different hashtags to their posts, namely the ones representing irony, for example:

(4) *Team Obama (NE) feels just fine about suggesting Romney killed a woman but gets bent out of shape over a birth certificate joke. #irony*

(5) *Just saw a Mexican who could barely speak english and he had an anti-obama bumper sticker that said "got birth certificate?" #irony*

¹⁰:<http://topsy.com/> [Last access 03.11.2014]

¹¹Available at: [http://en.wikipedia.org/wiki/Topsy_\(analytics\)#Operation_and_History](http://en.wikipedia.org/wiki/Topsy_(analytics)#Operation_and_History) [Last access 03.11.2014]

We explored hashtags for collecting a corpus comprised of messages based on personal judgments, therefore the collection of messages was *a-priori* considered ironic by addresser. The data collected for the study is useful not only for analyzing the mechanisms used for expressing irony, but also for estimating the percentage of irony in social media nowadays by providing a questionnaire survey to be annotated by independent evaluators.

The collection of tweets had to meet the following criteria to be included in a corpus:

- be written in English;
- contain a political named entity (NE), corresponding to a presidential candidate that ran for the United States Presidential Election 2012, either Mitt Romney and/or Obama;
- contain a user-generated tag (hashtag) explicitly introduced by the users evoking irony, as, for example, #irony or #ironic;

For example, the tweet presented below obeys to all these prerequisites:

(6) *Somebody find the geniuses that gave Obama a Nobel peace prize because this man deserves an award #irony*

As illustrated, the positive words/expressions (e.g. *the geniuses* or *deserves an award*) very often express an aggressive meaning, when applied ironically to specific named entities, especially to politicians.

4.1.3 SAMPLING TECHNIQUES

In our research, we deployed a simple random sampling technique for selecting the data. The sample contains a data set composed of 500 tweets selected from 1000 that had been extracted manually from Topsy, after applying the filters on user-generated tags and political named-entities keywords. This method avoids subjectivity and bias - each

member of the sampling unit has an equal chance of being selected¹². Moreover, the time slot and domain of the published tweets was the same, August 2012 and October 2012.

4.2 CORPUS AND DATA ANALYSIS PROCEDURES

Corpus annotation could be undertaken at different levels and may take various forms. For example, at the phonological level, corpora can be annotated for syllable boundaries (phonetic/phonemic annotation) or prosodic features (prosodic annotation); at the morphological level, corpora can be annotated in terms of prefixes, suffixes and stems (morphological annotation); at the lexical level corpora can be annotated for parts-of-speech (POS tagging), lemmas (lemmatization), semantic fields (semantic annotation); at the syntactic level corpora can be annotated with syntactic analysis (parsing, tree banking or bracketing); at the discourse level corpora can be annotated to show anaphoric relations (co-reference annotation), pragmatic information like speech acts (pragmatic annotation) (Xiao, 2003). Finally, stylistic features such as speech and thought presentation are expressed with a help of *stylistic annotation*. While pragmatic annotation focuses on speech acts in dialogue, stylistic annotation is particularly associated with stylistic features in literary texts (Leech, McEnery and Wynne 1997: 94). Wallis and Nelson (2001) first introduced what they called the 3A perspective for corpora annotation: annotation, abstraction, and analysis.

Annotation consists in the application of a scheme to texts. Annotations may include structural markup, part-of-speech tagging, parsing, and numerous other representations.

Abstraction consists in the translation (mapping) of terms in the scheme to terms in a theoretically motivated model or dataset. Abstraction typically includes linguist-directed search but may include, for example, rule-learning for parsers.

¹²Available at:

<http://www.rgs.org/OurWork/Schools/Fieldwork+and+local+learning/Fieldwork+techniques/Sampling+techniques.htm> [Last access 03.11.2014]

Analysis consists in statistical probing, manipulating and generalizing from the dataset. Analysis might include statistical evaluations, optimization of rule-bases or discovery methods knowledge.

In our research we used a *stylistic annotation approach* due to the goals of the investigation. Thus, our corpus is aimed at distinguishing main linguistic devices for expressing irony on human targets and grouping them into different subclasses if possible. More precisely, the data extraction was focused on representing figurative language patterns based on social media examples, such as an online microblogging service Twitter, which introduces so-called “up-to-date” ironic instances, rather than prototypical ones.

Data analysis is the process of systematically applying statistical techniques to describe and illustrate, condense and recapitulate, and evaluate the data. According to Shamoo and Resnik (2003), various analytic procedures provide a way of drawing inductive inferences from data and distinguishing the signal (the phenomenon of interest) from the noise (statistical fluctuations) present in the data. Therefore the goals of the analysis presented below.

4.2.1 GOALS OF THE ANALYSIS

An essential component of ensuring data integrity is the accurate and appropriate analysis of research findings. In this study, we:

- Perform a manual annotation of the corpus created in order to identify the mechanisms used in Twitter to express irony on human targets;
- Create a typology of such mechanisms;
- Evaluate which types of language devices are easier to recognize as ironic, by applying an online questionnaire survey created for this purpose;
- Conduct an inter-annotator agreement study to test the reliability of the classification on the manually annotated corpus and evaluate task complexity;
- Evaluate the performance of Sentistrength¹³ (a sentiment annotation tool) in

¹³ <http://sentistrength.wlv.ac.uk/> [Last access 03.11.2014]

automatically analyzing the polarity of ironic tweets, and compare the results obtained with the manual annotation and the questionnaire survey annotation results;

- Create lexico-syntactic rules for automatic identification of ironic comments, if possible.

4.2.2 MANUAL ANNOTATION OF THE DATA

According to Gottschalk (1995), the validity of a content analysis study refers to the correspondence between the categories (the classification that is assigned to text content) and the conclusions; and the generalizability of results to a theory (did the categories support the study's conclusion, and was the finding adequately robust to support or be applied to a selected theoretical rationale?).

Hence, after creating a typology of the mechanisms used to express irony, we are going to concentrate on testing its reliability on the corpus with the help of independent annotators. Gottschalk claims that researchers performing analysis on either quantitative or qualitative analyses should be aware of challenges to reliability and validity. For example, in the area of content analysis, Gottschalk identifies three factors that can affect the reliability of analysed data:

- *stability*, or the tendency for coders to consistently re-code the same data in the same way over a period of time;
- *reproducibility*, or the tendency for a group of coders to classify categories membership in the same way;
- *accuracy*, or the extent to which the classification of a text corresponds to a standard or norm statistically.

A manual annotation of the corpus aims at distinguishing main linguistic devices to express irony on human targets and group them into different subclasses. This typology may include different devices, such as metaphors, hyperboles, and other language strategies; and clues, such as the use of graphic symbols, like emoticons and/or

onomatopoeic expressions, etc. For instance, one of the possible classes is illustrated by the following example:

(7) Romney, we need more wars everywhere #sarcasm

Irony results from the negative object (*wars*) of a predicate *need*, which is then hyperbolized by the locative adverb *everywhere*. So, irony in this tweet is expressed through antiphrasis (*need-war*) and secondarily, by hyperbole (*everywhere*). Hyperbole can be defined as a deliberate overstatement or exaggeration of a feature essential to the object or phenomenon.

4.2.3 QUESTIONNAIRE SURVEYS IN THE RESEARCH

The inquiry forms constructed for this study are based on a Google template, namely Google Drive. The tool gave us a possibility to make the survey available to everyone, with an option to share the link in any kind of social networks. Total number of surveys created for this research – three. The surveys consist of a number of questions, which a respondent has to answer in a set format. A distinction is made between open-ended and closed-ended questions (also known as open and *cloze* questions). An open-ended question asks the respondent to formulate his or her own answer, whereas a closed-ended question lets the respondent choose an answer from a given number of options. The response options for a closed-ended question should be exhaustive and mutually exclusive. Four types of response for closed-ended questions are distinguished (Mellenbergh, 2008):

- *Dichotomous*, where the respondent has only two options;
- *Nominal-polytomous*, where the respondent has more than two unordered options;
- *Ordinal-polytomous*, where the respondent has more than two ordered options;
- (*Bounded*) *continuous*, where the respondent is presented with a continuous scale¹⁴.

¹⁴Available at: http://en.wikipedia.org/wiki/Survey_methodology [Last access 03.11.2014]

In our research, we use three surveys with closed-ended questions, which is also a commonly used technique in research based on questionnaires. It gives multiple-choice variation to annotators providing several options to be applied to each tweet. The advantages of closed-ended questions are the following (Mellenbergh, 2008):

- Closed questions are an appropriate means of asking questions that have a finite set of answers.
- They oblige the respondent to answer particular questions and provide a high level of control to the questioner.
- They involve minimal cognitive effort on the part of the respondent.
- They provide uniformity of questions and responses, so they are potentially easier for evaluating the opinion of the sample group as a whole.
- They save time: closed questions are less time consuming for respondents to complete, and this allows the questionnaire to include more questions.
- They can provide better information than open-ended questions, particularly where respondents are not highly motivated.

Survey 1. *Linguistic Devices Used to Express Irony in Social Media*

To measure the reliability of the annotated corpus, we applied a closed-ended questions survey in order to validate the manual annotation of the corpus (available in Appendix A). As we mentioned above, methodology of closed-ended questions limits annotators to a list of certain answer choices (in our case *nominal-polytomous*). It facilitates the process of annotation and shortens the time necessary for the task.

The answers for closed questions were designed as following:

- 1 option is correct;
- 1 option is offset: it has absolutely nothing to do with the question;
- 2 options are misleading or ambiguous.

Unfortunately, closed questions give to a respondent a certain type of limitation, but in our case it is essential to know the evaluator's opinion about the type of figurative device used to produce ironic effect in a tweet. Thus, a certain degree of freedom has also been provided to respondents by also providing the choices:

- "None of the above";
- "No figurative device involved ";
- "Other", with a space for the respondent to type his/her answers.

All in all, that gave us the possibility of not limiting the annotators into giving their option to specify subjective opinion about which figurative device has been used in one or the other tweet, but plenty of liberty for him/her to make his/her own observations, if adequate.

The tweets given to the annotators for reliability analysis consist in 20% (100 tweets) of the data, selected from entire collection and equally distributed according to the distribution of the figurative devices used for ironic expression in the entire corpus. After the respondents submit their result, an inter-annotator agreement study was conducted.

Survey 2. *Linguistic Expression of Irony in Social Media*

One of the questionnaires is aimed at verifying whether annotators generally agree or not with irony presence in the tweets. A set of 20 % of the data was selected from primary dataset and the hashtags representing an external clue of irony were eliminated in each sample. The purpose of this survey is to answer the following questions:

- What is distribution of irony in social media?
- Which types of irony are easier to identify during a manual annotation of the corpora?

Even though non-expert annotators usually use an intuitive and unspoken definition of irony, rather than one sanctioned notion such as the one presented in a dictionary, we decided to suggest the annotators a set of guidelines with all the necessary

definitions and requirements clearly explained (available in Appendix B). Thus, three options have been given to annotator to provide his/her opinion as:

- ironic;
- not ironic;
- difficult to decide.

