

A ventriloquism perspective on Natural Language Processing

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Abstract. Natural language interfaces and, in general, Natural Language Processing (NLP) state of the art applications cannot handle satisfactory (if they can at all) conversational implicatures, illocutionary force, stylization, parody, inner disguised polemic, disguised dialogue and other similar phenomena. Considering the ventriloquism perspective in the context of the dialogic-polyphonic theories of Mikhael Bakhtin may provide a basis on trying to cope with such phenomena. The paper introduces some basic ideas of Bakhtin related to ventriloquism in an extended sense, discusses the approaches based on ventriloquism in other domains than NLP, then it analyzes several NLP applications from the perspective of this concept. Several ideas on how the analysis of ventriloquism might be done in NLP are introduced.

Keywords: ventriloquism, dialogism, polyphony, computational linguistics, interanimation, visualization

Introduction

Interfacing with computers in natural language exactly as we do with a human would be a great achievement. There is a lot of interest in this direction and we have now a series of systems trying to obtain this goal, including speech, such as Siri from Apple, the “OK Google” facility, Cortana from Microsoft and other, non-commercial ones, based only on text, like Alicebot (<http://alice.pandorabots.com/>). However, these systems cannot handle even some simple conversations, like the one below,

in which I wrote the “judge” utterances and the bot answered me as “Alice”

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judge: I am out of petrol
ALICE: Would you like to have it?
judge: my car does not start
ALICE: Where did you get your car does not start?
judge: my car needs petrol
ALICE: Can what?

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The first utterance is taken from an example of Grice (1975) and the expected answer should be related to where petrol can be bought. It is what Grice names a “conversational implicature” and it is one of the trickiest tasks of Natural Language Processing (NLP), together with recognizing illocutionary force (Austin, 1962), coreference resolution and other pragmatics and discourse problems of human language understanding using computers (Jurafsky and Martin, 1999).

We consider that one of the solutions to try solving the above mentioned problems in NLP is to consider ventriloquism in the sense of the multivocal approach of Mikhail Bakhtin (1981, 1984, 1990). Ventriloquism, in its most used sense, is an act in which a person speaks with the voice of someone else. In this way the illusion may be induced that, for example, a doll speaks, although, of course, the puppeteer is the owner of the voice. This is considered as a “real ventriloquation” by Linell (2009) and he contrasts it to another kind of ventriloquation (a “reversed” one) in which “a speaker may also claim to express ideas originating in his or her own mind, when in fact, he or she has appropriated (or expropriated, that is, stolen) them from somebody else” (Linell, 2009, p.131). In our opinion, we should classify the acts in the latter case as conscious or unconsciousness. The first ones may be fraudulent (for example, plagiarism) or correct (for example, quoting). The second type, unconsciousness ventriloquism, may be due to media manipulation or to subconscious, in Freud’s (1914) sense.

In addition to these types of ventriloquism, we add, according to Bakhtin’s ideas, the overlapped ventriloquism: A person voices (speaks or writes) something, but, meanwhile, his/her utterance contains also another voice, in a generalized sense. In order to deeply understand this phenomenon, the concept of “voice” should be considered in a generalized, non-physical sense (Trausan-Matu, 2010), as it will be detailed later in this paper. This sense may also be recognized in the above quote of Linell: voices are ideas in the “reversed” ventriloquism.

According to the above ideas, we define ventriloquism as the act of a

person that emits an utterance (spoken or written) that contains more than one voice, in a generalized way. For example, in the first utterance of the previous dialog excerpt, one voice says “I am out of petrol” and a second, implicit one, with an illocutionary force (Austin, 1962) says “Where can I find a petrol station?”

