

# Sentiment Analysis

НИС «Компьютерная семантика»

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# Экспрессивы

## В формальной семантике:

1. *Independence*: Expressive content contributes a dimension of meaning that is separate from the regular descriptive content.
2. *Nondisplaceability*: Expressives predicate something of the utterance situation.
3. *Perspective dependence*: Expressive content is evaluated from a particular perspective. In general, the perspective is the speaker's, but there can be deviations if conditions are right.
4. *Descriptive ineffability*: Speakers are never fully satisfied when they paraphrase expressive content using descriptive, i.e., nonexpressive, terms.
5. *Immediacy*: Like performatives, expressives achieve their intended act simply by being uttered; they do not offer content so much as inflict it.
6. *Repeatability*: If a speaker repeatedly uses an expressive item, the effect is generally one of strengthening the emotive content, rather than one of redundancy.

# Экспрессивы

В формальной семантике:

- (45) a. **damn** :  $\langle e, \varepsilon \rangle$   
b.  $\llbracket \mathbf{damn} \rrbracket^c$  = the function  $f$  such that  $f(\llbracket a \rrbracket^c)(c) = c'$ , where
- i.  $c \approx_{cJ, \llbracket a \rrbracket^c}^{\mathbf{I}} c'$ ;
  - ii. the length of  $\mathbf{I}$  is not more than .5; and
  - iii.  $\mathbf{I} \subseteq [-1, 0]$
- (47) a. **fucking** :  $\langle e, \varepsilon \rangle$   
b.  $\llbracket \mathbf{fucking} \rrbracket^c$  = the function  $f$  such that  $f(\llbracket a \rrbracket^c)(c) = c'$ ,
- i.  $c \approx_{cJ, \llbracket a \rrbracket^c}^{\mathbf{I}} c'$ ;
  - ii. the length of  $\mathbf{I}$  is not more than .2; and
  - iii.  $\mathbf{I} \subseteq [-1, 0]$

# Экспрессивы и восклицания

- Constant et al., 2009; Potts and Schwarz, 2008

# Экспрессивы

Rating: 1 star

Review: I bought this book and read it half way through. It was soo damn boring to read. Just opinions on what caused what. It was absolutely dreadful and was a good way to fall asleep. Sold it back on amazon for 8 bux.

(a) A short one-star review

Rating: 3 star

Review: This is a good book to compare the various menu items and products for their calorie values. The one problem I have with it is that it only shows 3-4 good items and 3-4 bad items per restaurant/store/manufacturer. I would rather have had this broken into a series of books and gone into more detail.

(b) A short three-star review

Rating: 5 star

Review: I never had an opinion either way about Tori. I thought she was fun in Scary Movie 2, and then got totally addicted to So NoTORIous. I couldn't believe how down to earth and self-deprecating she was, and it seemed so sincere. Her book confirmed that too! And I learned that in the end, little girls (rich or poor) are the same, and all we really want is that damn Barbie dream house :-)

(c) A short five-star review

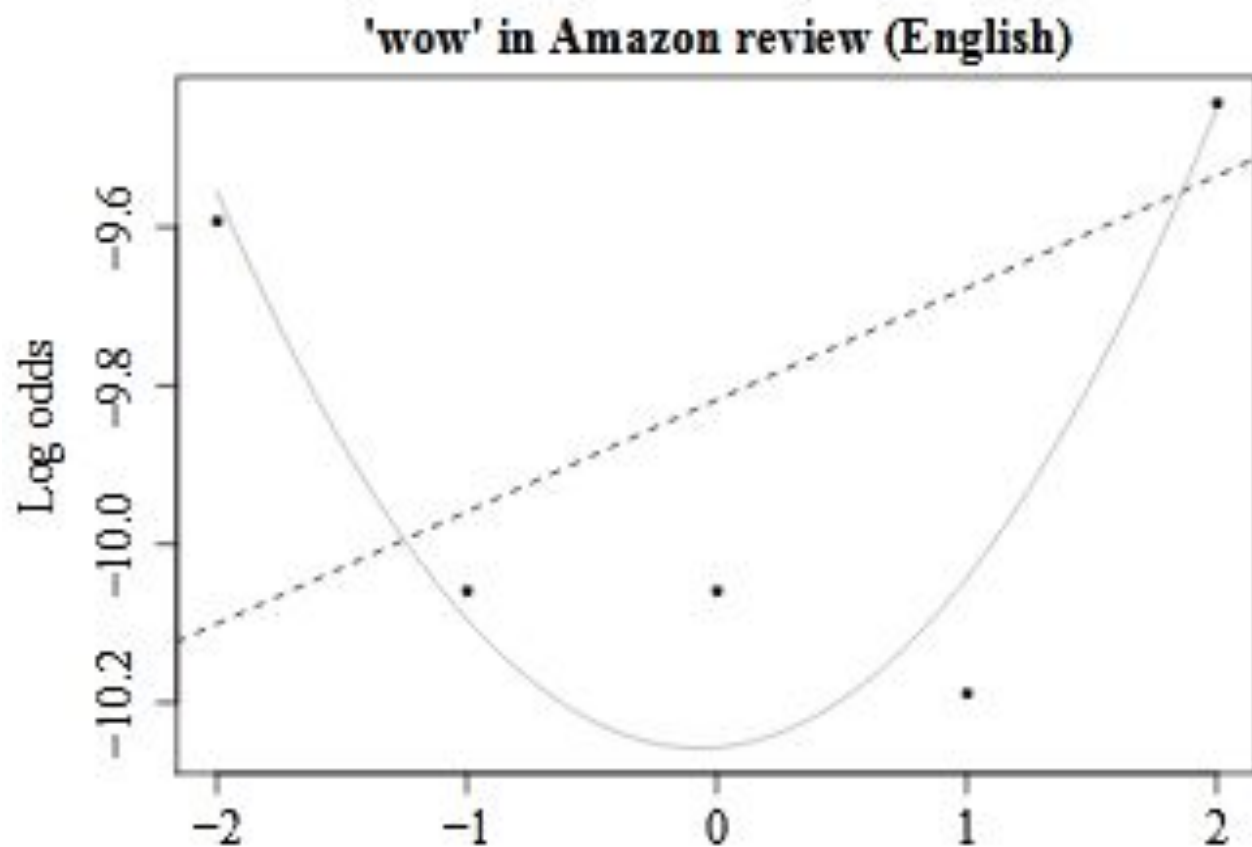
Figure 1: Example reviews from Amazon.com