Survey 3. *Distribution of Irony in Social Media*

The second questionnaire was designed with the aim of estimating the distribution of irony in social media. To achieve this objective, 1000 tweets have been extracted manually from analytics provider Topsy and, from those, we randomly selected 300 tweets. In this collection, the tweets do not contain any explicit marker standing for irony. The extraction of these tweets was based only on keywords of political named entities and tags for US Elections 2012. In this survey, the annotators were asked to choose if the tweet is ironic or not.

4.3 CALCULATION OF POLARITY DISTRIBUTION

Opinion mining, also known as sentiment analysis, is the extraction of positive or negative opinions from (unstructured) text (Pang & Lee, 2008). Opinion mining applications include detecting movie popularity from multiple online reviews or diagnosing which parts of a vehicle are liked or disliked by owners through their comments in a dedicated site or forum. There are also applications unrelated to marketing, such as differentiating between emotional and informative social media content (Denecke and Nejdil, 2009).

Sentiment-and-strength classification has been developed by Wilson et al. (2006) for a three level scheme (low, medium, and high or extreme) for subjective sentences or clauses in newswire texts using a linguistic analysis converting sentences into dependency

trees reflecting their structure. SentiStrength¹⁵ estimates the strength of positive and negative sentiment in short texts, even for informal language. SentiStrength reports two sentiment strengths:

-1 (not negative) to -5 (extremely negative)

1 (not positive) to 5 (extremely positive)

SentiStrength was originally developed for English and optimized for general short social web texts, but it claims that it can be configured for other languages and contexts by changing its input files - some variants are demonstrated below. It is worth noting that SentiStrength mentions that it is not widely applied to political texts.

¹⁵ <http://sentistrength.wlv.ac.uk/> [Last access 03.11.2014]

5. LINGUISTIC MEANS TO EXPRESS IRONY

*Irony is just honesty with the
volume cranked up.*

George Saunders

This chapter describes the linguistic resources created in the scope of this research. In particular, we introduce the criteria of manual annotation process and explain the steps taken in the experiments in detail. This chapter illustrates the linguistic and rhetoric devices used and their representation in our corpus from user-generated content.

5.1 IRONY IN SOCIAL MEDIA

Expression of irony in classical literature is quite different from irony expressed in social media nowadays. For example, let us consider the following lines in Shakespeare's "Romeo and Juliet", Act I, Scene V:

(8) *"Go ask his name: if he be married.
My grave is like to be my wedding bed."*

In this example Juliet commands her nurse to find out who Romeo is and to ask if he is married. If he is, she will never marry; hence, the grave will be her wedding bed.

This is an illustrative sample of verbal irony due to the fact that the audience knows a priori that Juliet is going to die on her “*wedding bed*”. The example of irony provided above from a Shakespearian play is quite far from short online ironic messages in social media. For instance, the following tweet contains a verbal irony expressed in a different “modern” way:

(9) *Obama on Romney's taxes: "If you're gonna run for President, your life should be an open book." #irony*

In this sentence the irony is expressed due to the metaphorical comparison between the position of the President and an idiom, with a metaphorical value, “*an open book*”. President Obama is addressing Mitt Romney, a nominee for the US president, whose tax declaration has to be done yearly to declare ALL the incomes and expenses of the citizen. The phrase “open book” links us to a thought that Mitt Romney has a thinly veiled declaration submitted.

In this respect, we consider social media the best example concerning the impact of new technologies on language and social habits. Communication, for instance, is slightly changing and acquiring wider scope because new ways of interacting come into use. As our media is increasingly becoming more social, the problem of figurative language use is becoming even bigger. Thus, in this research we performed a stylistic corpus annotation aimed to analyze figurative language in terms of actual, recent and mostly colloquial examples, rather than in terms of irony examples sealed in the masterpieces of the world literature.

5.2 REPRESENTATION OF IRONY IN CORPUS

According to Gibbs (2000), irony could be expressed by a variety of figurative devices like sarcasm, hyperbole, rhetorical questions, jocularly, and other strategies. In our work, we test if ironic effect in user-generated content could be produced with the help of other figurative devices that are often used to express abstract emotional or philo-

sophical concepts in ironic statements, particularly, like in example 9, presented above, that express metaphorical comparison. This could be explained by the fact that the differences between rhetorical devices can be quite subtle and relate to typical emotional reactions of the listeners and rhetorical goals of the speakers. Thus, we consider, similarly to Gibbs, that different stylistic rhetoric and figurative devices could be used to express irony in social media.

A corpus of 500 tweets was analyzed in terms of linguistic devices used for ironic expression, which help the speaker to achieve the utmost expressiveness in his/her speech and lend to a desired emotional coloring; for example, tweet expressing irony with a help of rhetorical question: “*Bill Clinton is now telling the country how great Obama is?*”; and exaggerating (hyperbole) “*Well he's definitely **never** lied to us before so it **must** be true...*”. Such wide use of stylistic devices helps the addressee to disclose the author’s attitude to the events described and to “read a lot between the lines” of the literary content.

In the course of analysis we propose a unique subdivision of stylistic devices proposed by us. This classification has been organized as follows: (i) *lexico-semantic devices*, where lexicon and interpretation of the words are the main features; usually one word *x* substitutes the other one *y*; (ii) *syntactic devices* could be represented with reduction and/or extension of the sentence, change of word order or transposition of sentence meaning with the help of additional signs in a short message that convert the sentence meaning into the opposite one, for example, rhetoric questions; (iii) *phonetic devices* consist of the group where ironic effect is produced with the help of different sounds (e.g. humans, animals, etc.) (iv) *other* – this category has been created for the cases where the exclamation or cliché categories have been involved for creating ironic effect. Besides that, the category *other* was chosen when the tweet did not belong to any other group mentioned above and involved ambiguity. Classifying devices used to produce ironic effect was not an easy task. Figure 5.1 illustrates these groups’ classifications as well as names of all the figurative devices involved in our corpus annotation.

Thus, it is important to note that ironic effect in user-generated content could be expressed with help of several stylistic devices at the same time. The classification presented above can vary from tweet to tweet and from content to content. An interesting observation is that some tweets can combine several devices that produce ironic effect.

Moreover, one stylistic device can intensify, in our opinion, the other one; for example, hyperbole is usually reinforced by antiphrasis and exclamation, according to the data analyzed in the corpus:

(10) *Obama is a real genius and protector!!! #irony*

This example shows hyperbolic words “*a real genius and protector*” expressed with antiphrastic value and exclamation marks.

This chapter describes linguistic resources created in the corpus analyzed; manual annotation followed a certain criteria in terms of definitions of figurative, stylistic and rhetoric devices and their representation in our corpus from user-generated content.

5.3 LEXICO-SEMANTIC DEVICES

The first group that represents **lexico-semantic stylistic devices** was represented by us in several categories: *figures of quantity, quality, opposition and fixed phases*. In the process of annotation, we noticed that this group is the largest one, both in terms of stylistic devices involved and in terms of their representation in our dataset after manual annotation.

Figures of quantity are based on the comparison of two different objects or phenomena having a common feature expressed with a certain degree of intensity. If this feature characterizes the referent in a deliberately greater degree, it may be regarded as *hyperbole*; if this feature is ascribed to the referent in a deliberately less degree, it is considered to be *litotes*¹⁶. *Hyperbole* is an amplification applied in verbal singular with the clear intention of provoking alienation effect beyond credibility (Lausberg, 1993: 158).

¹⁶ Available at: http://bagumyan.at.ua/index/stylistic_semasiology_of_the_english_language/0-60 [Last access 03.11.2014]

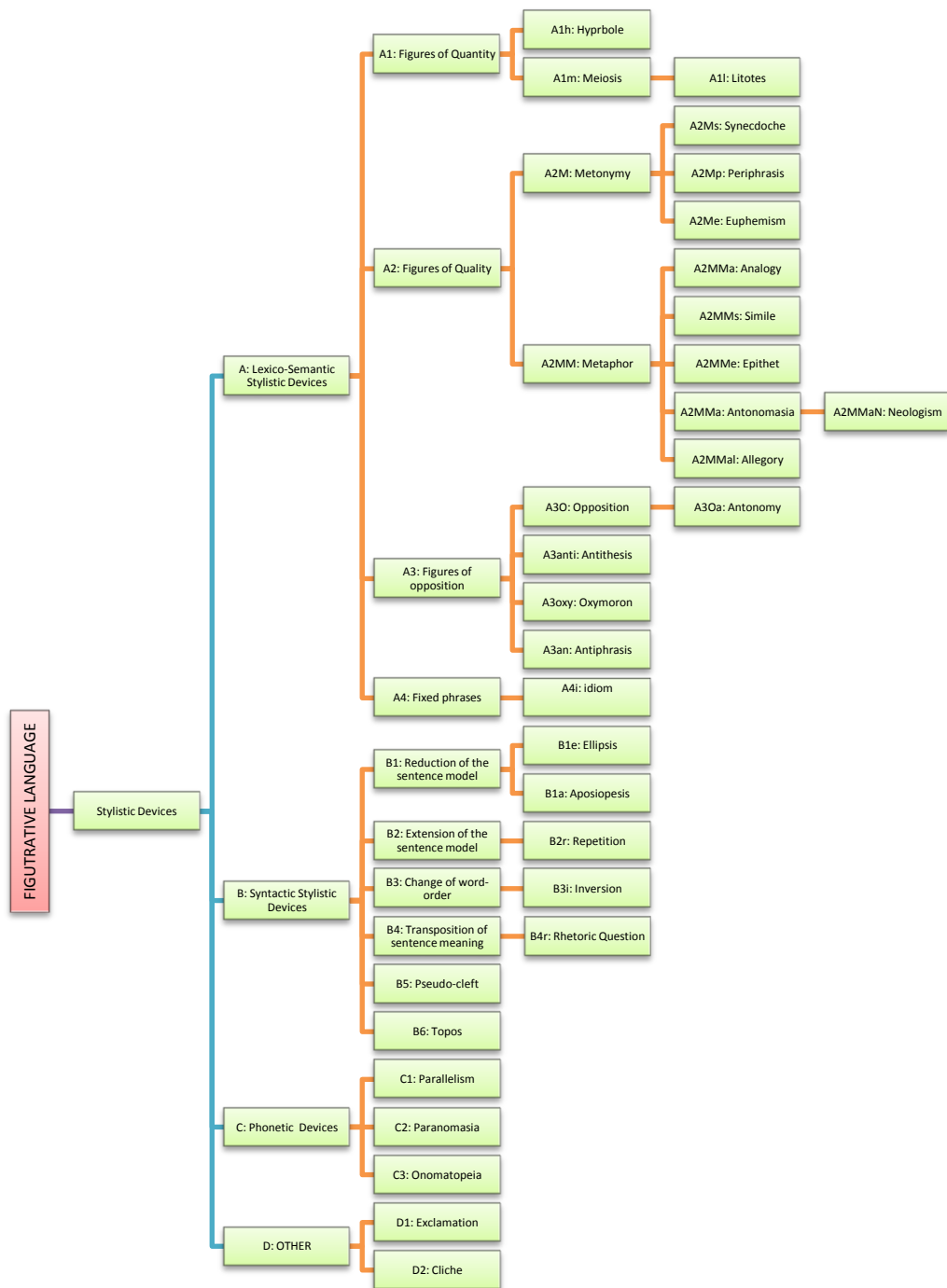


Fig. 5.1. Classification of Stylistic Devices.