Ventriloquism is deeply related to the multivocality and polyphony perspectives of discourse introduced by Mikhail Bakhtin (1981, 1984, 1990). Ventriloquism is, in our sense, one particular form of *multivocality* (which is characterized by the existence of multiple voices in the same time), its specific feature being that the different voices are emitted by the same person. In our opinion, ventriloquism, even if it may have many times the appearance of a single voice, it implies at least two voices, in the generalized way. For example, the puppeteer emits a voice supposed to be of a doll, but this voice is in fact double-voiced, it contains also the implicit voice of its utterer (a voice in a generalized way: the ideas and acts of the puppeteer).

Multivocality is a premise for the special achievement called *polyphony*, which is a phenomenon in which multiple voices jointly build a coherent discourse while maintaining their individuality. Polyphony may be realized even by a single person by ventriloquism, like a pianist playing a Johann Sebastian Bach fugue at three voices or like Dostoyevsky, characterized by Bakhtin as writing polyphonic novels (Bakhtin, 1984).

The ventriloquism perspective is totally absent in the context of the dominant approaches in theoretical linguistics and, especially in Natural Language Processing. The latter approaches were mainly based on the principle of decompositional semantics, which asserts that the meaning of a piece of text is the sum of the meanings of the component words. Other basic ideas of these approaches were logical positivism – anything may be described in mathematical logic – and Ferdinand deSaussure’s (1996) structuralism and semiotics - which consider that words are arbitrary signs. In addition, successful approaches in NLP are based on statistical learning and often on the assumption of “bag of words” (Jurafsky and Martin, 2009).

In opposition to these above mentioned NLP approaches are the double-voiced word theory of Mikhail Bakhtin (1981, 1984, 1990), Heidegger’s philosophical ideas (“words are speaking through us” (Stahl, 2006)), and “the logic of Hermes” of Constantin Noica (1986). All of these theories can

be included in a ventriloquism-based view. These theories and concepts, together with the polyphonic model - based on the theories of Bakhtin's dialogism - and the associated analytical method (Trausan-Matu, 2008, 2009, 2010; Trausan-Matu, Dascalu and Rebedea, 2014) may be a starting point for such a new approach, starting from the ventriloquism perspective. The justification is that it may cope with aspects not covered by current approaches in computational linguistics or it may simplify existing approaches, for example Grice's conversation implicatures, we already mentioned. Moreover, we believe that the ventriloquism perspective can be used for a new vision of existing approaches.

The ventriloquism idea, in the wider sense, is used in several areas such as education (Wertsch, 1991), history/religion (Hayes, 2011), politics (Lauerbach, 2006), communication (Cooren and Sandler, 2014; Tannen, 2010), etc. In this paper, in addition to the Bakhtin's dialogical theories analysis of ventriloquism, we will review the presence of this concept also in other areas.

The paper continues with a presentation of the ventriloquism perspective into the works of Mikhail Bakhtin. After reviewing other works and domains that consider this perspective, the fourth chapter deals with a ventriloquism vision on natural language processing, considering both approaches and existing applications in this new perspective, and what would require natural language processing in this new sense. The paper ends with conclusions.

The perspective of ventriloquism in the work of Michael Bakhtin

The ventriloquism perspective is present in many places in Bakhtin's work¹, as many scholars and commentators observe (Wertsch, 1991; Clark and Holquist, 1984). An illustration of this view appears in the English translation of one of Bakhtin's books, where Michael Holquist, translator and commentator of Bakhtin's work (Clark and Holquist, 1984) uses the

¹ Mikhail Bakhtin's theories are considered by many researchers as foundations for domains like Computer Supported Collaborative Learning (Koschmann, 1999; Stahl, 2006; Trausan-Matu, 2009, 2010), discourse analysis (Tannen, 2010), sociology (Markova, 1994), etc. (see also Section 3)

word “ventriloquates” (which, in other translations does not appear):

“... a prose writer can distance himself from the language of his own work, while at the same time distancing himself, in varying degrees, from the different layers and aspects of the work. He can make use of language without wholly giving himself up to it, he may treat it as semi-alien or completely alien to himself, while compelling language ultimately to serve all his own intentions. The author does not speak in a given language (from which he distances himself to a greater or lesser degree), but he speaks, as it were, through language, a language that has somehow more or less materialized, become objectivized, that he merely ventriloquates.” (Bakhtin, 1981, p. 299)