# Экспрессивы

Our basic perspective is the log-odds distribution, as in (1), where  $\text{count}(x_n, R)$  is the number of tokens of  $x_n$  (a word-string of length  $n$ ) in rating category  $R$ , and  $\text{count}_n(R)$  is the number of tokens of word-strings of length  $n$  in rating category  $R$ .

$$(1) \quad \text{log-odds}(x_n, R) \stackrel{\text{def}}{=} \ln \left( \frac{\text{count}(x_n, R)}{\text{count}_n(R) - \text{count}(x_n, R)} \right)$$

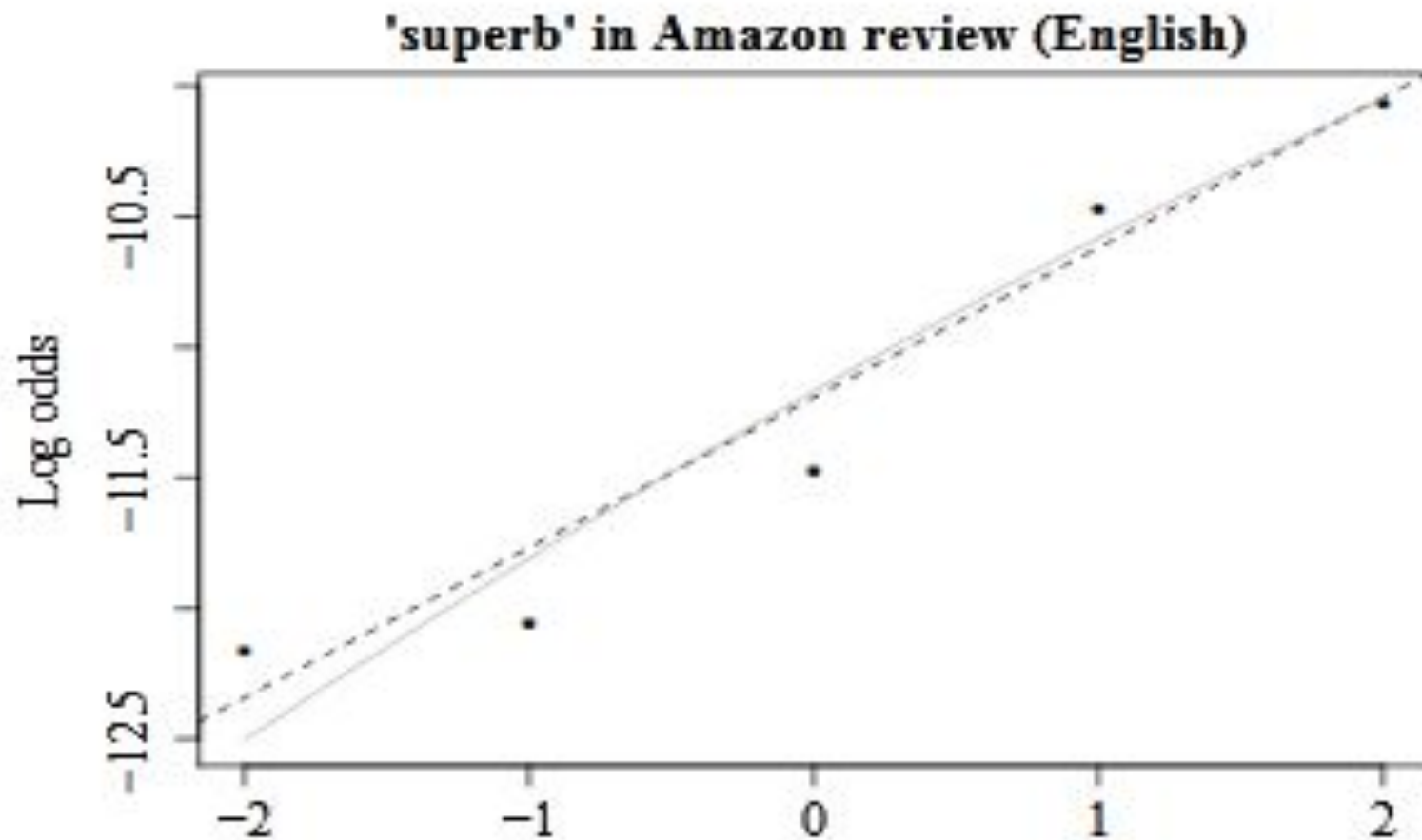
# Экспрессивы



Constant et al., 2009



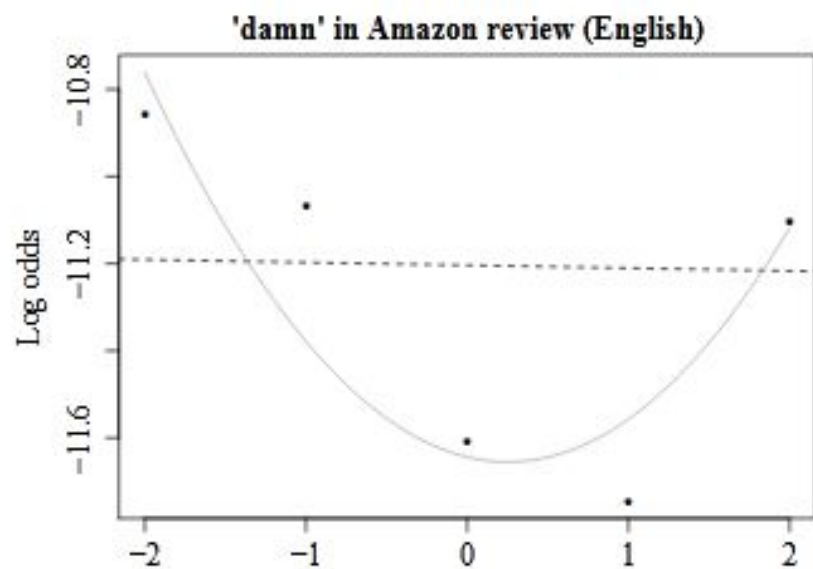
# Экспрессивы



Constant et al., 2009



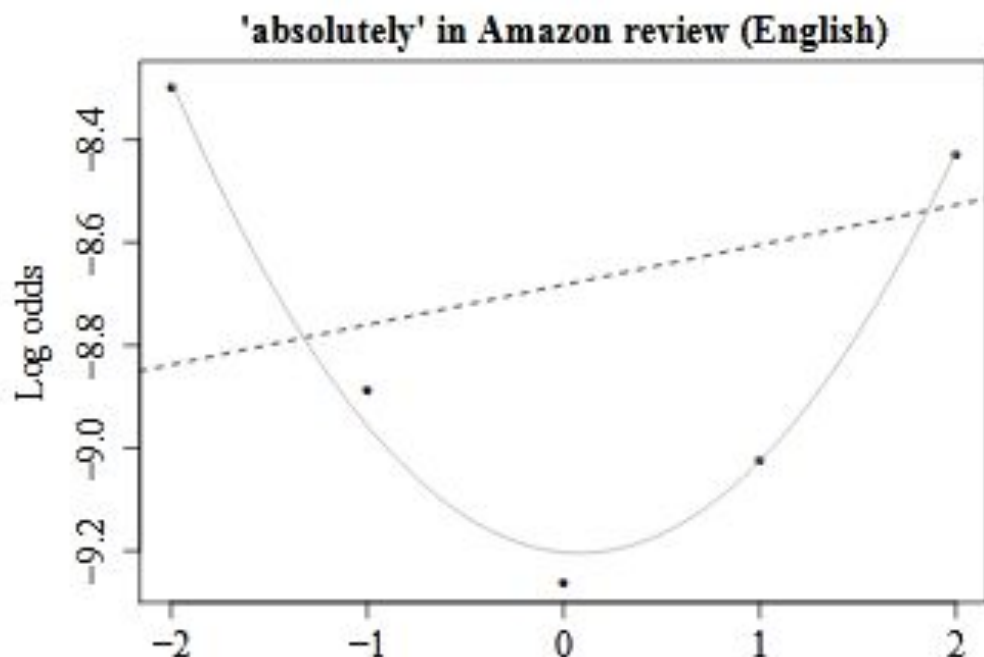
# Экспрессивы



- a. Try answering the damn question.
- b. Sounds like another damn politician to me.
- c. Just a damn minute! What history books did you read?

- a. funnest damn movie i've seen all year<sup>6</sup>