Consequently, hyperboles are exaggerations to create emphasis or effect. It is typically illustrated with superlative modifiers. It may be used to evoke strong feelings or to create a strong impression but is not meant to be taken literally. (Efimov, 2004:46). For instance:

(11) *Liberal hero and protector of the 99%, Mr. Barack Obama! #tlot #tcot #liberal #Obama2012 #irony*

In this case 99% is clearly a figure that is meant not to be read literally. While annotation, we noticed that hyperbole in tweet is usually expressed by pronouns (e.g. *all, every, everybody, everything*); by numerical nouns (e.g. a million, a thousand, 99%); by adverbs of time (e.g. *ever, never*). In our perception, hyperbole is mostly connected with such other stylistic devices as exclamation and antiphrasis. Besides that, hyperbole may be the final effect of other stylistic devices: metaphor, simile, etc.

Litotes is a figure of quantity is opposite in meaning to hyperbole. It contains an “artistic” way of understatement of the value, object or phenomenon and represents quantity (Efimov, 2004: 47). Therefore, litotes has a peculiar syntactic structure; it is a combination of the negative particle “*not*” and a word with negative meaning or a negative prefix, e.g. “*not negative x = x*” in other words two negative particles give the opposite meaning, e.g. “*not unkind*” means “*kind*”. Such a combination makes positive sense: “*not bad*” means “*good*”. It quite often expresses ironic meaning, like in the example below:

(12) *LOL not bad, not bad...one thing is certain to happen if Romney wins. When economy gets worse or no better, GOP will blame Obama for years. #irony*

In this case the use of *not bad, not bad* is ironic. It makes statements and judgments sound delicate and diplomatic. *Gets worse or no better* emphasizes the litotes even more.

Figures of Quality are based on comparison of features and qualities of two objects belonging to different areas or classes, which are perceived as having a common feature.

Metonymy is the transfer of a name of one object to another object, indicating that object and/or phenomenon is in the spatial, temporal, etc. relation to the object which is a designated replaceable word. A substituted word in this case is used in a figurative sense. In this context, metonymic transference of names is based upon the principle of contiguity of the two objects. As a rule, metonymy is expressed by nouns, less frequently - by substantivized numerals. That is why the syntactic functions and positions of metonymic words are those of the subject, object and predicative. For example:

(13) *Hey, ppl, lend me your ears! #irony! Poll: 40% of 47 percent were planning to vote for Romney. Now 99% plan on staying home. #irony*

In this example the purpose of using a metonymy is to add flavor to the writing. Instead of just repeatedly saying "*attention, attention*", the person uses a very famous quote by Mark Antony in the play *Julius Caesar*, by William Shakespeare. It breaks up any awkwardness of repeating the same phrase over and over and it changes the wording to make the sentence more interesting. In other words, "X=Y", where *x* is a word or phrase that is used to stand in for another word *y*. Sometimes a metonymy is chosen because it is a well-known characteristic of the word, like in the example mentioned above.

Synecdoche is a variety of metonymy realized in two variants. The first variant is naming the whole object by mentioning part of it: "Caroline lives with Jack under the same roof" (under the same roof -in the same house). The second variant of synecdoche is using the name of the whole object to denote a constituent part of this object: "The hall applauded" (the hall = the people inside). In Twitter, a synecdoche has been used in:

(14) *#Romney is a REAL BREADWINNER of his family, but he leaves everyone in US Middle class without that bread and water...lol #irony #ThanksRomney*

The term "*REAL BREADWINNER*" and "*bread and water*" have been chosen to represent the whole expression of food in general and money, $x^2 = x$. This creates an ironic effect since the politician Mitt Romney does not feel the lack of money to buy bread.

Periphrasis is a replacement of a direct name of a thing or phenomenon by the description of this thing or phenomenon quality. Periphrasis intensifies a certain feature of the object described. It stands close to metonymy because it is one more way to rename objects.

There are such types of periphrasis as logical and figurative. *Figurative periphrasis* is usually based upon metaphor or metonymy, e.g. to marry = to tie the knot (metaphor); enthusiast = young blood (metonymy); money = root of evil (metaphor). Meanwhile, *logical periphrasis* is based upon one of the inherent properties of the object, e.g. weapons = instruments of destruction; love = the most pardonable of human weaknesses.

For example:

(15) LOL... #Romney *knows everything about #blackGold and his better part about the soft one. #greenpeace #irony #sarcasm*

This example is clearly represented by figurative periphrasis. “Black gold” corresponds to oil, “soft gold” to furs, and finally “his better part” is linked to the wife of Mitt Romney – Ann. All these expressions just in one tweet produce an ironic effect expressed by periphrasis: $X = x + y$. It is a stylistic device that can be defined as the use of excessive and longer words to convey a meaning which could have been conveyed with a shorter expression or in a few words.

Euphemism is a word and/or word-combination which is used to replace an unpleasantly sounding word and/or word-combination. For example, **x is not x**, but a polite way to express **y**:

(16) *Hey Mr.Romney your position as a president of USA is fell off the back of the truck, hahaha #sarcasm #irony*

In this case the euphemism “fell off the back of the truck” is used in order to make a blunt or unpleasant truth seem less harsh. The person makes a prediction that Mitt Romney is going to lose the US Presidential elections 2012, giving a priority to his

opponent Mr. Barack Obama. It is worth noting that the author of the tweet “must have been looking in a crystal ball”.

Metaphor is a use of a word in an environment where another word would be more likely to occur, but not the first one. The two terms, the literal and its substitute, are taken to be equivalent in that environment, thus implying a comparison of relevant aspects between them. This creates the figurative effect, which can then be used in different ways. The metaphor can appear as a single word or as metaphorical periphrasis (Lausberg, 1993: 256), which literally denotes one kind of object or idea to another and suggests likeness or analogy. For example, the representation of metaphor in social media is the following $x = y$, where x is used in order to give more esthetical coloring to y :

(17) *Cream, Sugar, Romney Or Obama With Your Coffee? Gee, I wonder who will win this one? #sarcasm*

In this case Romney and Obama (names of human entities) are used in coordination rates where other coffee ingredients (non-human objects) would be expected to occur. Though the precise intention is unclear, this replacement of the non-human for human nouns establishes the comparison between the named entities and the distribution series they appear in.

Analogy is a comparison or parallelism more or less overt between two events or two states of affairs having something in common: $x + not\ x$.

(18) *Ahhh, #Irony. RT @AlecMacGillis Mirror image: Biden got in trouble for calling Obama "articulate"; and now Ryan calls Romney "inarticulate."*

In this case there is a parallelism between the two instances of call; irony is derived from the change of participants and the use of two antonymous words. In fact, the same word is used without and with a negative prefix.

Antonomasia is a variety of metaphor based upon the principle of identification of human beings with things which surround them. People may be identified with other people, with animals, with inanimate objects and natural phenomena.

When the speaker resorts to antonomasia, he creates the so-called "talking names" which aim at depicting certain traits of human character: moral and psychological features, peculiarities of behaviour, outlook, etc.:

(19) OOOHHHHYeah...#Romney reminds me an IRON LADY! #irony

In this example, the expression "IRON LADY" corresponds to Margaret Thatcher, where x (Iron Lady) is not y (Romney) is α (Margaret Thatcher). Usually antonomasia is identified with human entities.

Allegory is a figure of speech in which abstract principles are described in terms of characters and events. Allegory is an idea what metaphor is to a single word, so allegory stands in a close relationship of comparison to the intended serious idea. The relation of allegory and metaphor is quantitative: an allegory is a metaphor sustained to the length of the whole sentence (and beyond) (Lausberg: pp 398-399). For example:

(20) Well, the GOP finally found its snakepit of voter fraud. In the mirror! #Irony thy name is #Romney #obama

In this case, voter fraud implicitly is compared to a GOP, government of USA, thus assuming all the negative connotation associated to those up tiles. Allegory consists in using an abstract concept of x in an environment where usually concrete means would occur – y . Typically, a concept is used like a human but other types exist also.

Neologism is the name for a newly coined term, word, or phrase that may be in the process of entering common use, but that has not yet been accepted into mainstream language. Neologisms are often directly attributable to a specific person, publication, period, or event. Neolexia ("new word" or the act of creating a new word) is a synonym for it. The term *neologism* was borrowed from French *néologisme* (1734) and first attested in English in 1772.

(21) *Obamacare is bad policy. However, it's the same exact policy Romney instituted in Massachusetts while Governor. #irony*

X (*Obamacare* =in this case is a newly coined word from **a** and **b**. Recently this phenomenon has been widely used in social networks due to the possibility to create hashtags, where one word has to be written together with the other in order to create an active link.

Figures of Opposition are characterized by the combination of two or more words or word-groups with opposite meanings in the context. Their relations are either objectively opposite or are interpreted as such by the speaker. Here we refer to antithesis and oxymoron.

Oxymoron is a figure of contrast, which is a combination of words semantically incompatible. As a result, the object under description obtains characteristics contrary to its nature, e.g. *hot snow, loving hate, horribly beautiful, nice blackguard*.

In our view, an oxymoron has great expressive potential and is really possible to be identified automatically. It is normally used in cases when there is a necessity to point out contradictory nature of the object under description. Nevertheless, oxymoron is closely related to antithesis and paradox, which makes its essential distinction more difficult.

(22) *BREAKING NEWS! Wise foolishness of #Obama, check his yesterday debates out!!!! #sarcasm*

In this example an expression "wise foolishness" is a classical oxymoron - the description of characteristics that are contradictive to each other by their nature, where *a* contradicts *b*, that is why *x* (named entity) obtains paradoxical meaning.

Antiphrasis is a figure of speech in which a word or phrase is used to mean the opposite to its usual sense, especially ironically (Miller). In other words, it is a device based on the author's desire to stress certain qualities of the thing described by opposing it to another thing possessing antagonistic features. It is worth noting that the antithesis is based on opposition, but not every opposition may be called antithesis. Antithesis is only a

stylistically colored opposition, e.g.:

(23) *Hey Obama, great job over there in Libya! I'm so glad we helped them out in the summer! #sarcasm #imgoingofftonight*

In this case the irony is in great job, which literally means a compliment but is used in the opposite way, as a criticism. The same also happens to help, implying that instead of that the American (we) action in Libya was prejudicial to treat country's people (them) *x is not equal; it is opposite to x and means y, or not x.*

Antithesis is a figure of contrast which stands close to oxymoron. The major difference between them is structural: oxymoron is realized through a single word-combination, while antithesis is a confrontation of at least two separate phrases semantically opposite.

Like in the previous example "*wise foolishness*" is an oxymoron, "... *the age of wisdom, the age of foolishness*" is an antithesis. Usually the main lexical means of antithesis formation are antonyms (words opposite in meaning), e.g. danger - security, life – death:

(24) *What a #paradox...Romney's salary was high; Romney's work was light. #irony*

However, the use of antonyms is not strictly obligatory. In this sample, for instance, antithesis is formed through situational confrontation of two notions expressed by non-antonymous words, where *x* is not *y* it is *y* opposite of what is being said/written, a opposes *b*.