We may say that the ventriloquism perspective is ubiquitous in the works of Bakhtin, even if not named as such by him. Several concepts found in the writings of Bakhtin are synonymous with the “ventriloquism” concept: The word as a “two-sided act” (Voloshinov, 1973, p.86), the “double voiced word” or “double-voiced discourse” (Bakhtin, 1984), the “alien discourse” (Bakhtin, 1984), the “other’s voice” (Bakhtin, 1984) or “echo” (Bakhtin, 1984) and last but not least, “interpenetration” (Bakhtin, 1984, 1990).

The utterances, even the word in Bakhtin’s works has a social dimension, contains several voices, their echoes and foreshadowing words and utterances:

“In point of fact, the speech act or, more accurately, its product - the utterance, cannot under any circumstances be considered an individual phenomenon in the precise meaning of the word and cannot be explained in terms of the individual psychological or psychophysiological conditions of the speaker. The utterance is a social phenomenon [...] In point of fact, *word is a two-sided act*. It is determined equally by whose word it is and for whom it is meant. As word, it is precisely *the product of the reciprocal relationship between speaker and listener, addresser and addressee*,” (Voloshinov, 1973, p.83-86)

“Voice” is a fundamental concept in Bakhtin’s works, which is absolutely necessary for understanding the ventriloquism perspective. Voice, in a generalized sense must be understood not only in the usual, physical sense, characterizing the utterances of a speaking person (Trausan-Matu, 2010). A voice may be also a position, a presence, an idea that can have echoes in the future and, as Emerson and Holquist (1981) write, a

personality or speaking consciousness.

A person may issue several voices simultaneously in an utterance. Even each single word can contain several voices: at least the voice of the man who said or wrote it, the listener or potentially reader, and others voices, any speaker or writer becoming a ventriloquist:

“The word in language is half someone else’s. It becomes ‘one’s own’ only when the speaker populates it with his own intentions, his own accent, when he appropriates the word, adapting it to his own semantic and expressive intention. Prior to this moment of appropriation, the word does not exist in a neutral and impersonal language ... but rather it exists in other people’s mouths, in other people’s contexts, serving other people’s intentions; it is from there that one must take the word, and make it one’s own.” (Bakhtin, 1981, p. 294)

The multivocality of utterances has an extremely important effect. For Bakhtin anything, even a word, has a dialogical perspective. In this dialogical-ventriloquism sense, voices not only have echoes in the future, through their mere presence they interact with each other in every moment. Moreover, as speaking consciousness (Emerson and Holquist, 1981), the voices do not only interact, they interanimate (Trausan-Matu, Stahl and Sarmento, 2007) and even interpenetrate (Bakhtin, 1984, 1990; Trausan-Matu, Stahl and Zemel, 2005). Constantin Noica uses this term (“compenetrare”, in Romanian) to denote a complex operation of composition similar to Leibniz’s association of monads in the generation of a superior class of monad (Noica, 1986). This operation cannot be reduced to logical conjunctions (Noica, 1986).

Classification of double-voiced words

Bakhtin, as mentioned above, used frequently the double-voiced word concept in the idea of a sort of ventriloquism. He makes a classification of double-voiced words in texts, including: words with inner dialog, stylization, narrative, parody, inner disguised polemic, dialogue replica, and disguised dialogue (Bakhtin, 1984). Furthermore, inner disguised polemic is considered highly prevalent in everyday speech, taking various forms, such as speaking with detours, humble, reserves, tricks, etc. Bakhtin classifies double-voiced discourse as follows (Bakhtin, 1984, p. 199):

1. Unidirectional

- a. Stylization;
- b. Narrator's narration;
- c. Discourse of a character who carries out (in part) the author's intentions;
- d. First person narrative;
 - 2. Vari-directional
 - a. Parody with all its nuances;
 - b. Parodistic narration;
 - c. Parodistic first person narrative;
 - d. Discourse of a character who is parodically represented;
 - e. Any transmission of someone else's words with a shift in accent
 - 3. The active type (reflected discourse of another)
 - a. Hidden internal polemic;
 - b. Polemically colored autobiography and confession;
 - c. Any discourse with a sideward glance at someone else's word;
 - d. A rejoinder of a dialogue;
 - e. Hidden dialogue.