- b. Linnea Faris, a woman from Michigan who was wearing a “Remember Alex” T-shirt, shook her head in disbelief. [...] “I’ve spent hours crying over that damn bird.”<sup>7</sup>

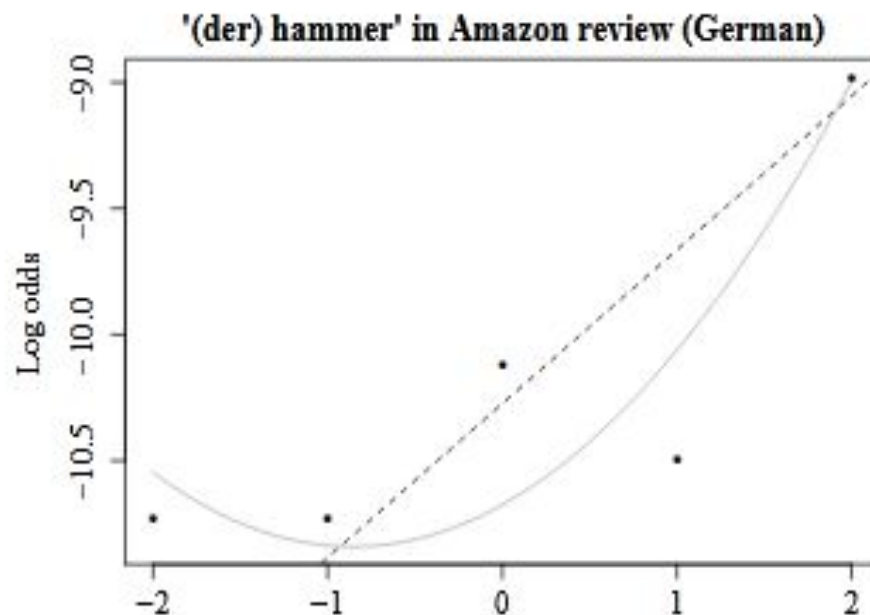
# Экспрессивы



- a. I could absolutely/totally/SO jump over that fence.
- b. MTV like totally gave us TWO episodes back to back. It was like so random. The more the merrier, but it's like waay too much for one recap. (Web example from Beaver and Clark 2008: 74)

# Экспрессивы: немецкий

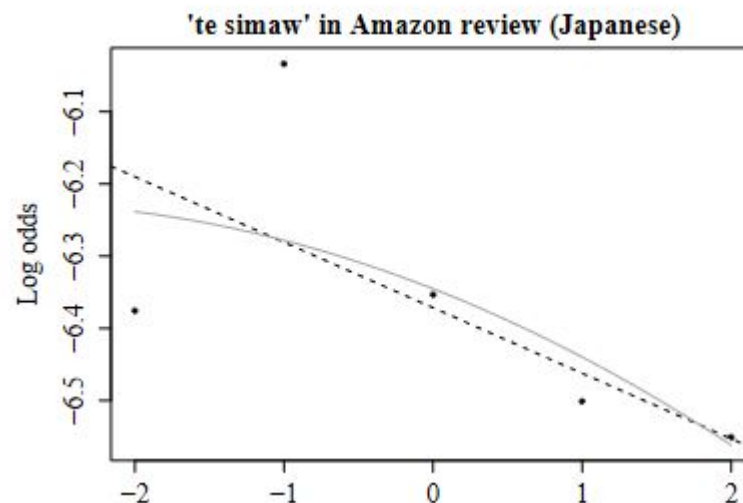
- a. Dieses Album ist **der Hammer**  
This album is **the hammer**  
'This album is cool.' ( $\approx$  'the bomb', colloquially)
- b. amys stimme mischt sich mit **hammer** beats  
Amy's voice mixed self with **cool** beats  
'Amy's voice mixed with cool beats.'
- c. Was für ein **Hammer** Album  
what for a **cool** album  
'What a cool album!'



