

Summing up

- We developed a technique for giving life to texts automatically, exploiting a link between **lexical semantics processing** (in particular emotion recognition) and **text animation**
- Possible applications
 - Automatic personalized advertisements
 - Computational humor (e.g. irony)
 - Persuasive communication
 - Electronic newspapers
 - Computer assisted creativity
 - Edutainment
 - ...

Outline

1. Witty language
 - Humor generation
 - Humor recognition
2. Affective Text
 - Lexical resources
 - Annotation of emotions in text
 - Colors of emotions in texts
 - Dancing with words
3. **Persuasive NLP**
 - **Analyzing political speeches along with audience reactions (e.g. applauses)**
 - How to evaluate persuasive language ?
4. Deceptive Language recognition
 - Is it possible to recognize when people are lying, just using the produced text ?

Predicting Persuasiveness in Political Discourses



Introduction

- Persuasion is becoming a hot topic in NLP.
- Past works on persuasion and NLP have focused mainly on text generation using knowledge-based approaches.

Scope of the work

- In political speeches, the audience tends to react or resonate to signals of persuasive communication
- Automatically predicting the impact of such discourses is a challenging task
- It can be useful to have a measure for testing the persuasiveness of what we retrieve or possibly of what we want to publish on Web
- We exploit a corpus of political discourses, tagged with audience reactions, such as applause, as indicators of persuasive expressions
- We explore differences between Democratic and Republican speeches, experiment the resulting classifiers in grading some of the discourses in the Obama-McCain presidential campaign available on the Web.

C. Strapparava, M. Guerini, O. Stock
"Predicting Persuasiveness in Political Discourses". *LREC-2010*

Resources

- We want to explore persuasive expression mining techniques as a component for persuasive NLP systems in an unrestricted domain.
- In order to automatically produce and analyze persuasive communication, **specific resources** and methodologies are needed.

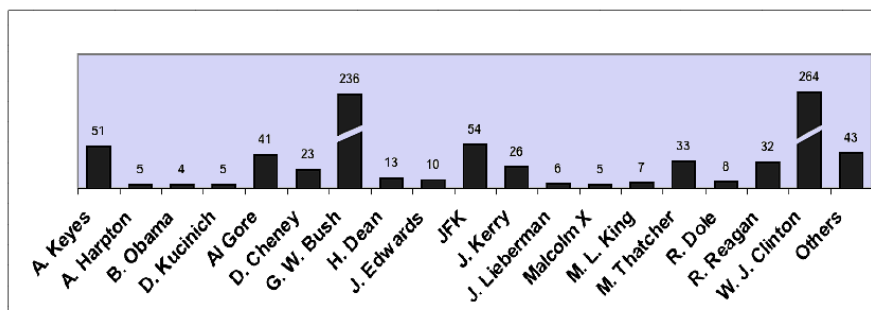
Persuasive Communication typologies & resources

- **Long and elaborated persuasive texts:** a CORpus of tagged Political Speeches (CORPS)
- **Short, high impact sentences:** a Corpus of labeled advertising or political slogans (SloGun)
 - "Your Potential. Our Passion" "A diamond is forever"
- **High impact, evocative words:** the art of Naming
 - "Air" (Macbook), "Hammer" (jeep)
- **Affective aspects of communication:** terms gathered by semantic similarity and ordered by valence (OWTs)

← *Decrepitude* *Old age* *Golden years* →

CORPS: a CORpus of tagged Political Speeches

- About 3600 tagged speeches (from the Web) in the corpus and about 7.9 millions words.