Comparison is a rhetorical or literary device in which a writer compares or contrasts two people, places, things, or ideas. In our everyday life we compare people and things to express ourselves vividly. So, when we say "as lazy as a snail," we compare two different entities to show similarity, i.e. someone's laziness is like a slow pace of a snail¹⁷.

¹⁷ Available at: <http://literarydevices.net/comparison/> [Last access 03.11.2014]

(25) *Too bad Romney doesn't have the extensive foreign policy "experience" that Obama did when he became President. #Sarcasm*

“**a** compares with **b**”, in social networks, especially with political data we work with, the comparison appears between two or more *named entities*, in our case the political candidates.

Fixed Phrases are meaningful as a whole. Idioms, as representatives of this category, are inherent in all languages. Native speakers learn and remember them as a complete item, rather than a collection of separate words, e.g. a red herring = a false trail, raining cats and dogs = raining very heavily, a fly in the ointment = spoiling the effect. Idioms often break semantic conventions and grammatical logic - as in *I'll eat my head (I'll be amazed if...)*. The object of the verb "to eat" is conventionally something edible, but as part of this idiom it is something definitely inedible. Non-native speakers find the idiomatic side of any language difficult to grasp. Native speakers of a language acquire idioms from a very early stage in their linguistic development.

For example, the Twitter represents idioms like that:

(26) *Wouldnt want a "son of cain" too close to ol' #romney. He might have to burn off his hands! #sarcasm #irony*

It's worth noting that idioms very often contain metaphors, exactly like in this case. The example illustrates an ironic expression produced with a help of metaphor and idiom. Usually, idioms are based on the context of the group and communication, e.g. He was caught *leg-before-wicket* (sport). She was at her sister's *hen-party* (gender).

5.4 SYNTACTIC DEVICES

Rhetoric Question is a stylistic device which is not confined solely to oratorical speech but is typical of oral speech too. It consists in the fact that the author gives a positive or negative judgment in the form of a question without expecting an answer to this question. A rhetoric question makes the utterance more expressive. By using it the author makes his speech more vivid and avoids the monotony of the monologue.

(27) *Brit Hume was a bit critical of Romney's campaign today. What, does he want Obama to win?!? #sarcasm #irony*

In this example an erotema (a rhetoric question) implies its own answer; it's a way of making an ironic and funny effect. (clues: ?/?!/?/??).

Stylistic *repetition* of language units in speech (separate words, word-combinations or sentences) is one of the most frequent stylistic devices that are really easy to identify automatically using a rule-based approach that repeats two/tree or more words together in the same tweet. For example, “*Poor....Poor...Poor*” (x, x, x,) when x appears 2 or more times:

(28) *Obama: Victory is what we need. Victory is what we expect. Haha #irony Poor....Poor...Poor #Obama.*

Inversion is the syntactic phenomenon of intentional changing word-order of the initial sentence model. There are two basically different types of inversion: grammatical and stylistic. Grammatical inversion is devoid of stylistic information. It is just a technical means of forming different types of questions. Stylistic inversion is such a change of word-order which gives logical stress or emotional colouring to the language units placed in an unusual syntactic position. Stylistic inversion is typical of the predicate, predicative and all the secondary parts of the sentence:

(29) *Hardly Obama became a President when shit start happen...#irony*

In this case an inversion is used to give emphasis to the political situation.

When the word-order is changed, instead of **a b c** we have, for example, **c a b**, which gives emotional coloring to the text and usually emphasizes certain fact.

Aposiopesis (ellipsis) is also realized through incompleteness of sentence structure, though this incompleteness is of different structural and semantic nature. It appears when the speaker is unwilling to proceed and breaks off his narration abruptly, e.g. *if you go on like this...* The information implied by aposiopesis is usually clear in communicative

situation. Break-in-the-narrative expresses such modal meanings as threat, warning, doubt, indecision, excitement, and promise. It is important that aposiopesis should not be confused with unintentional break in the narrative, when the speaker does not know what to say. For example:

(30) *Ohh yeah....yeahh...ALL the Americans gonna vote for the Black Muslim #irony*

The use of the aposiopesis in this sample is quite obvious. In this way the author intends to emphasize the other stylistic devices in this tweet, as antiphrasis “ALL the Americans gonna vote “, which means the opposite to what is written. Besides that, the sample contains as well an expression “Black Muslim” that can be interpreted as a metaphor and/or antonomasia (a certain variety of the metaphor). Unintentional break off is of no stylistic significance, though it may serve as an indirect evidence of the speaker's confusion, his being at a loss, and have a representation of

*Pseudo-cleft*¹⁸ is a sentence is a kind of cleft sentence in which the subordinated clause is a relative clause headed by an interrogative pro-form.

(31) *What Obama gave USA was NOTHING #irony*

In English they have the structure **wh-relative clause + be + X** (X can be a constituent of one of many varieties). The so-called 'inverted' pseudo-cleft sentence reverses the order of the two constituents.

Pseudo-Cleft	What John gave to Mary were flowers.
Inverted Pseudo-Cleft	Flowers were what John gave to Mary.

¹⁸Available at: <http://www-01.sil.org/linguistics/glossaryoflinguisticterms/WhatIsAPseudoCleftSentence.htm> [Last access 03.11.2014]

5.5 PHONETIC STYLISTIC DEVICES

The *pun*, also called *paronomasia*, is a form of word play which suggests two or more meanings, by exploiting multiple meanings of words, or of similar-sounding words, for an intended humorous or rhetorical effect. *A paronomásia é um jogo de palavras respeitante à significação da palavra, o qual surge devido à alteração de uma parte do corpo de palavra, processo no qual frequentemente corresponde a uma alteração, quase imperceptível, do corpo de palavra uma surpreendente ("que provoca estranhamento"), "paradoxal" alteração do significado de palavra.* (Lausberg: 179).

(32) *Obamanation flag is no longer available. Pity. #sarcasm Obama flag disappears from campaign store*

In this case, the newly coined word ***obamanation***, besides being a neologism, has also paronomasic relation with abomination, whose negative sense is associated with. Since the Obamanation is in agreement with noun “flag”, it allows to analyze Obama + nation + flag as “the flag of the nation of Obama”, which also can be interpreted as a criticism or negative opinion towards the candidate.

Alliteration is a figure of speech that “consists in repeating or opposing the same sounds or letters several times. It can be used for comic effect or to the other stylistic purposes” (Lausberg, 1993: 847). It is a word and/or rhyme repetition of the same object or the same letters several times, which produces a comic effect. Alliterative names are also a very strong and strategic way to make it more memorable. For example, both fictional characters and real people may stand out in our head as a result of the alliterative effect of their name (Ronald Reagan, Mickey Mouse, Donald Duck, Dunkin’ Donuts, Coca-Cola, etc.)¹⁹.

Alliteration is commonly used since it adds interest to a sentence and can be a great way to help you remember it. For example:

(33) *Hahhhaa, **Busy as a bee** Obama tries to convince Americans in his decency... #Sandy helped him indeed? #irony*

¹⁹Available at: <http://examples.yourdictionary.com/alliteration-examples.html> [Last access 03.11.2014]

In this case, an ironic effect is expressed with the help of clues - onomatopoeic expression (*hahhha*) and alliteration phrase “*Busy as a bee*”, exaggerating component of Obama’s presidential campaign activity. x xx

(34) *Ryan and Romney are eating donuts in Donkin ´ Donats and discuss how to rock the world #irony*

An *onomatopoeia* is a word that phonetically imitates, resembles or suggests the source of the sound that it describes. Common occurrences of onomatopoeias include animal noises such as "oink", "meow", "roar" or "chirp". Onomatopoeias are not the same across all languages; they conform to some extent to the broader linguistic system they are part of; hence, the sound of a clock may be *tick tock* in English, *dī dā* in Mandarin, or *katchin katchin* in Japanese. For example:

(35) *Tick tock the time, tick tock...Romney does nothing on debates...tick tock #irony*

Phonetic device represents the natural sounds expressed in a written form: *wind wailing, sea murmuring, rustling of leaves, bursts of thunder*, etc. Words that represent this figure of speech have an aural similarity with the things they describe: *buzz, roar, bang, hiss, sizzle, twitter, pop, swish, burble, splash*, etc. Animal calls and sounds of insects are evoked onomatopoeically in all languages (Efimov, 2004). For example, an expression “*cock-a-doodle-do!*” is conventionally the English representation for the crowing of a cock. Interestingly, the Russians and the Portuguese represent this imitation as “*ку-ка-ре-ку*” and “*có-córo-cóco*” respectively, which is significantly different from the English form, although logic tells us that the rooster's cry is the same across the world. It means that onomatopoeia is not an exact reproduction of natural sounds but a conventional representation of the subjective perception of a phenomenon. Basically, in social media, onomatopoeia is used for the emphasis of ironic and/or humorous effect in a statement and signals subjective opinion of the user. It is quite easy to automatically recognize this sound due to the limited number and fixed phrase. Lexicon creation is necessary in this case.

5.6 OTHER

Exclamation (also known as *interjection* and *ecphonesis*) is a rhetorical term for expressing strong emotions and feelings.

(36) *WAIT. WAIT. Hold the phone. Obama is black?!?!?!?!?!*

In this example irony is expressed with a help of rhetoric question and high level of exclamation point, illustrated with numerous quantity of exclamation and interrogative marks, as well as uppercase letters. List of interjections²⁰

Clues for exclamation recognition: !+, WILL (use of uppercase), other highlighting devices, such as -.

A *cliché* is an expression, idea, or element of an artistic work which has become overused to the point of losing its original meaning or effect, even to the point of being trite or irritating, especially when at some earlier time it was considered meaningful or novel. Clichés come from all over the world. They can be interpreted differently, depending on your cultural knowledge and identity. Often, a cliché starts with a smart remark that ends up becoming very well known. Even if the origin is unclear, it's clear to see that clichés are a popular form of expression. For example, the tweet presented below contains an expression "*Have A Heart To Heart*" which is considered a cliché.

(37) (pic) *If Reagan Could Have A Heart To Heart
With Obama... <http://t.co/08i8N7em> #tcot #satire*

Clues: *x_voc* – means interpretation of x available for each culture (e.g. *all that glitters not gold*).

Parallelism, in rhetoric, means giving two or more parts of the sentences a similar form as if to give the passage a definite pattern. Parallelisms in proverbs are very common in languages around the world. In such a structure the listener/hearer has to compare the

²⁰Available at: <http://www.vidarholen.net/contents/interjections/> [Last access 03.11.2014]

parallel elements and deduce the point. E.g. *The truth has legs and ran away; the lie has no legs and must stay.* (Yiddish proverb)

(38) *The protester who interrupted Romney didn't like it when I interrupted her to ask why she didn't protest Obama's Afghanistan. #irony*

In this tweet *protestor /protest and interrupted* are used repeatedly to create an ironic effect with the help of parallelism.

6. RESULTS AND DISCUSSION

*Neither irony or sarcasm is
argument.*

Samuel Butler

This chapter describes and discusses in detail the results of the experiments carried out for this research. Although the identification of irony in social media is a complex process, we believe that this research contributes to a better understanding of the linguistic expression of irony in social media. In particular, this study reveals some means of the linguistic devices used to produce ironic effect in user-generated content.