# Экспрессивы: японский

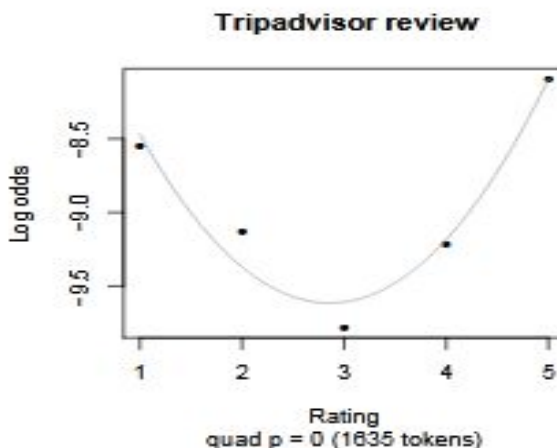
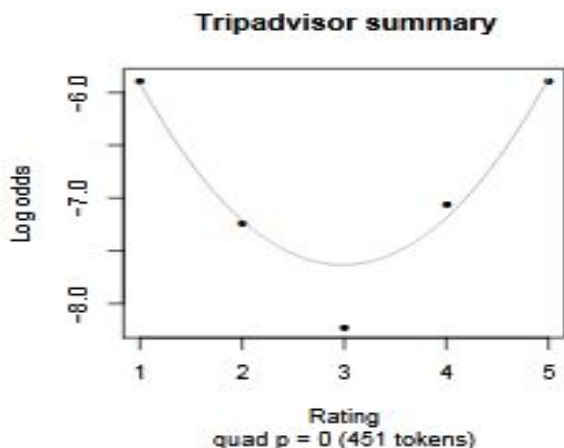
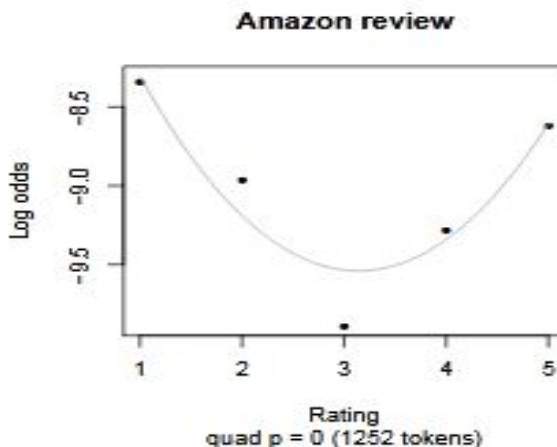
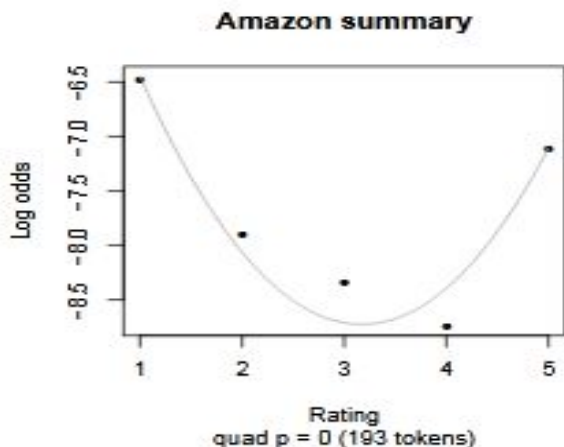
- (11) harii pottaa to wa nagai o-tukiai de, owat-**tesimat**-te totemo kanasii  
Harry Potter with TOPIC long HON-acquaintance be end-ANTI~~HON~~-INF very sad  
omoi-ga si-masu  
thought-NOM do-HON  
'I had a long acquaintance with the Harry Potter series, and was sad to see it end.'

- (12) nesugoshi-**chimat**-ta.  
overslept-ANTI~~HON~~-PAST  
'I overslept, which sucks.'