Characteristics (cont'd)

- **Hypothesis:** *tags* about audience reaction, such as **APPLAUSE**, are indicators of hot-spots, where persuasion attempts succeeded.
- Semi-automatic conversion of tags names to make them homogeneous

Tags List

Tag	Note
{APPLAUSE}	Main tag in speech transcription.
{SPONTANEOUS-DEMONSTRATION}	Tags replaced: "reaction" "audience interruption"
{STANDING-OVATION}	-
{SUSTAINED APPLAUSE}	Tags replaced: "big applause" "loud applause" etc.
{CHEERS}	Cries or shouts of approval from the audience. Tags replaced: "cries" "shouts" "whistles" etc.
{BOOING}	In this case, the act of showing displeasure by loudly yelling "Boo" Tags replaced: "hissing"
{TAG1 ; TAG2 ; ...}	In case of multiple tagging, tags are divided by semicolon. Usually there are at most two tags.
Special tags	Note
{AUDIENCE-MEMBER} [text] {/AUDIENCE-MEMBER}	Tag used to signal a single audience member's intervention such as clagues speaking.
{OTHER-SPEAK} [text] {/OTHER-SPEAK}	Tag used to signal speakers other than the subject (like journalists, chairmen, etc.)
{AUDIENCE} [text] {/AUDIENCE}	Tag used to signal audience's intervention.

Audience Reactions Typologies

- Three main groups of tags according to the characteristics of the audience reaction:
 - **Positive-Focus:** a persuasive attempt that sets a positive focus in the audience. Tags considered: {APPLAUSE}, {STANDING-OVATION}, {SUSTAINED-APPLAUSE}, {CHEERING}, etc.
 - **Negative-Focus:** a persuasive attempt that sets a negative focus in the audience. Note: the negative focus is set towards the object of the speech and not on the speaker herself. Tags considered: {BOOING}, {AUDIENCE} No! {/AUDIENCE}
 - **Ironical:** Indicate the use of ironical devices in persuasion. Tags considered: {LAUGHTER}

Approach

- In analyzing CORPS, we focused on the lexical level.
- We considered:
 - Windows of different width wn of terms preceding audience reactions tags.
 - The typology of audience reaction.

An example: Fragment from JFK

Freedom has many difficulties and democracy is not perfect. But we have never had to put a wall up to keep our people in, to prevent them from leaving us. {APPLAUSE ; CHEERS} I want to say on behalf of my countrymen who live many miles away on the other side of the Atlantic, who are far distant from you, that they take the greatest pride, that they have been able to share with you, even from a distance, the story of the last 18 years. I know of no town, no city, that has been besieged for 18 years that still lives with the vitality and the force, and the hope, and the determination of the city of West Berlin. {APPLAUSE ; CHEERS}

wn = 15

positive-focus

Valence and persuasion relation

- The phase that leads to audience reaction, if it presents valence dynamics, is characterized by a valence *crescendo*
- Valence calculated using SentiWordNet scores

Words persuasive impact

- We extracted “persuasive words” by using a coefficient of **persuasive impact** (pi) based on a weighted tf-idf ($pi = tf \times idf$).

$$tf_i = \frac{n_i \times \sum_k n_k s_i}{\sum_k n_k} \quad idf_i = \log \frac{|D|}{|\{d : d \ni t_i\}|}$$

Topmost Persuasive Words

Positive-focus words	Negative-focus words
bless#v deserve#v victory#n justice#n fine#a relief#n November#n win#v help#n thanks#n glad#a stop#v better#r congressman#n lady#n regime#n fabulous#a uniform#n military#a wrong#a soul#n lawsuit#n welcome#v appreciate#v Bush#n behind#r grateful#a 21st#a defend#v responsible#a safe#a terror#n cause#n bridge#n prevail#v choose#v hand#n love#v frivolous#a sir#n honor#n defeat#v end#v fight#n no#r Joe#n ready#a wear#v future#a direction#n foreign#a death#n single#a democratic#a	horrible#a criticize#v waste#n opponent#n timidity#n shuttle#n erode#v torpor#n Soviets#n invasion#n scout#n violation#n Castro#n troop#n authority#n Guevara#n Kaufman#n Sachs#n Goldman#n ferociously#r solvent#n page#n front#a international#a direction#n monstrosity#n Cambodia#n unbearable#a drilling#n Soviet#a increase#v intelligence-gathering#a Carolina#n Gerald#n trusted#a drift#n operation#n WTO#n entry#n mcgovern#v coward#n household#n Neill#n

Advantages

- For persuasive political communication the approach using the *persuasive impact (pi)* of words is much more effective than simple word count.