6.1. CORPUS MANUAL ANNOTATION

To meet the objectives of our research, data annotation of the corpus was performed. The experiment was considered to be quite challenging and often depended on personal our assessment. Despite the fact that all the data was labeled *a priori* as ironic by social media users, some cases were ambiguous, and a clear intuition, rather than a description of literal interpretation of any figurative device for its recognition, was applied. According to the results presented in Figure 6.1, the most representative categories that create an ironic effect in social media targeting politicians are: *exclamation* (21.6%), *rhetoric question* (14%), *antiphrasis* (11.2%) and *metaphor* (10.4%).

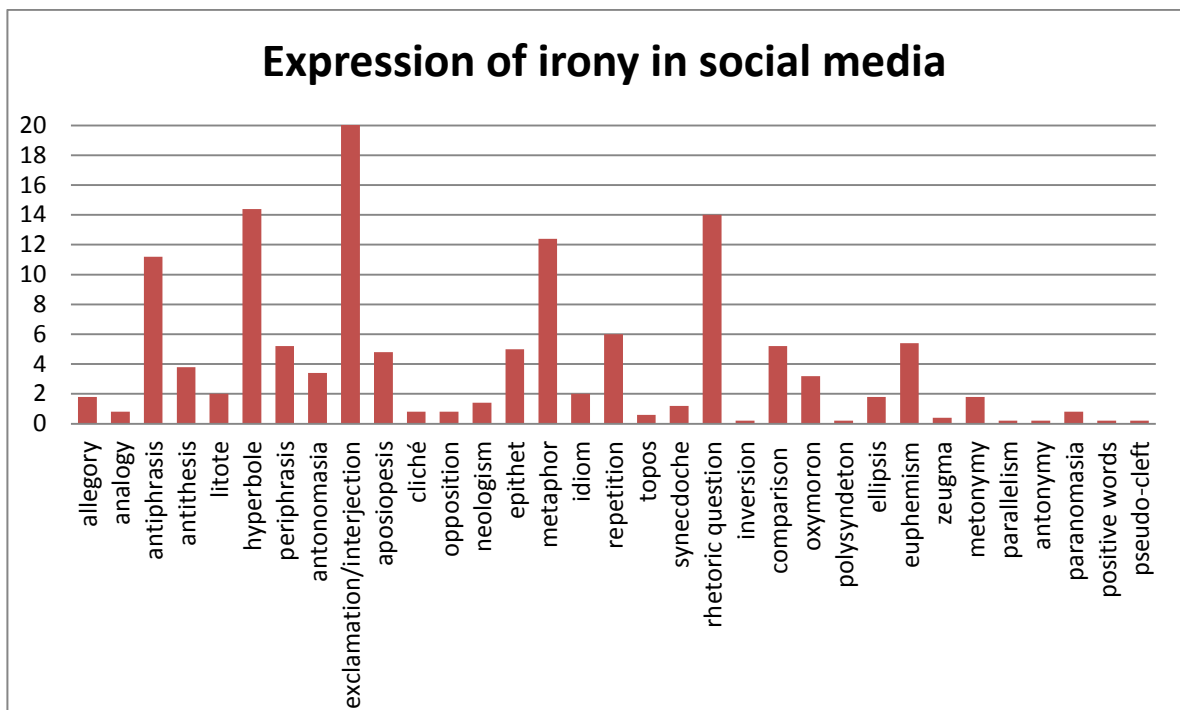


Fig. 6.1 Expression of irony in social media of 500 tweets with %.

The results have shown that the toll of **exclamation** subclass is the highest in the corpus. It is noticeable that an exclamation category in our annotation was presented with other figurative device at the same time and gathered a certain set of characteristic features, so-called external clues, which had already been evaluated before. For instance, the research by Carvalho et al. (2009) showed that the most productive patterns for irony recognition involve (i) emoticons “☺”, (ii) onomatopoeic expressions for laughter “lol”, (iii) heavy punctuation marks “!?!?”, (iv) quotation marks “” and (v) positive interjections like “força”, “muito obrigado/a”. For example:

- (39) *Bravo, another story from Romney's past I'm sure u have never heard, lol. What an ass this guy is!!!! I WONDER myself hoe he runs for #USPresident #irony*

It is worth noting that all these clues are related to orality, which shows that ironic constructions are frequently signaled by oral clues. Some of these clues are extremely representative and valuable linguistic clues for manual and automatic identification of irony in social media due to the fact that they are fixed in every language.

Tang and Chen (2014) mention in their research that **emoticons** are used quite often in social media to express the feelings of the posters also. The tagged emoticons specify their actual meanings in some sense. Developing this idea, the authors collected the messages from Plurk²¹, a microblogging platform similar to Twitter. It lets users post messages limited to 140 characters, and allows them to use graphical emoticons in their messages. In our research, the representation of emoticons is also a valuable device.

The usage of the extremely **positive interjections** and **adjectives** (e.g. *Great President, Bravo*, etc.) is not just a representative feature of exclamation category, but also of hyperbole that can function as antiphrasis. It should be mentioned that a lot of tweets contain two or even more stylistic devices in one sentence, which subsequently causes ambiguity and vagueness. Tang and Chen (2014: 1272), for example, claim that specific positive adjectives with high intensity are used to form ironic expressions with or without other rhetorical elements. Since the context is negative, the positive adjective is used to express non-literal meanings. The adjectives Tang and Chen found in the corpus include “偉大” (great), “了不起” (remarkable) and “天才” (genius). For example, the word *great* is used in the following message:

- (39) 我的plurk「又」發生不明錯誤了...這真是這世紀最偉大的發明
啊 Translation: *My Plurk account encountered an unknown error
'again'... This is indeed the greatest invention in the century.*

According to Carvalho (2009) and Barbieri and Saggion (2014), **heavy punctuation** and the use of **uppercase letters** patterns are tell-tale clues and significantly may help to increase the accuracy of ironic texts detection in NLP. In our study, we followed and confirmed this idea. It is worth mentioning that, according to our annotation, the cases of antiphrasis, exclamation and rhetoric questions contain the higher value of such instances.

²¹ <http://www.plurk.com/> [Last access 03.11.2014]

Another stylistic device widely used in user-generated content is **antiphrasis**. According to our annotation, it is one of the most representative devices for ironic statements. It can be easily explained because antiphrasis is the usage of a word or phrase in a sense contrary to its normal meaning, which corresponds to the traditional definition of irony.

(40) *Mitt Romney came from such a hard life. It's not easy when your Father was a Governor of a State. #Sarcasm*

In this case the use of phrases “hard life” and “it is not easy” means the opposite to what is being said. By mentioning the fact that the father of Mitt Romney was a State Governor, the user expresses doubts about the hardship endured by Mitt Romney during his life.

An **erotema** (or rhetorical question) and **hypophora** (answering a rhetorical question) are another examples of stylistic devices used to produce ironic effect. Erotema is a very common tool in social media targeting politicians. According to Corbett (1998), a rhetorical question is “*an effective persuasive device, subtly influencing the kind of response one wants to get from an audience*”²². For instance:

(41) *Do we really want this genius to be the next president? #sarcasm
#irony*

In this example the irony is expressed with the help of a rhetorical question, which is usually defined as any question asked for a purpose rather than to obtain the information the question asks. In this case, clues like the antiphrasis *this genius* hint at a definite negative answer to the rhetorical question posed by the user.

²²Available at: <http://grammar.about.com/od/rs/g/rhetquesterm.htm> [Last access 03.11.2014]

Finally, one of the most widely used stylistic devices in our corpus is **metaphor**. It is worth noting that metaphor usually implies a comparison in which a word or phrase ordinarily and primarily used for one thing is applied to another. For example:

(42) *Confirmation Obama is Jimmy Carter's Clone*

This example illustrates that the speaker compares a named entity, in this case, Obama with Jimmy Carter. X (Obama) is a clone of Y=X is Adj as a clone of Y (Jimmy Carter) is Adj (because Y is Adj).

While analyzing the data, we came to the conclusion that a lot of tweets combine several linguistic devices in one sentence. Such categories as hyperbole, exclamation, aposiopesis, rhetoric question, metaphor, epithet, idiom, oxymoron, and ellipsis are the most commonly used to produce ironic effect in social media targeting politicians. According to the results of this study, nearly one third of the instances in the whole corpus contained two or even more stylistic devices. The most interesting instances, in our point of view, were the categories of metaphor, oxymoron, and neologism.

6.2 SURVEY 1: CORPUS VALIDATION RESULTS

The corpus used in this research was manually annotated by the author, following the guidelines determined in Methodology section. In particular, five hundred posts were manually labeled for the linguistic devices used in them to express an ironic effect. However, in order to ensure the correctness of the annotation results, a survey to test the reliability of the corpus was conducted with other independent annotators.

Two annotators were advised to either consider the enclosed concepts of figurative devices used to produce ironic effect available in the survey or to use their own interpretations of the figurative language involved, based on fixed rhetoric definitions presented in literature. Annotator A has a strong background in linguistics and excellent English skills. We represent Annotator B using the results of manual annotation in survey for validation the reliability of our analysis.

In the tweets presented for the analysis, at least one of the choices mentioned in open-ended questions was correct, according to the manual annotation of the data. Nevertheless, it is worth mentioning that irony is a highly subjective device and the choice from our manual annotation could possibly not correspond to the evaluators' option. Thus, the annotators were free to express their own opinion by creating new categories, if the ones suggested by us were not corresponding to the annotator's personal opinion.

The inter-annotator agreement study was confined to stylistic device identification by online calculator for inter-rater agreement with multiple raters' tool²³, featuring Light's kappa, Fleiss's kappa, Krippendorff's alpha, and support for missing. Mostly, we rely on a coefficient α (Krippendorff, 2004) in all calculations for this research; it is based on assumptions similar to π , namely the agreement is calculated by looking at the overall distribution of judgments between the annotators. This coefficient applies multiple coders, thus it makes this calculation used by most researchers in computational linguistics following stringent conventions from content analysis proposed by Krippendorff (1980), as reported by Carletta (1996: 252): "*content analysis researchers generally think of $K \geq .8$ as good reliability, with $.67 \leq K \leq .8$ allowing tentative conclusions to be drawn*" (Krippendorff was discussing the values of α rather than K , but the coefficients are nearly equivalent for categorical labels). As a result, ever since Carletta's influential paper, the researchers have attempted to achieve a value of K (more seldom of α) above the 0.8 threshold, or, failing that, the 0.67 level allowing for "tentative conclusions". However, the description of the 0.67 boundary in Krippendorff (1980) was actually "highly tentative and cautions", and in later work Krippendorff clearly considers 0.8 the absolute minimum of α to accept for any serious purpose: "Even a cutoff of $\alpha = .800 \dots$ is a pretty low standard" (Krippendorff, 2004: 242). Recent content analysis practice seems to have settled even more stringent requirements: A recent textbook, Neuendorf (2002: 2), analyzing several proposals concerning acceptable reliability, concludes that that "reliability coefficient of .90 or greater would be acceptable to all, 0.80 or greater would be acceptable in most situations, and below that, there exist a great disagreement." Nevertheless, we doubt that a single cutoff point is appropriate for all purposes. For our research, where the topic under

²³ Available at: <https://mlnl.net/jg/software/ira/> [Last access 03.11.2014]

consideration is quite challenging and involves great value of subjectivity between annotators, to achieve the threshold of .90 is extremely difficult if not impossible.