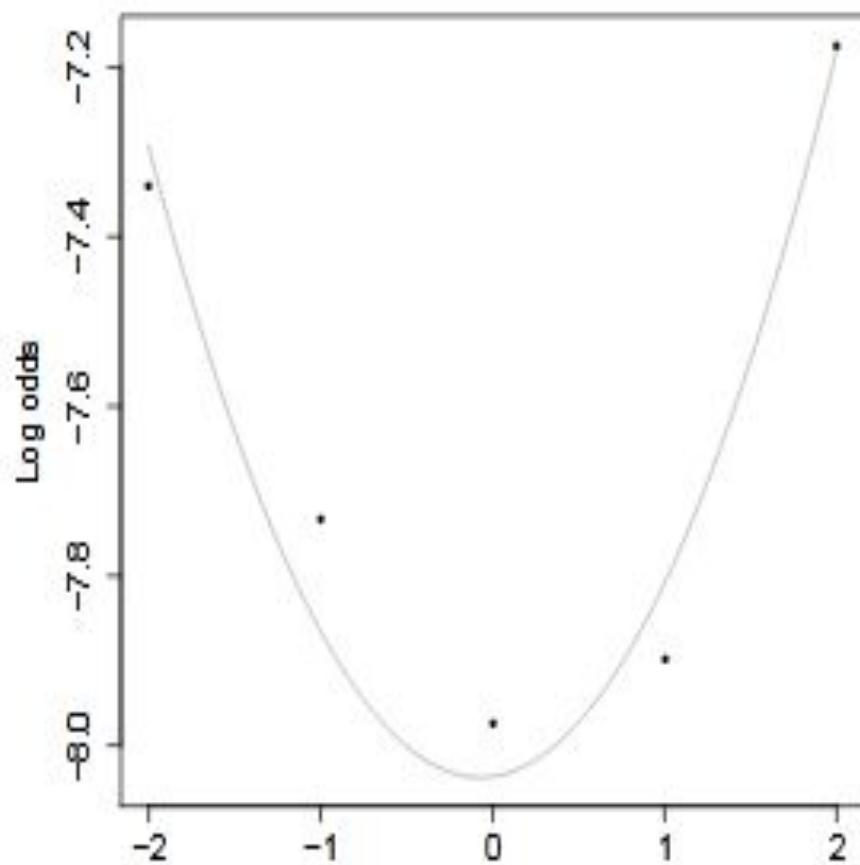


# Восклицания

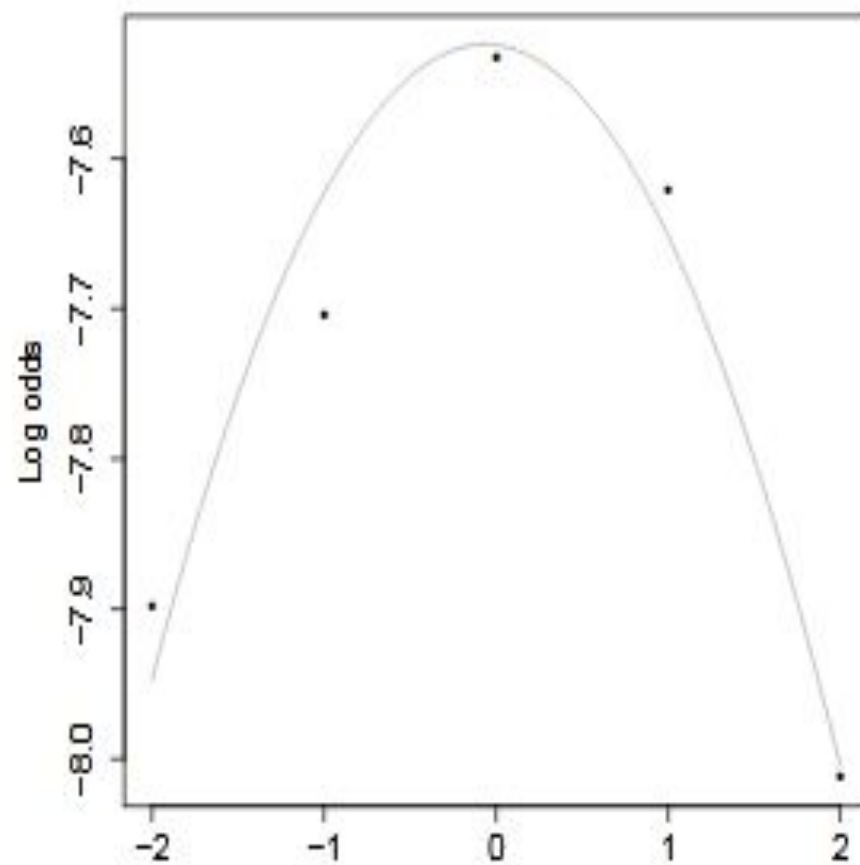
- |    |                         |                                       |
|----|-------------------------|---------------------------------------|
| a. | What a Find!            | (from a five-star Tripadvisor review) |
| b. | What an awesome place!! | (from a five-star Tripadvisor review) |
| c. | What a mess!            | (from a one-star Tripadvisor review)  |
| d. | What an Overpriced Dump | (from a one-star Tripadvisor review)  |



U shape: 'ever'

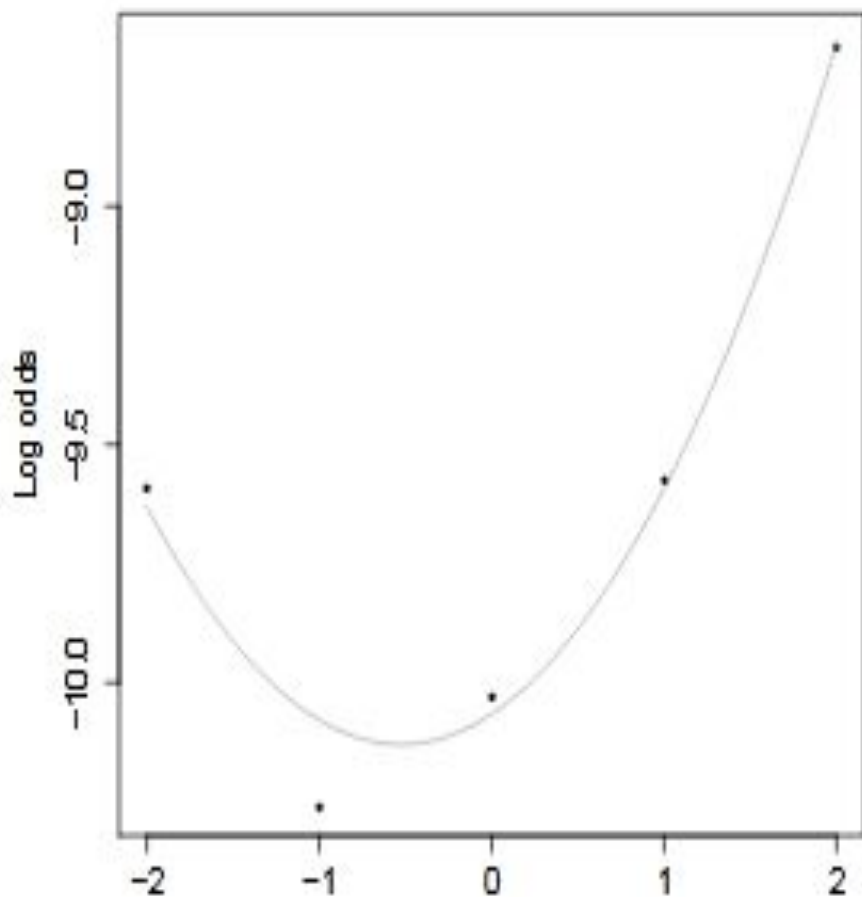


Turned-U shape: 'quite'