Examples of Use (1)

- *What can be said of the lexical choices of a specific speaker that obtains a certain characteristic pattern of public reaction?* Many qualitative researches on Ronald Reagan's (aka "the great communicator") rhetorics, e.g. conversational style, use of irony.
 - **Great Communicator?** 32 Reagan's speeches, mean tag density 1/2 of the whole corpus (t-test; $\alpha < 0.001$) → being a "great communicator" not bound to "firing up" rate.
 - **Reagan's style:** "simple and conversational". *Hypothesis:* conversational style more polysemic than a "cultured" style (richer in technical, less polysemic, terms). No statistical diff. between mean polysemy of Reagan's words and the whole corpus. *But* the mean polysemy of Reagan persuasive words is double of the whole corpus (t-test; $\alpha < 0.001$).
 - **Use of irony:** Density of ironical tags in Reagan's speeches almost double as compared to the whole corpus (t-test; $\alpha < 0.001$). In Reagan's speeches the *mean ironical-tags ratio (mtri)* is about 7.5 times greater than the *mtri* of the whole corpus (t-test; $\alpha < 0.001$).

Examples of Use (1)

- Mean ironical-tags ratio *mtr* - the mean of the ratio of ironical tags to positive-focus and negative-focus tags per speech.

$$mtr_i = \sum \frac{|ironical-tags|}{|positive-focus| + |negative-focus|}$$

- In Reagan's speeches the *mtr* is about 7.5 times greater than the *mtr* of the whole corpus
- That is to say, while normally there is one tags of LAUGHTER every two other tags such as APPLAUSE, in Reagan's speeches there is one tag such as APPLAUSE out of three, four tags of LAUGHTER.

Examples of Use (2)

- *How do political speeches change after key historical events?*

Bush's speeches before and after 9/11 (70 + 70 speeches)

- while the positive valence mean remains totally unvaried, the negative increases by 15% (t-test; $\alpha < 0.001$).
- Words counts only partially reflects word impact...

Examples of Use (2) – Cont'd

Lemma	<i>pi</i> before	<i>pi</i> after	Occur before	Occur after
win#v	112	7	27	52
justice#n	x	9	15	111
military#n	197	36	23	29
defeat#v	x	16	1	44
right#r	x	25	94	55
victory#n	826	65	9	26
evil#a	-	129	0	44
death#n	4	450	65	32
war#n	36	x	80	258
soldier#n	70	296	20	47
tax#n	x	93	702	81
drug-free#a	87	x	9	3
leadership#n	81	261	40	75
future#n	83	394	54	51
dream#n	99	321	77	30

Examples of Use (3)

- *Persuasive lexical choice NLG microplanning:*
given a synset and an affective/persuasive goal use the lists of words to choose the lemma that maximizes the impact of the msg.
- The candidate with highest ranking (*pi*) selected.
 - "elephantine#a#1 gargantuan#a#1 giant#a#1 jumbo#a#1" → "giant"
- Approach Implemented in *Valentino* (VALENced Text INOculator)

For more details about the CORPS corpus see:

M. Guerini, C. Strapparava, O. Stock

"CORPS: A corpus of tagged political speeches for persuasive communication processing".
Journal of Information Technology & Politics. 2008

Predicting Audience Reaction

- Using machine learning for predicting the persuasive impact of novel discourse
 - Predicting the passages that trigger a positive audience reaction
 - Distinguishing Democrats from Republicans
 - Cross classification (training made on adverse party speeches, and test on the others)

Machine Learning Setting

- For all experiment we used Support Vector machine framework (SVM-light)
- Preprocessing:
 - all corpus pos-tagged
 - we considered lemmata in the form *lemma#POS*
 - all the tokens - no frequency cut-off

Democrats vs. Republicans

- Considering the corpus as 4-sentences chunks
- About 38,000 chunks, random splitting 80%/20% training and test
- Baseline 50% for all the experiments