According to the results, Krippendorff's coefficient agreement $\alpha = 0.77$. This result is for the cases where both annotators only assigned one figurative device to each tweet. These cases represent just 50 % of the annotated data. The remaining data presented a more complex structure, and was assigned with more than one figurative device and/or clue for expression irony. Hence, we defined four major groups:

1 to 1: Both annotators just identified one figurative device. As we mentioned above, the agreement on this category is 0.77; such considerably high result exceeded our initial expectations, but it should be stressed that this calculation applies only to a half of the corpus, more precisely 52 instances out of 100 of the annotated data in the survey.

1 to set: Annotator A only identified one figurative device, while Annotator B identified more than one figurative device. 14% percent of the data analyzed represents this category. In this group, as well as in the remaining ones for this survey, the agreement was not calculated in terms of Krippendorff's coefficient. According to our observations, the results would not be fair calculated in terms of IAA, nevertheless we explicitly mention how many cases gathered partial or no agreement at all. Thus, 5 cases, that corresponds to nearly 35 % of this group, had been considered by one annotator A as "none of the above" and/or "no figurative device involved" while Annotator B presented a set of stylistic devices used in a tweet to produce ironic effect, for example: *#Irony: Twits twittering about #Romnesia hoping America will forget #Obama was Prez. past 4 years & had chance to impose agenda unimpeded.* In this tweet Annotator A expressed opinion of none of the above figurative device involved (presented in close-ended question), while Annotator B determined neologism and oxymoron being present in tweet. Therefore, Table 6.1. presents the results of the group: **1 to set**, where no agreement had been reached between annotator A and B.

	Annotator A	Annotator B
Tweet 4	None of the above	neologism, oxymoron
Tweet 8	None of the above	metaphor, antonomasia
Tweet 11	None of the above	euphemis, idiom
Tweet 58	None of the above	opposition, metaphor
Tweet 92	None of the above	idiom, rhetoric question

Table 6.1. Results for patterns where Annotator A identified none figurative device involved, while Annotator B identified more than one figurative device.

set to 1: Annotator A identified more than one figurative device, while annotator B only identified one figurative device. This set includes 11 % of the total amount of analyzed data. In this group all the cases gathered partial agreement between Annotator A and B, only tweet 99 was an absolute offset, the devices presented by Annotator A did not even partially agreed with a device suggested by Annotator B. Table 6.2. illustrates the matches between annotators involved in the survey.

	Annotator A	Annotator B
Tweet 32	exclamation, epithet	exclamation
Tweet 33	comparison, idiom	comparison
Tweet 47	comparison, idiom	comparison
Tweet 48	antiphrasis, euphemism	antiphrasis
Tweet 55	exclamation, neologism	exclamation
Tweet 59	metaphor, rhetoric question	metaphor
Tweet 79	antiphrasis, exclamation	antiphrasis
Tweet 81	exclamation, epithet	exclamation
Tweet 97	exclamation, idiom	exclamation
Tweet 99	exclamation, antiphrasis	idiom

Table 6.2. Results for patterns where Annotator A identified more than one figurative device involved, while Annotator B identified more one figurative device.

set to set: Both annotators provide a different set of figurative devices. This is the most difficult and complex category, representing 17% of the analyzed tweets. The results in this category demonstrate a complete or partial mismatch, for example tweet 52:

If voting is like sex, and an Obama administration is what I get impregnated with, I want an abortion! #irony,

This tweet recognized by Annotator A as expressing metaphor and comparison devices, while Annotator B decided that this expression contains metaphor and exclamation.

In general, the findings of this validation demonstrate that the most frequent categories that were recognized by both annotators and respectively gathered the higher agreement were the categories of: *antiphrasis, exclamation, rhetoric question and comparison*. On the contrary, tweets gathered less agreement between annotators when figurative devices of: *metaphor, epithet, synecdoche, euphemism and idiom* were involved in annotation the group of lexico-semantic patterns. An interesting observation, that figures of *opposition*, such as antiphrasis, oxymoron; *figures of quantity*, such as hyperbole; and *syntactic stylistic devices*, such as rhetoric questions; they have been easier recognized because they are more clearly definable. Still, the level of agreement between the annotators is sufficiently high to rely on the manual annotation of the corpus and use it as a reference for further experiments.

6.3 SURVEY 2: LINGUISTIC EXPRESSION OF IRONY

In Survey 2: Linguistic expression of irony, we applied the approach by Kreuz and Caucci (2007), by removing the phrase “said sarcastically”; in our case hashtags *irony* or *ironic*, to eliminate any explicit clue about the ironic content of the statement and to avoid the annotators to be influenced by the user-generated content labeling. The number of the sentences was the same, 100 tweets, which represent 20% of the dataset manually annotated. All the extracted tweets were selected reflecting the proportion of their stylistic devices in manually annotated corpus (Fig. 6.1). Annotators have been asked to consider only the concept of irony as opposite to what is literary said, thus, not to mix notions of

irony, humour or just funny sentences. We advised annotators not to analyze each tweet for a long time, but to make decisions based on their first impression. Whenever annotators were not sure whether the tweet is ironic or not, they were suggested to use the label “difficult to decide”.

Due to the fact that the main annotator (the author of this research) has a different mother tongue (Russian) from the language of the corpus analyzed (English), we tried to involve native speakers of the English language, preferably from the USA, in this task. Two native speakers, citizens of the United States, who are quite familiar with the context and background of the US Presidential Campaign 2012, had been annotating the corpus. At the end, ten annotators from different countries have been participating in the inquiry: Portuguese (4), Russian (1), and Ukrainian (1), German (1) and, finally, Lithuanian (1).

	Native Speaker	Non-Native Speaker	Proficiency in English	Nationality	Linguistic Background
Ev1		X	C1	Portuguese	X
Ev2	X		C2	American	X
Ev3		X	C2	Ukrainian	
Ev4		X	C2	Portuguese	X
Ev5		X	C1	German	X
Ev6		X	B2	Lithuanian	
Ev7		X	C2	Portuguese	X
Ev8		X	C2	Portuguese	X
Ev9		X	C1	Russian	
Ev10	X		C2	American	

Table. 6.3. Annotators’ personal data for Survey 2.

Furthermore, the majority of annotators have a background in linguistic studies, which makes their annotation more trustworthy. All the annotators are fluent in English (at least B2, C1, C2). Nevertheless, the results have shown that the agreement between all the annotators is not reliable: Krippendorff’s Alpha standard metric results were just 0.137. While assessing the results of the inquiry, we noticed the level of familiarity with the US Presidential Campaign and the culture, influence the results of the survey significantly. It is also indicative that, the results could contain a certain level of subjectivity not only in terms of different interpretation of irony between annotators, but also the other factor; each tweet referencing one of the candidate (either Obama and/or Romney) strengthen or

weakness the ironic effect of some tweets, because annotators had been supporting different candidates and share opposite political views. Consequently, we decided to analyze the set of annotators into 3 major groups according to the criteria mentioned below.

		Native Speaker	Non-Native Speaker	Proficiency in English	Nationality	Linguistic Background
Group A	Ev2	X		C2	American	X
	Ev10	X		C2	American	
Group B	Ev1		X	C1	Portuguese	X
	Ev4		X	C2	Portuguese	X
	Ev5		X	C1	German	X
	Ev7		X	C2	Portuguese	X
	Ev8		X	C2	Portuguese	X
Group C	Ev3		X	C2	Ukrainian	
	Ev6		X	B2	Lithuanian	
	Ev9		X	C1	Russian	

Table 6.4. Annotators division into groups for Survey 2.

The results have shown higher agreement between the groups, even though the agreement is still considerably low. **Group A** is comprised of just two annotators, native speakers (US residents). The agreement between them is **0.383**. Interestingly, these annotators had been supporting different candidates for US Electoral Campaign 2012, thus, we can assume that this factor did not influence the higher inter-annotator agreement they have achieved. For example, below in Table 6.5. presented several tweets where Annotator A considers tweets regarding Mitt Romney as “not ironic” while the tweets targeting Barack Obama are, in fact, ironic for him. The behavior of Annotator B is absolutely the opposite of Annotator A.

Tweet	Annotator A	Annotator B
Mitt Romney zingers. Ooooooooo...I can't wait. #deadpan alert	Not ironic	Ironic
Less than 30% of Romney's donators are female. NOOOOOOOO WAYYYYYY #bigsurprise	Not ironic	Ironic
Somebody find the geniuses that gave Obama a Nobel peace prize because this man deserves an award http://t.co/jTtBHqNr	Ironic	Not ironic
Madonna Calls on Her Fans to Vote for “Black Muslim” President Barack Obama http://t.co/hD2yglmp Not #Islamophobia #Islam	Ironic	Not ironic

Table 6.5. Results of the native-speakers' (Group A) annotation patterns.

The agreement in **Group B**, which comprised all the members with linguistic background, most of them are Portuguese, is 0.095. **Group C** reached an agreement 0.042. Obviously, this is the lowest agreement between all three groups established. Nevertheless, we compared the results between all annotators individually in order to find out which pair had the highest agreement. The results have shown that the highest agreement is between representatives from different groups - Group B and C (Portuguese and Lithuanian annotators), and Ev9 (Russian) and Ev7 (Portuguese). These results, in fact, are difficult to interpret and further analysis has to be performed; taking into account, that Portuguese and Lithuanian annotators do not have common linguistic, cultural, political background between each other speaking about elections in a third country; in second case, the annotators from Russia and Portugal cannot be considered compatible for the same reason (Table 6.6.). Nevertheless, there could be possibility of unobserved factors, such as the same level of education and/or political preferences; all these can result in a higher agreement between these annotators and groups.

Thus, it can be concluded that the agreement between native speakers is almost the highest in the evaluation (0.383), which gives us a positive ground to consider this rate valuable for our research.

	Ev2	Ev3	Ev4	Ev5	Ev6	Ev7	Ev8	Ev9	Ev10
Ev1	0.239	0.105	0.049	0.054	0.004	0.132	0.053	0.185	0.134
Ev2		0.117	0.108	0.005	0.085	0.191	0.279	0.279	0.383
Ev3			0.177	0.072	0.185	0.085	0.088	0.052	0.196
Ev4				0.133	0.451	0.033	0.15	0.011	0.117
Ev5					0.119	0.018	0.03	0.055	0.166
Ev6						0.121	0.107	0.08	0.2
Ev7							0.29	0.472	0.094
Ev8								0.306	0.037
Ev9									0.023
Ev10									

Table 6.6. Survey 2: IAA agreement between all (10) annotators.