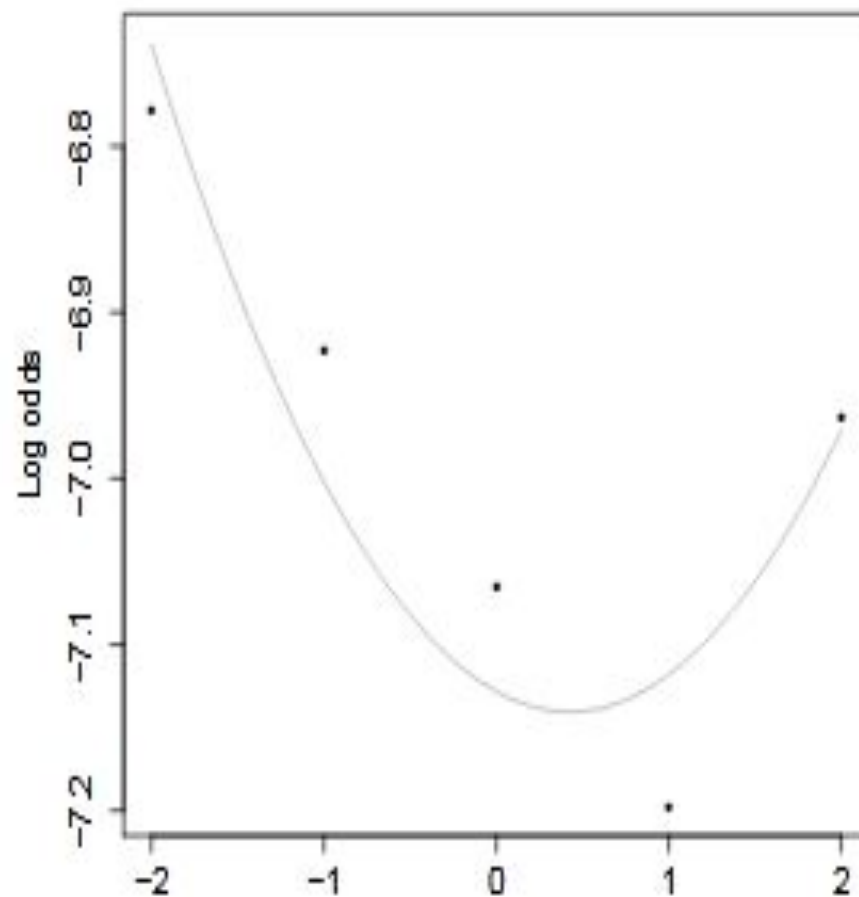


# Восклицания

J shape: 'thanks'



Reverse-J shape: 'never'





# Восклицания

!!	!	absolutely	all
best	ever	every	i've ever
i've	i	it !	my
the best	this	what a	wow

(a) The items whose shapes are limited to U, J, and Reverse J for all four corpora.

# Восклицания

!!	!	absolute	absolutely
again !	all	am	any
anyone	best	book	couldn't
even	ever !	ever	ever had
every	have ever	i	i am
i could	i have	i've	i've ever
is the	it !	life	must
my	never	new	one of
simply	the best	this	this is
time	what	what a	will
will never	wow !	wow	

(b) The items whose shapes are limited to U, J, and Reverse J in at least three of the four corpora.

# Восклицания

- but	a few	a good	average
basic	but nothing	but some	but still
cons	decent	few	fine
little too	mostly	near the	not bad
not quite	otherwise	part	points
pretty	pros	quite	short
some	somewhat	though	two
with some			

(c) The items whose shapes are limited to Turned U in at least three of the four corpora.

# Экспрессивные указательные местоимения

- Acton and Potts, 2014; Potts, 2013

# До Трампа: Sarah Palin

*“Americans are cravin’ that straight talk”*

Acton and Potts, 2014; Potts, 2013

# Бурная реакция на ее речь

FoxNews.com:

- *“We feel like she talks like we do.”*
- *“She talked like real people to real people”*

Huffington Post:

- *“illusion of straight-talking”*
- *“pseudo-folksiness and fundamental dishonesty”*

Acton and Potts, 2014; Potts, 2013

# Дебаты 2008

- Joe Biden, Palin's opponent:

*“We should be helping them build schools to compete for **those hearts and minds of the people in the region**”*

Acton and Potts, 2014; Potts, 2013



# И все, все, все:

- В полиции: *make that phone call right now*
- Стюард(есса): *get those bags under that seat in front of you*
- Инструктор йоги: *get that left arm up over that head*

Acton and Potts, 2014; Potts, 2013

# Экспрессивные употребления указательных местоимений

- давно известны лингвистам
- есть и в русском:
  - Смех смехом, а в полицию уже обратилось более двадцати горожан, которые уверяют, что после встречи с этим "похитителем человеческих душ"( так окрестили маньяка журналисты) у них чего-то не хватает. Ох, и мнительные **эти американцы!** У нас бы на такого маньяка народ молился. Лос-анджелесская полиция злоумышленника усиленно разыскивает, но пока безуспешно. [ Похититель душ // «Криминальная хроника», 2003.06.24]
  - **эти дети** мне уже надоели
  - Уберите уже **эти ноги** из прохода!
  - на вкус отвратительно— ну и гадость **эта ваша заливная рыба** [Наши дети: Подростки (2004)]
  - Какого полёта птица **этот ваш человекомух** и какой он там подвиг совершил— нам с Жоржем плевать. [Олег Павлов. Карагандинские девятины, или Повесть последних дней // «Октябрь», 2001]
  - Что вы мне талдычите, — мог он порисоваться в так называемом узком кругу, — что вы мусолите мочалу... **Этот ваш прогрессивный реформатор** в двадцать девятом году барду для самогона добывал, тем его связь с сельским хозяйством и ограничивалась. [Анатолий Азольский. Лопушок // «Новый Мир», 1998]

# Корпусный подход

Эти утверждения импрессионистические

Можем ли мы их квантифицировать?

Например, проанализировать дистрибуцию экспрессивных местоимений по аннотированным контекстам?

# Experience Project: признания

**\*Sigh\***[All Confessions >>](#)

CATEGORY: FRIENDS CONFESSIONS >>



Posted by [BrokenAngelWishes](#)  
on January 20th, 2010 at 12:38 PM

Rate Up +  
3

I really hate being shy... I just want to be able to talk to someone about anything and everything and be myself.. That's all I've ever wanted.

[...]

14 Reactions

 you rock (1)  teehee (2)  I understand (10)  sorry, hugs (1)  wow, just wow (0)

6 Comments (add your own) Sort By [Earliest](#)

Posted by [bigbadbear](#) on January 20th, 2010 at 12:41 PM

 I was really shy when I was younger. I got better when I entered the work field and gained confidence. I think you will grow out of it . :)



[like](#) 1 [dislike](#) [Flag](#)

# Experience Project: признания

---

Confession: I bought a case of beer, now I'm watching a South Park marathon while getting drunk :P

Reactions: *Sorry, hugs: 2; You rock: 3; Teehee: 2, I understand: 3; Wow, just wow: 0*

---

Confession: subconsciously, I constantly narrate my own life in my head. in third person. in a british accent. Insane? Probably

Reactions: *Sorry, hugs: 0; You rock: 7; Teehee: 8; I understand: 0; Wow, just wow: 1*

---

Confession: I really hate being shy . . . I just want to be able to talk to someone about anything and everything and be myself. . . That's all I've ever wanted.

Reactions: *Sorry, hugs: 1; You rock: 1; Teehee: 2; I understand: 10; Wow, just wow: 0;*

---

# Experience Project: признания

## 10 Reactions

 you rock (3)  teehee (0)  I understand (6)  sorry, hugs (1)  wow, just wow (0)

Figure: EP reaction icons.