	<i>Precision</i>	<i>Recall</i>	<i>F1</i>
Democrats	0.842	0.756	0.797
Republicans	0.773	0.854	0.811
micro	0.804	0.804	0.804

Positive vs. Neutral

- Positive-Ironical chunks vs. Neutral chunks
- Neutral: no audience reaction labels
- Positive-Ironical: all positive audience reaction tags
- Baseline 0.50

	<i>Precision</i>	<i>Recall</i>	<i>F1</i>
Positive-Ironical	0.646	0.683	0.664
Neutral	0.676	0.641	0.658
Micro average	0.660	0.660	0.660

Cross-Classification

- Training on Democrats, Test on Republicans

	<i>Precision</i>	<i>Recall</i>	<i>F1</i>
Positive-Ironical	0.642	0.632	0.637
Neutral	0.579	0.599	0.589
Micro average	0.612	0.612	0.612

- Training on Republicans, Test on Democrats

	<i>Precision</i>	<i>Recall</i>	<i>F1</i>
Positive-Ironical	0.625	0.660	0.642
Neutral	0.658	0.626	0.641
Micro average	0.641	0.641	0.641

Further Testing

- Testing on typical non-persuasive texts
- ~ 8000 four-sentences chunks from BNC (from A00 to A0H texts)
- Supposing that all chunks are neutral
- F1 measure: 0.891

Obama vs. McCain

- Speeches from the last presidential campaign
- ~ 2400 four-sentences chunks
- Who was more persuasive (according to the classifier) ?

	<i>Obama</i>	<i>McCain</i>
Positive-Ironical	2372	2360
Neutral	68	80
Total chunks	2440	2440

Future Work

- Consider also persuasive rhetorical pattern extraction from CORPS.
- Consider windows width (wn) based on sentences rather than tokens.
- On-going work on persuasive NLP:
Persuasive Language and Virality on Social Networks

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Evaluating Persuasive NLP

- **Problem1:** evaluating systems and theories about persuasion represents a bottleneck: *experiments are usually expensive and time consuming.*
- **Problem2:** Field experiments are better than laboratory or artificial settings where results are biased by subjects awareness of being tested.
- **Goal:** develop “cheap and fast” methodologies to measure the persuasiveness of communication.
- **Solution:** by tweaking and using existing commercial tools for advertising on the web, such as *Google AdWords*, it is possible to:

“Conducting FIELD experiments with thousands of subjects for a few dollars in a few hours”

M. Guerini, C. Strapparava, O. Stock

“Evaluation Metrics for Persuasive NLP with Google AdWords”. LREC-2010

- **Google AdWords** is Google advertising program. It lets advertisers display their ads only to relevant audiences by means of keyword-based contextualization on the Google network, divided into:
 - **Search network:** Google search pages, search sites etc.
 - **Content network:** news pages, topic specific websites, blogs and others

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AdWords Metrics

- **Metrics:** AdWords measurements for identifying the performance of each ad (its “persuasiveness” from our point of view):
- **CTR**, Click Through Rate: measures the number of clicks divided by the number of times an ad has been displayed) → *It indicates which message has the highest initial impact.*
- **Google Analytics:** a web analytics tool that gives insights into website traffic, such as: number of visited pages, time spent on the site, location of visitors, etc. → *It indicates interest/attitude generated in the subjects.*
- **Conversion Rate:** how many user clicks turned into actual conversions for the advertiser. Conversion rate equals the number of conversions divided by the number of ad clicks. → *It indicates complete success of the persuasive message.*
- **ROI:** By assigning a value to a conversion we represents a return on investment (ROI). The more relevant (from a persuasive point of view) the action the user performs, the higher the value we must assign to that action.

Experimental Setup

- We conducted some pilot experiments to test irony in persuasion, using **a real promotion campaign.**
- All the experiments were based on a **between-subject design with two conditions** (one ad for each condition):
 - A control condition, with a neutral message.
 - An experimental condition with an ironical message.