All the above mentioned classes of double-voiced words should be considered in NLP implementations of human-computer interfaces, if we want to achieve the goal of mimicking humans. For example, handling parody, hidden internal polemic, hidden dialogue, etc. are needed for discourse understanding. Of course that the identification of double-voicing means the identification of ventriloquism and, most important, to detect which is the real personal voice of the utterer (and if it is, in fact his/hers) and which are others' voices re-voiced by the utterer.

Ventriloquism in education and in other domains

The ventriloquism phenomenon has been noted by other authors, apart from Bakhtin and, significantly, most of them refer to him. It has been identified in domains ranging from education to politics and the history of ideas.

In education, James Wertsch, one of the authors highlight the importance of ventriloquism at Bakhtin, exemplifies the emergence of this phenomenon in a dialogue between a student ("C") and a professor ("T"). As noted by Wertsch, the teacher aims that the student becomes a kind of ventriloquist, repeating what he said:

- (1) C: What is found in the southeastern snakes, also the copperhead, rattlesnakes, vipers-they have. I'm not doing this right.
- (2) T: All right. Do you want to know about the pit vipers?
- (3) C: Yeah.
- (4) T: What would be a good question about the pit vipers that starts with the word "why?"
- (5) C: (No response.)
- (6) T: How about, "Why are the snakes called pit vipers?"
- (7) C: Why do they want to know that they are called pit vipers?
- (8) T: Try it again.
- (9) C: Why do they, pit vipers in a pit?
- (10) T: How about, "Why do they call the snakes pit vipers?"
- (11) C: Why do they call the snakes pit vipers?
- (12) T: There you go! Good for you. (Palincsar and Brown, 1984, p.138)

(Wertsch, 1991)

The result of teacher's insistence towards ventriloquism is beneficial: After some time, the student understands the idea and, in a similar case, he asks a correct question, that the teacher expected: "Why do scientists come to the South Pole to study?" (Wertsch, 1991).

In fact, we can say that, at least in the past, teachers used in classroom methods to make students repeat what they said, they had the goal to induce a kind of ventriloquism. Even now, we could say that professors supervising the research in masters and doctorates like that their students understand and assimilate their ideas and further 'speak with their voices', continuing their research.

Another point of view on ventriloquism in education is emphasizing the importance of repetitions in Computer-Supported Collaborative Learning (CSCL) based on instant messaging ("chat") (Trausan-Matu, 2010, 2012; Trausan-Matu and Murarus, 2015; Trausan-Matu, Stahl and Zemel, 2005). These repetitions may be seen as taking the form of a ventriloquism phenomenon (similarly to the example of Wertsch above), sometimes becoming a socially built artifact used in collaborative problem solving using chat (see the third example, in which the repeated word "overlap" becomes an artifact), according to the following two examples:

160 mathisfun, 20:26 (12.05): k so there are **two ways** right?
 161 bob123, 20:27 (12.05): yeah
 162 bob123, 20:27 (12.05): $2c1=2$
 163 Marisol, 20:27 (12.05): yes, I agree there are only **two ways**
 164 mathisfun, 20:27 (12.05): then there is a one by two
 165 qwer, 20:29 (12.05): only **two ways**? @: Message 158: To whole message
 166 mathisfun, 20:28 (12.05): is the one by two going to be 4 ways?