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<i>Sorry, hugs</i>	sympathy
<i>You rock</i>	cheering, supportive
<i>Teehee</i>	amused
<i>I understand</i>	solitary
<i>Wow, just wow</i>	shock

---

Table: Interpreting the icons.

# Experience Project: признания

		Category	Reactions
		<i>Sorry, hugs</i>	91,222 (22%)
		<i>You rock</i>	80,798 (19%)
		<i>Teehee</i>	59,597 (14%)
		<i>I understand</i>	125,026 (30%)
		<i>Wow, just wow</i>	60,952 (15%)
		Total	417,595
Texts	140,467		
Words	21,518,718		
Vocab	143,712		
Mean words/text	153.19		

(a) The overall size of the corpus.

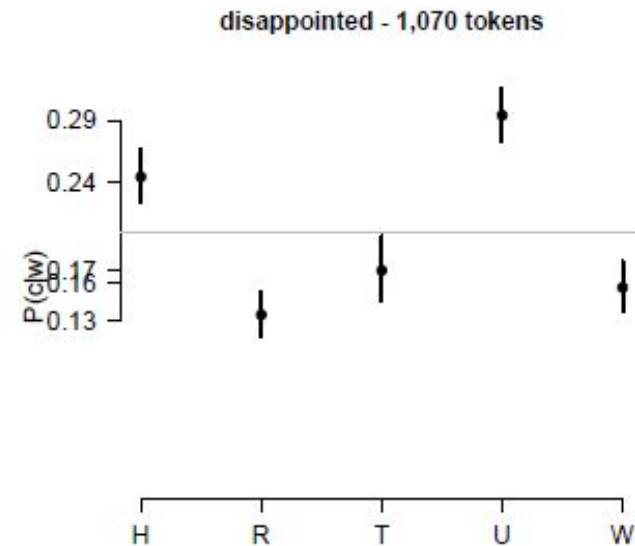
(b) All reactions.

**Table:** In general, reader reactions are sympathetic and supportive.



# Считаем и изображаем

Cat.	Count	Total	$\text{Pr}_{\text{EP}}(w r)$	$\text{Pr}_{\text{EP}}(r w)$
<i>Sorry, hugs</i>	1167	18038374	0.00006	0.26
<i>You rock</i>	520	14066087	0.00004	0.15
<i>Teehee</i>	300	8167037	0.00004	0.15
<i>I understand</i>	1488	20466744	0.00007	0.29
<i>Wow, just wow</i>	473	12550603	0.00004	0.15



# Указательные местоимения

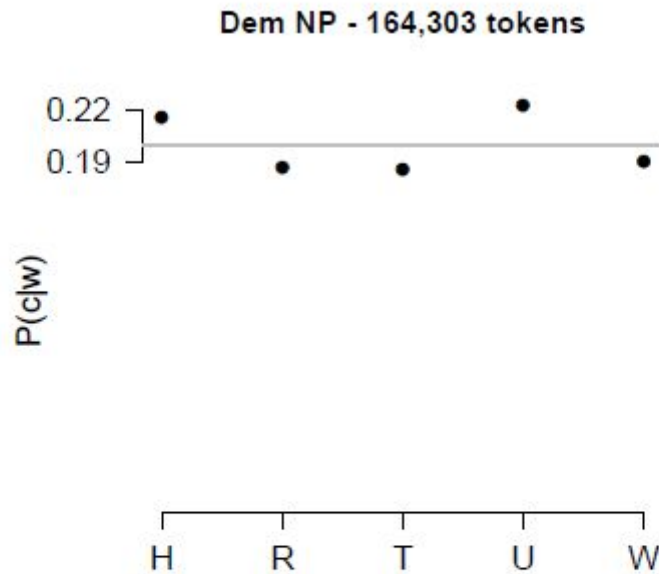


Figure: All determiner demonstratives in the EP data.

# Примеры: слова, вызывающие симпатию

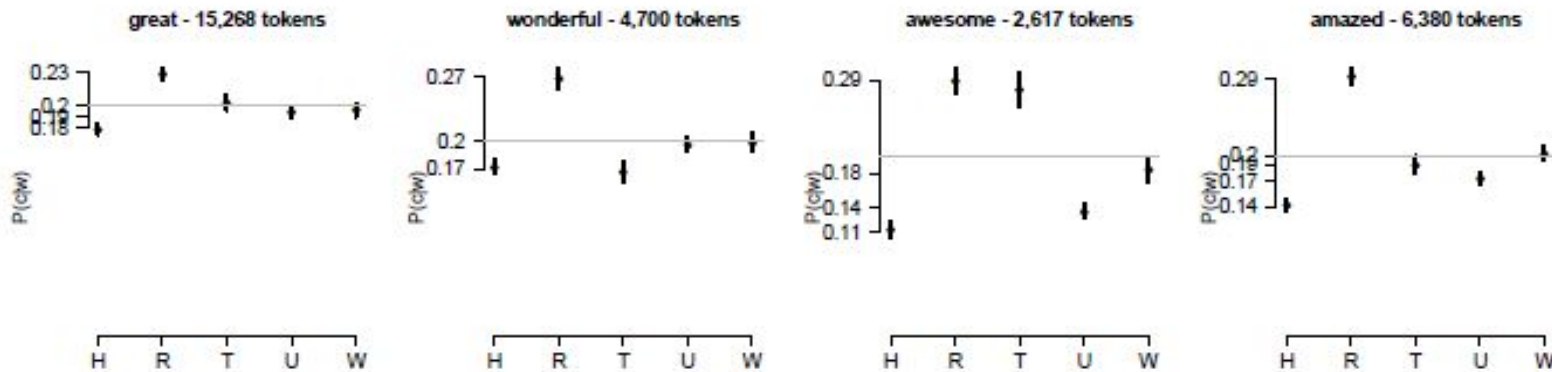


Figure: Words eliciting predominantly 'you rock' reactions.