As we mentioned above, ten annotators were asked to rate the sentences as “ironic”, “not ironic”, or “difficult to decide” without being provided any additional contextual information. Even though the annotators came from different countries with different cultures, native languages and linguistic background, some of the tweets were considered by all annotators as ironic. Independently of the group the annotator belonged to, most cases considered ironic by annotators contained a certain set of external clues involved, such as presence of *adjectives and adverbs*; *presence of positive interjections*; *use of heavy punctuation, such as exclamation points or question marks*, like in the example below. Thus, we assume that cases with extra linguistic clues, was a good predictor of irony for the annotators. For example the following tweet illustrates the case which everyone marked as ironic:

- (43) *Since everyone is so against Mitt Romney, lets all talk about how Obama has really improved this country the last 4 years?!? hahahaha*

In this survey, besides the analysis of irony expression in social media, we aimed at identifying which categories were easier for the annotators to recognise as ironic according to the figurative devices used to produce ironic effect. As a matter of fact, the cases of exclamation, antiphrasis, ellipsis, euphemism were most frequently considered ironic by the annotators. (Fig. 6.2) It can be logically assumed that exclamation marks, ellipsis, positive interjections, etc. are regarded as clearly indicative of irony in the tweets.

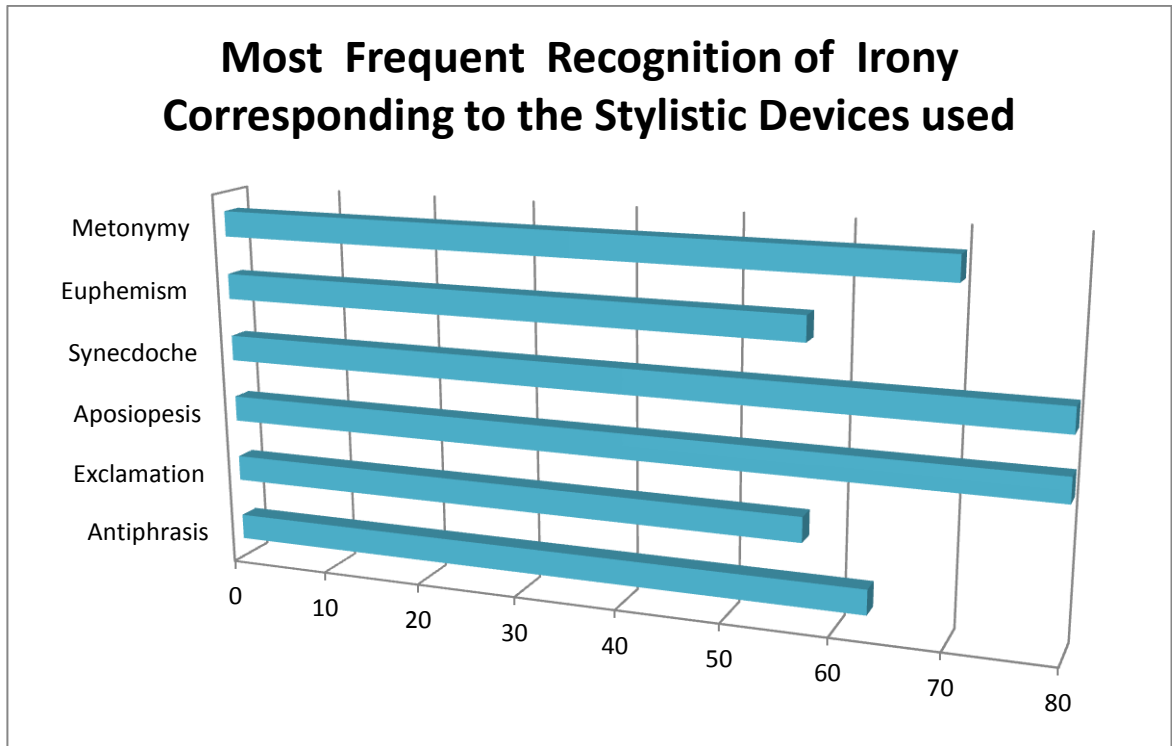


Fig. 6.2. Most frequent recognition of irony corresponding to the stylistic devices used.

Similar logic explains the fact that the cases of epithets, litotes, parallelism, antonomasia and neologism were less recognized as ironic by the annotators (Fig.6.3).

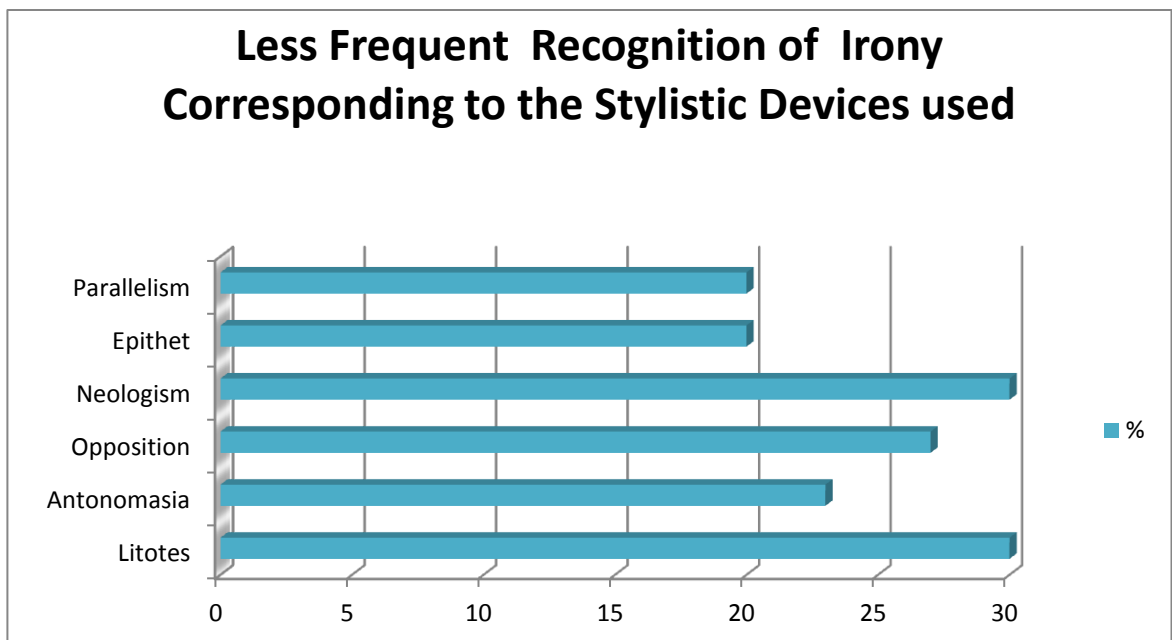


Fig. 6.3. Less frequent recognition of irony corresponding to the stylistic devices used.

Figure 6.4. shows that Group A (blue) considered the majority of tweets as ironic probably due to their greater familiarity to the subject itself. Meanwhile Group B (red), consisting of annotators with linguistic background but resident of the US, recognized the tweet more as not ironic than ironic. In general these findings can demonstrate that the Group B having a residence in other countries rather than United States feels a certain lack of internal political information and in this case the fact of having a specific linguistic background is not crucial. Group C (green), with annotators from different countries with no linguistic background, showed intermediate results between the two groups mentioned above.

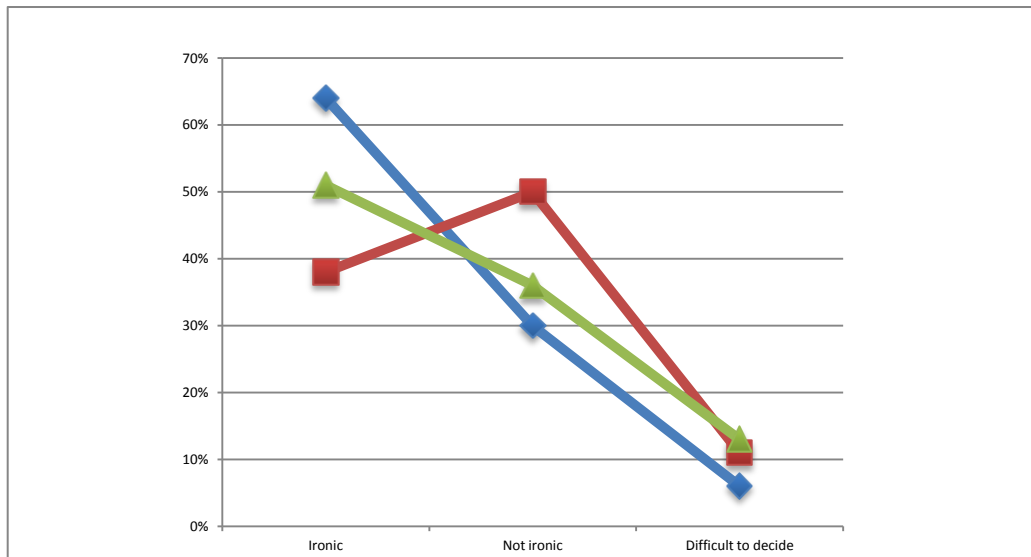


Fig. 6.4. Survey 2: the results of irony recognition according to the group deviation.

6.3.2 SURVEY 3: DISTRIBUTION OF IRONY IN SOCIAL MEDIA

The survey: Distribution of Irony in Social Media (see Appendix C) was given to three annotators to evaluate whether the tweet is ironic or not. The annotators were asked to choose from a closed-ended questionnaire survey two possible options – ironic/not ironic. The collection of tweets presented for evaluation had been extracted randomly from a dataset that did not contain any explicit information regarding literality of the

tweet, and, through the retrieval procedure adopted all the tweets bear on the US 2012 Presidential candidates. Figure 5.8 presents the personal information of the annotators involved in the questionnaire:

	Native Speaker	Non-Native Speaker	Proficiency in English	Nationality	Linguistic Background
Ev1	X		C2	American	X
Ev2		X	C2	Russian	X
Ev3	X		C2	American	X

Table 6.7. Survey 3: Class distribution of annotated data.

The results (Table 6.8.) have shown that inter-annotator agreement between the author of the dissertation and two other annotators, native speakers with linguistic background, is relatively low 0.177:

<i>Fleiss</i>	<i>Krippendorff</i>	<i>Pairwise avg.</i>
A_obs = 0.738 A_exp = 0.68 Kappa = 0.183	D_obs = 0.265 D_exp = 0.322 Alpha = 0.177	% agr = 0.737 Kappa = 0.179

Table 6.8. Survey 3: Results obtained in IAA.

Nevertheless, it is worth mentioning that the agreement between native speakers (NS) living in US is higher (0.273) than the agreement between us and one of the native speakers (0.118 and 0.14):

	Ev2	Ev3
Ev1	0.118	0.273
Ev2		0.14

Table 6.9. Survey 3: IAA agreement between all three evaluators.

6.4 POLARITY DISTRIBUTION OF THE CORPUS

Manually annotated dataset consisting of 500 tweets was pre-processed by Sentistrength²⁴, a sentiment analysis tool that scores sentiment positively or negatively, in

²⁴ <http://sentistrength.wlv.ac.uk/> [Last access 03.11.2014]

order to test if ironic tweets, which frequently convey negative sentiment, are adequately processed in terms of polarity. Sentistrength provided an automatic output by distributing the tweets with positive, negative and neutral sentiments.

Class	Number	%
positive	148	29,7
negative	167	33,2
neutral	185	37,1

Table 6.10. Sentistrength output.

Results have shown that nearly **67%** of all tweets were automatically classified as positive and/or neutral class, while **33%** of the dataset were interpreted as negative cases (Fig. 6.5). Thus, if we assume that all ironic tweets are in fact negative, the error rate of the automatic classification corresponds to 67%. It is worth to note, that the opinion polarity value can range from «-4» (the strongest negative value) to «4» (the strongest positive value).