69 ModeratorSf, 20:14 (19.05): you can continue the problems from last time or we can **try another**, what you say?
 70 mathpudding, 20:16 (19.05): **try another**
 71 TinyFryhiii12, 20:15 (19.05): **another**
 72 mathman, 20:16 (19.05): **another** we came to a solution for the one last time
 (Trausan-Matu, 2010)

In a third example, the word “overlap”, introduced by a participant (137) is taken by a kind of ventriloquism, even after several days, by the other participants (Jason and qwertyuiop) and becomes an artifact in solving the problem:

Nr.	Date	Time stamp	137	Jason	Qwertyuiop
31	09 May 2006	18:28:43	and $2(1+2+3 \dots n-1)$ overlaps		
393	11 May	19:36:23	There are n-1 overlaps here...		
398	11 May	19:36:57		what do you mean by :"overlaps"	
401	11 May	19:38:22		because i dont think the overlap in the diagrams matters	
406	11 May	19:40:04		i don't see how the borders overlap	
410	11 May	19:40:46			overlap?
78	16	19:41		are you taking into account	

8	May	:01		the fact that some of the sticks will overlap	
79 0	16 May	19:42 :22			Yes. The blue and green/orange lines make up on of the three colinear sets of sides in the triangle. Each set is identical and doesn't overlap with the other sets.
79 6	16 May	19:43 :52	Yes, but they will overlap..		
84 7	16 May	20:00 :14			but the sides of the triangles making up the hexagon overlap
85 9	16 May	20:02 :15			actually, this doesn't complicate it that much. The overlaps can be accounted for with "-6n"
10 98	18 May	19:43 :38			the overlap is different depending on whether the cube is on the outside of the shape or on the inside
10 99	18 May	19:43 :48	?		
11 00	18 May	19:43 :57	Oh.		
11 02	18 May	19:45 :02			Take the cube at the very top. 4 of its edges overlap with other cubes. Take the cube just below it. Only 1 of its edges doesn't overlap with any other cube.
11 03	18 May	19:45 :54			that would still have to account for the overlap that way
11 04	18 May	19:46 :03		so are you thinking about a function that first takes into account how many	

				vertices there are total, including overlaps, and then subtracting how many overlaps there are based on another formula	
11 05	18 May	19:46 :42			or the sum of different formulas for cubes in different places
11 25	18 May	19:58 :55			all together it would account for overlap, as each cubes 3 lines doesn't overlap with any other
11 31	18 May	20:00 :09		at first i thought there was going to be some overlap in the front of the cube (this current view)	

Another application of the ventriloquism perspective is introduced by Cooren and Sandler (2014). They analyze communication processes from this perspective, as shown in the following two examples: “the journalist represents or ventriloquizes the New York Times, which can itself be deemed as representing or ventriloquizing the U.S. media more generally” and “adding voices to your own voice can constitute a very effective way to lend weight to what has you saying .“

Tannen (2010) analyzes the ventriloquism in family dialogue and Lauerbach (2006) in politics. Hayes considers another dimension, the divine ventriloquism of the voice of Jesus in others' utterances (Hayes, 2011). In the end, we may say that the concept of unconsciousness from psychoanalysis may be viewed dialogically (Billig, 2006) as a kind of ventriloquism: the voice of unconsciousness speaks through us.

The perspective of ventriloquism in human-computer interfaces using natural language processing

In natural language processing words are seen from the decompositional semantics perspective mentioned in the beginning of the paper. Words are part of a glossary, thesaurus, dictionary, ontology or lexical database. A significant example (and probably the most complex) is WordNet (Miller, 1995). Each word can have several meanings and is in different

relationships with other words (in the terminology of WordNet, synonymy, hypernymy, hyponymy, holonymy, meronymy, antonymy, etc.). They may have certain features (e.g. transitive or nontransitive verbs) and may be in different dependency relationships with other words in the text (for example, according to the dependency grammars).

In the statistical approach to computational linguistics, words are primarily classified by relevance, the so-called “stop words” - words very common but unimportant for the content - are eliminated. Following statistical processing, words can be associated with semantic spaces (LSA) or topical sets – LDA (Blei, Ng and Jordan, 2003). These approaches are based on the assumption of the “bag of words”, that the order of words does not matter. In more recent approaches, word order is considered using neural networks. However, this is not an approach that considers the idea of ventriloquism.

As we see, words are considered mainly from an “individualistic” perspective, as atoms in univocal syntactic constructions. When one considers their meaning, a semantic disambiguation is needed. The same happens in the case of pragmatics, in which case also clear meanings are searched for.

In the ventriloquism perspective, every word, every utterance is multifaceted, it contains multiple interacting voices. Naturally, this approach complicates matters, the classical approach to natural language processing being oriented on the direction of the structuralist theories, decompositional, reductionist, simplifying in order to avoid the complexities involved in an approach in which even one word can contain multiple echoes, which eliminates obvious unique interpretations. It should be however noted that even in the currently used techniques are elements of ventriloquism, as we shall see in the next section.

An interesting perspective on ventriloquism is given by what Plato wrote in *Phaedrus* (Plato, 1983). He criticized the usage of writing instead of speech. We do not go that far, but we believe that in the speech case, what is communicated is directly linked by an utterance of an individual, a reflected position, a personality, with an impact on future interventions.

Elements of ventriloquism in the existing approaches of natural language processing

Making a critical analysis of the state of the art of the domain of natural language processing, elements of ventriloquism may be identified even in the currently used models and technologies. In what follows we will attempt to overview these elements.

1. In several syntactic analysis models (eg dependency grammars) structures centered on a head are used, for example, nouns or verbs. These words may have related adjectives or adverbs, which customize and “change” them for the next usage. These associations may be seen in the ventriloquism sense as voices with echoes in the future. For example, the characterization of a concept (noun) as “beautiful”, “good”, “cold”, “sad”, etc. may be seen, in fact, as a voice that has echoes in future utterances (interventions). An example is the following, the second occurrence of the word ‘day’ carrying echoes of the initial utterance (the voice) of Andreea that it is a sad day:

Andreea: For Michael, yesterday was a sad day.
Constantin: Yes, and Mircea did not want to add anything to this day.

2. In the syntactic analysis ellipses may occur, as in the following example, in which the voice of Andreea is present in what says Constantin, even if “day” is missing, is an ellipse:

Andreea: For Michael, yesterday was a sad day.
Constantin: Yeah, it was really sad.

3. Metaphors and poetic phrases can be seen also as bearing ventriloquism. We could say that many metaphors carry the voice of the person who created them, for example, Pascal’s voice is present in the metaphor “Man is a thinking reed.”

4. Semantic networks are based on associations between words, some of them being subjective, individual, which can be seen as echoes of utterances. For example, the association of the word “insensitive” to a person may be the result of an utterance of another person, even a long time ago. Sometimes, even if we may perceive the voice of the person who emitted that utterance, it can follow us even a lifetime.

5. At least even some co-references may be considered also as a kind of ventriloquism. This is the case for the pronoun “it” below:

Andreea: For Michael, yesterday was a sad day.
Constantin: Yes, and Mircea did not want to add something to it.

6. The illocutionary dimension of an utterance (Austin, 1962) is obviously very close to ventriloquism in the sense that we consider. For example, when the father tells to the child in the evening “It’s the time to brush your teeth!”, this utterance includes the voice that says “It’s time to sleep!”. The same may be said also for conversational implicatures (Grice, 1975) – see the example from the Introduction.

7. The analysis of feelings and opinions is actually the process of identifying voices containing relevant utterances for the sought purposes. Identifying the emotional dimensions of a text may be seen as highlighting the voices, sometimes hidden behind that text.

8. Statistical processing in computational linguistics, for example, semantic disambiguation of a word using the naive Bayes method implicitly uses the ventriloquism idea: meaning is determined by the associations, of echoes of utterances that co-occur with a word.