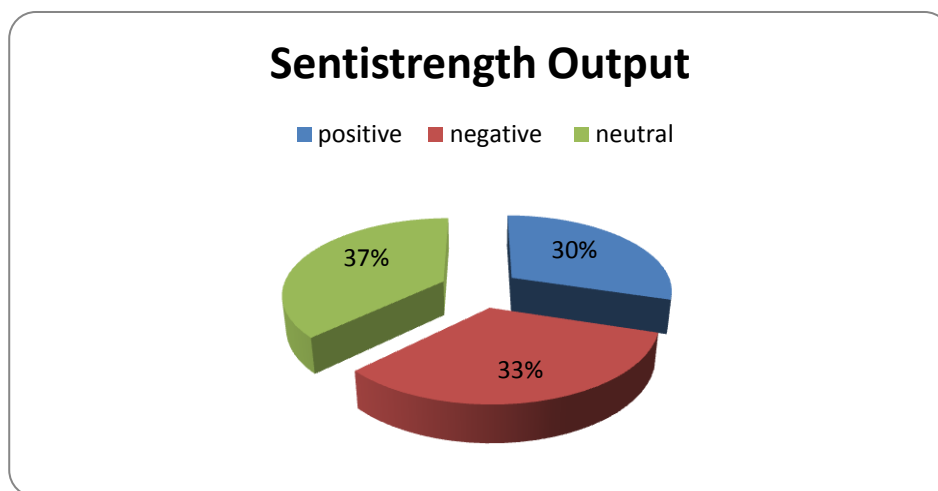


Fig 6.5. Class distribution of Sentistrength output.

Illustrative examples of each class drawn from the datasets are shown in Table 6.11. The examples clearly show that positive and neutral instances have not been correctly recognized as negative due to the fact that they contain positive words with a negative connotation. ~

Positive	4 -1	I'm[0] switching[0] to[0] #Romney[0] because[0] he[0] is[0] excellent[3] on[0] Gun[-1] Rights[0] http[0] ://t[0] [[Sentence=-2,4=word max, 1-5]] co/fLSqqIUK/co/fLSqIUK[0] #sarcasm[0] #newt[0] #ronpaul[0] #santorum[0] [[Sentence=-1,1=word max, 1-5]] [[4,-2 max of sentences]]
Negative	1 -4	Romney[0] claims[0] Obama[0] is[0] all[0] about[0] hatred[-3] says[0] the[0] man[0] who[0] physically[0] assaulted[-2] a[0] guy[0] for[0] his[0] hair[0] [[Sentence=-4,1=word max, 1-5]] http[0] ://t[0] [[Sentence=-1,1=word max, 1-5]] co/0o6pHZJc[0] #Irony[0] [[Sentence=-1,1=word max, 1-5]] [[1,-4 max of sentences]]
Neutral	1 -1	7[0] Eleven[0] Asks[0] Cream[0] Sugar[0] Romney[0] Or[0] Obama[0] With[0] Your[0] Coffee[0] [[Sentence=-1,1=word max, 1-5]] Gee[0] I[0] wonder[0] who[0] will[0] win[0] this[0] one[0] [[Sentence=-1,1=word max, 1-5]]

Table 6.11. Sentistrength examples of each class.

In order to calculate the rate of correct (incorrect) predictions made by the tool, the corpus was manually annotated. Accuracy is usually estimated by using an independent test set that was not used before during the learning process (Kohavi and Provost, 1998). More complex accuracy estimation techniques, such as cross-validation and the bootstrap, are commonly used in such types of experiments that we have. The results shown in Table 6.12 illustrate the precision, recall and F-measure calculations applying the following formulas²⁵:

$$\text{Precision} = \frac{tp}{tp + fp}$$

$$\text{Recall} = \frac{tp}{tp + fn}$$

$$\text{Accuracy} = \frac{tp + tn}{tp + tn + fp + fn}$$

²⁵ Available at: <http://www.uta.fi/sis/tie/tl/index/Rates.pdf> [Last access 03.11.2014]

$$F = 2 \cdot \frac{\text{precision} \cdot \text{recall}}{\text{precision} + \text{recall}}$$

Where **TP** is True Positive patterns, in our case it is 167 tweets, **FN** – False Negative misses, thus the number of tweets considered by Sentistrength as positive 148, **TN** – true negative and **FP** – false positive are considered by us as 0, because cases of neutral we cannot consider true negative or false positive. Thus the results have shown that Precision is 1, Recall is 0.53, Accuracy is 0.53 and F-measure corresponds to 0.28.

Precision	Recall	Accuracy	F-measure
1	0.53	0.53	0.28

Table 6.12. The results of precision, recall and F-measure.

These results have shown that sentiment analysis tools still do not recognize irony with high accuracy, thus, the improving of the quality of the analysis of irony in political domain in social media. The classification of figurative language described in this work might have multiple practical applications in future studies, suggested in conclusion section.

7. CONCLUSIONS AND FUTURE WORK

*It is more fun to arrive to a
conclusion than to justify it...*

Malcolm Forbes

Classical works on irony within the study of language and language use before the twentieth century focused on Aristotelian idea of “irony” as a form of “antiphrase”, where the speaker says A when s/he intends to convey B, and where B implies non-A. A turning point in the study of irony and related figures from a linguistic point of view, marked by the works of Emile Benveniste (Benveniste, 1966), arose when the notion of subjectivity was integrated as a parameter for the analysis of linguistic forms: the study of figures of speech became then a concern for linguistics, since linguistics became more generally concerned with more than just the “linguistic system”.

In our thesis we focused on the linguistic expression of irony in social media. The study provides a detailed analysis for the identification of the figurative devices used to produce ironic effect and targeting human entities, namely politicians. We showed that it is possible to identify irony in short messages (“tweets”) and, moreover, we presented a set of possible linguistic clues for detecting it. However, it is worth noting that irony detection is quite a challenging task, requiring not only understanding the reader’s intention, but also his/her interpretation. Moreover, personal factors such as mood, stress, culture or even linguistic competence, have impact on the final interpretation. Thus, we can claim that figurative meaning is not given a priori; rather it must be implicated. In this

respect, figurative language plays an important role in communication, due to the need of performing mental processes such as reasoning and referencing, which require additional cognitive effort (Gibbs, 2007).

According to the results described in Chapter 6, our initial assumptions concerning the usefulness of this type of information in characterizing figurative language (irony) have been confirmed. In addition, the analysis performed while identifying linguistic strategies for irony detection clearly leave room for improvement.

7. 1 CONTRIBUTIONS

By analyzing a specific domain of figurative language, we aimed at providing the detailed analysis of how irony works in that specific domain and in terms of its use in a social media platform. Such analysis intends to represent the impact of irony in social and microblogging services. Besides that, we focused on the representation of formal features of each stylistic device that later could be implemented in computational models to foster the automatic processing of irony. In this section we summarize our major findings whereas the details of each device, as well as their applicability, can be found in Chapter 2 and 5.

- (i) As described in Chapter 5, irony, in our opinion, can be linguistically represented with a help of other different stylistic devices that help to produce ironic effect.
- (ii) The most representative categories create an ironic effect in social media targeting politicians are: exclamation (21.6%), rhetoric question (14%), antiphrasis (11.2%) and metaphor (12.4%).
- (iii) Based on the data analyzed in this work, we assume that due to the limitation of 140 characters in one tweet, some of the instances were difficult to interpret accurately, since irony is a phenomenon based on a context and situation. Nevertheless, the most productive instances, from our point of point of view,

were the categories of a metaphor, oxymoron, and neologism. They have interesting platform for recognition.

(iv) The linguistic and social factors that are present in ironic statements make the task of automatically identifying figurative instances quite complex, especially, due to the lack of valuable information.

(v) According to the previous point, our stylistic device classification is given by analyzing the linguistic system as an integral structure which depends on grammatical rules as well as cognitive, experiential, and social contexts, which altogether, represent the meaning of what is communicated.

(vi) In addition, we confirm that the categories of exclamation/interjection, hyperbole, oxymoron, neologism, idiom, repetition, comparison are more suitable to be computationally represented due to their external clues and/or markers, which can be systematically applied in a rule-based approach and/or the creation of certain types of dictionaries.

(vii) Irony is a widespread phenomenon in web content. The empirical insights described in this thesis should improve and facilitate the possibility for automatic processing of figurative language, as well as accurate classification of it, as described in future work perspectives.

7.2 FUTURE WORK

The main directions of future work would address the improving of the quality of the analysis of textual patterns, as well as investigate new ones, in order to obtain a clearer picture of how irony works in social media. Moreover, the classification of figurative language described in this work might have multiple practical applications in future studies.

Precisely, in our research, after the in-depth analysis of rhetoric devices for expression of irony, our goal was to underline the most representative subclasses and try to undertake a case study in order to adequately lay out and recognize some categories automatically by means of creating local grammars in Unitex²⁶, a corpus processing system, based on automata-oriented technology. Due to the lack of time, because analysis of figurative devices for irony expression is sophisticated task, the main goal of the research was dropped. Nevertheless, we suggest this experiment for future research perspectives by conducting a study in attempt to identify the most representative categories of our findings automatically, by applying lexicon- and rule-based approach.

Special attention might deserve the use of already existing lexicons²⁷ proposed, for example, by Bing Liu in available sources; 2006 positive and 4783 negative words, especially tailored for social media, the lexicons consider misspellings, slang and other domain specific variations. Extra lexicons databases for interjection, positive adjectives and adverbs, most popular idioms in English; emoticons, oxymoron have been created by us in this study and could be possibly a valuable source for the future study implications.

According to our observations, the most complicated categories for automatic recognition are lexico-semantic categories of figurative devices used to process ironic effect, especially the ones that represent quality, rather than quantity and/or position. We suggest following certain guidelines determined in our study by a profound analysis of stylistic and rhetoric devices based on ironic nature. Therefore, the following representation could be useful potentially for recognizing ironic expressions categorized according to the classification archived in this research:

(44) *Romney, we need more wars everywhere*

²⁶ Available at: <http://www-igm.univ-mlv.fr/~unitex/> [Last access 03.11.2014]

²⁷ Available at: <https://github.com/jeffreymreen/twitter-sentiment-analysis-tutorial-201107/blob/master/data/opinion-lexicon-English/negative-words.txt> [Last access 03.11.2014]

Irony results from the negative object (*wars*) of a predicate *need*, which is then hyperbolized by the locative adverb *everywhere*. So, irony in this tweet is expressed through antiphrasis (*need-war*) and secondarily, by hyperbole (*everywhere*). Hyperbole can be defined as a deliberate overstatement or exaggeration of a feature essential to the object or phenomenon. Therefore, the following formula could be possibly applied:

$$[\text{NE}] + [\text{V}] + \text{Lex_quantity} + [\text{N}] + \text{Lex_adverb}$$

Where [V] corresponds to a modal verb of necessity systemized in a dictionary for this purpose, Lex_quantity – a lexicon applied with conditional quantifiers, finally, [N] – a lexicon, available from Bing Liu, of words with a negative polarity, in terms of sentiment (e.g. war).

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APPENDICES