One conclusion from the above considerations is that the ventriloquism perspective can throw new light on linguistics, unifying complex phenomena of semantics and pragmatics under a common concept.

NLP techniques and applications for ventriloquism detection

Ventriloquism may be used consciously or not, induced willingly or not, as mentioned previously. One of the most obvious (and with many available implementations) applications that can be considered as a means that can be used to identify conscious (and, of course illegal) ventriloquism is plagiarism detection. We can see this type of application as having the aim of separating the voice of the author from alien voices, consciously inserted by “copy/paste” in text but not mentioned as such. In the same idea, the automated identification of alien voices present in a text without being plagiarism, for example, references and intertextuality can also be categorized as ventriloquism detection applications. The latter use NLP techniques based on text mining techniques for extracting concepts and named entities (names of persons, locations, companies, etc.).

In addition to the identification of alien voices in a text by finding “copy/pasted” zones of text and common concept identification, other NLP techniques may be used for detecting ventriloquism, such as: collocations detection, detection of repetitions using, for example, suffix trees, identification of patterns in texts. All these are based on some kind of

repetition detection. However they do not consider the time dimension, they are, with little variations, using a bag of words approach.

The time sequencing is very important in detecting the re-voicing, an essential ingredient of polyphony and ventriloquism. Lexical chains (Jurafsky and Martin, 1999) may be, for example, considered that they are including a time sequencing element. However, in a ventriloquism (and bakhtinian) perspective, in addition to detecting chains of repeated concepts or entities, each of their repetitions should consider the echoes of their previous appearances, which should be considered in the further processings in which they are included. Each appearance of even a word is a unique event, because it is a ventriloquation event, the word is filled with overtones, with multiple voices.

Eventually, ventriloquism detection in texts and conversations should also consider cultural practices, for example politeness, related with illocutionary forces and conversational implicatures (Brown and Leevinson, 1987): For being polite, we many times use a different voice than our original, inner one, for example, we say “It is rather hot inside” while our real voice would be “Open the window”.

Conclusions

The approaches in the history of computational linguistics were mainly based on the assumption of decomposable semantics. Ventriloquism is a new vision, based on the ideas of Bakhtin (and, we can add, Noica, as we mentioned earlier). It considers the remote influence of previous utterances and, through the interaction between the voices of a writer or speaker and those ventriloquized. Consequently, even a word, in any re-occurrence, is changed; its connotations and associations are updated.

Ventriloquism elements can be identified even in the current NLP models and technologies. This fact can be explained by the omnipresence of this phenomenon. Considering an explicit ventriloquism perspective can throw a new light on linguistics, unifying even complex phenomena of semantics and pragmatics under a common concept and also opening new ways of investigation and development of natural language processing applications.

In addition to the applications and techniques discussed in the paper, we

consider that other techniques are needed, which have not been used so far in computational linguistics to detect the double-voiced character of words and phrases and of the echoes (voices) present in them.

Ventriloquism is intrinsically linked to multivocality and polyphony, according to the views of Bakhtin, Wertsch and Trausan-Matu, presented in this paper. To perform a polyphonic analysis of texts, we should do a ventriloquism analysis, for example, at each re-occurrence of a word an analysis of the ventriloquism presence and of interactions between the implied voices should be done. A solution may start from the already existing polyphonic model, analysis method and implementations (Trausan-Matu, 2008, 2009, 2010; Trausan-Matu, Dascalu and Rebedea, 2014).

To conclude, human-computer interaction in natural language should include the handling of double-voiced phenomena described by Bakhtin (1984) and mentioned by us: inner dialog, stylization, parody, inner disguised polemic, and disguised dialogue. In the context of the rapidly spread of “smart” devices that may enter in discussion with us, if they do not handle double-voicing, our language will become poorer. The existing NLP tools and techniques cannot cope with them.

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