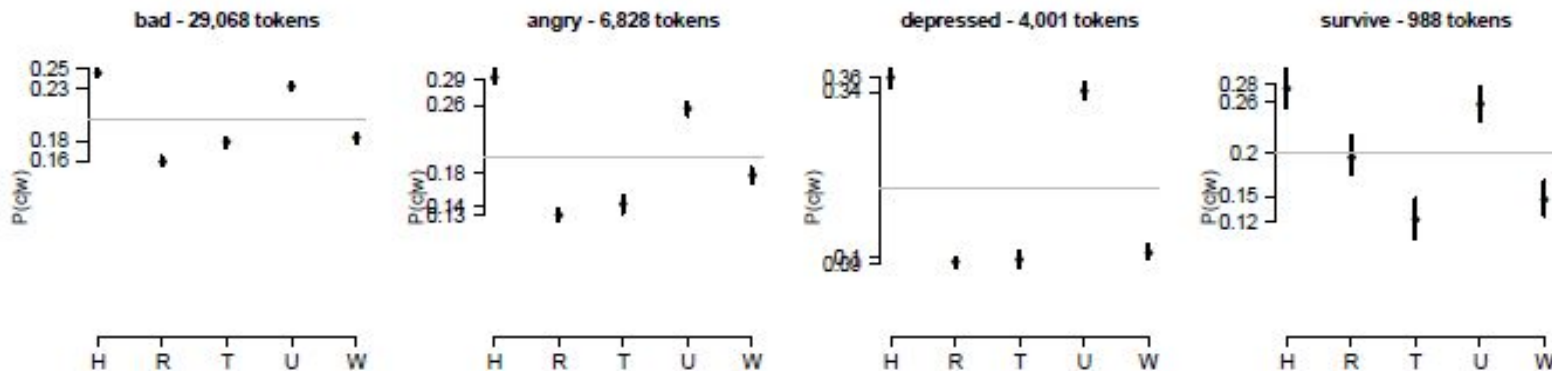


Figure: Words eliciting sympathetic reactions.

- Что же особенного в употреблении указательных местоимений у Palin?
- 16 интервью Palin на шоу
- + интервью до и после нее
- всего 48 интервью

Acton and Potts, 2014; Potts, 2013

# Квантитативный анализ

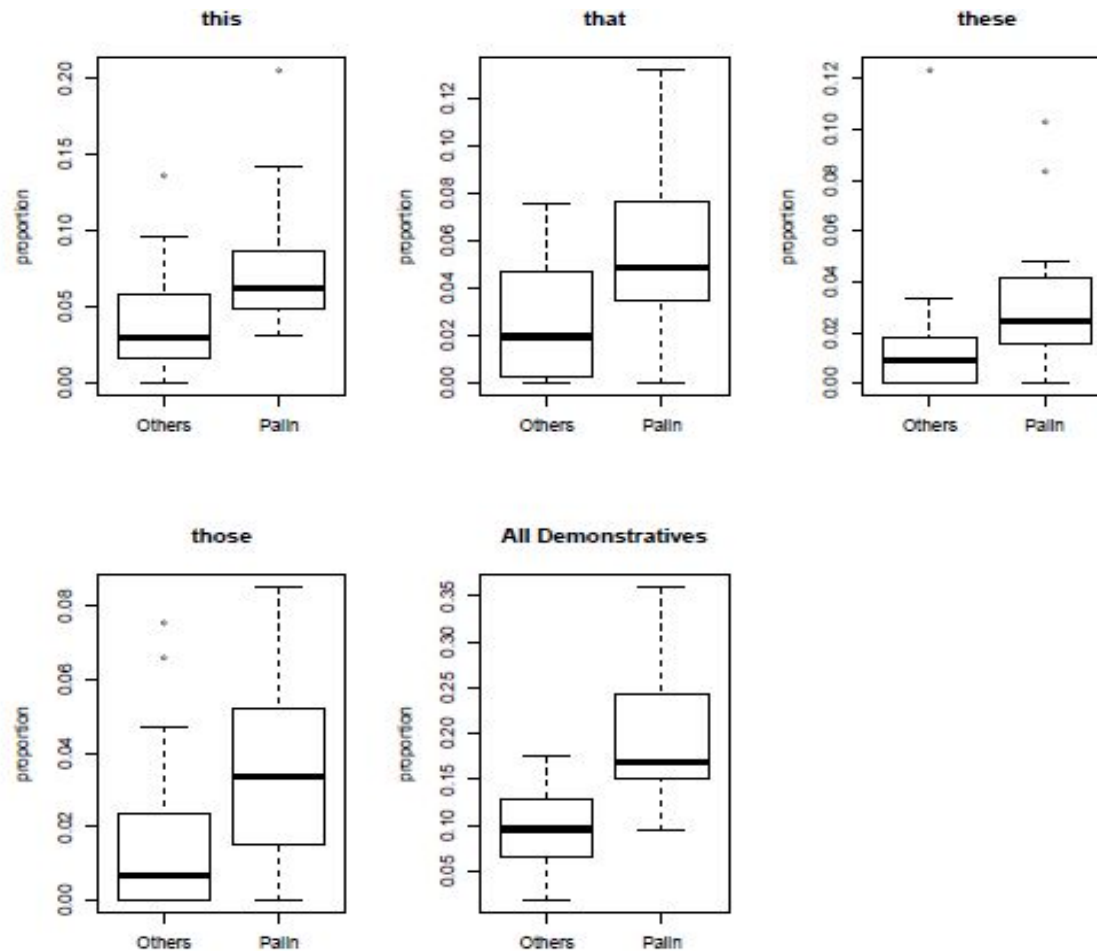


Figure: Non-pronominal dems. as a proportion of all determiners.

# Полярные мнения – почему?

## FoxNews.com:

- *“We feel like she talks like we do.”*
- *“She talked like real people to real people”*

## Huffington Post:

- *“illusion of straight-talking”*
- *“pseudo-folksiness and fundamental dishonesty”*

Acton and Potts, 2014; Potts, 2013

# Свойскость

Указательные местоимения в непрямом значении создают эффект **солидарности, свойскости** (термин восходит к лекциям Сандро Васильевича Кодзасова, мой перевод для solidarity из анализа статьи)

Проявления свойскости **уместны при совпадении отношения к сообщаемому, мнений**

**При несовпадении эффект обратный: навязанной солидарности, навязанной близости мнений, отношения к сообщаемому**



# Квантитативный анализ

1. Группы с указательными местоимениями у Palin длиннее, более описательны, чем у других
2. Более провокационный контекст

*“these good, hard-working, average, everyday, patriotic Americans who want to see the positive change in our country that they deserve”*

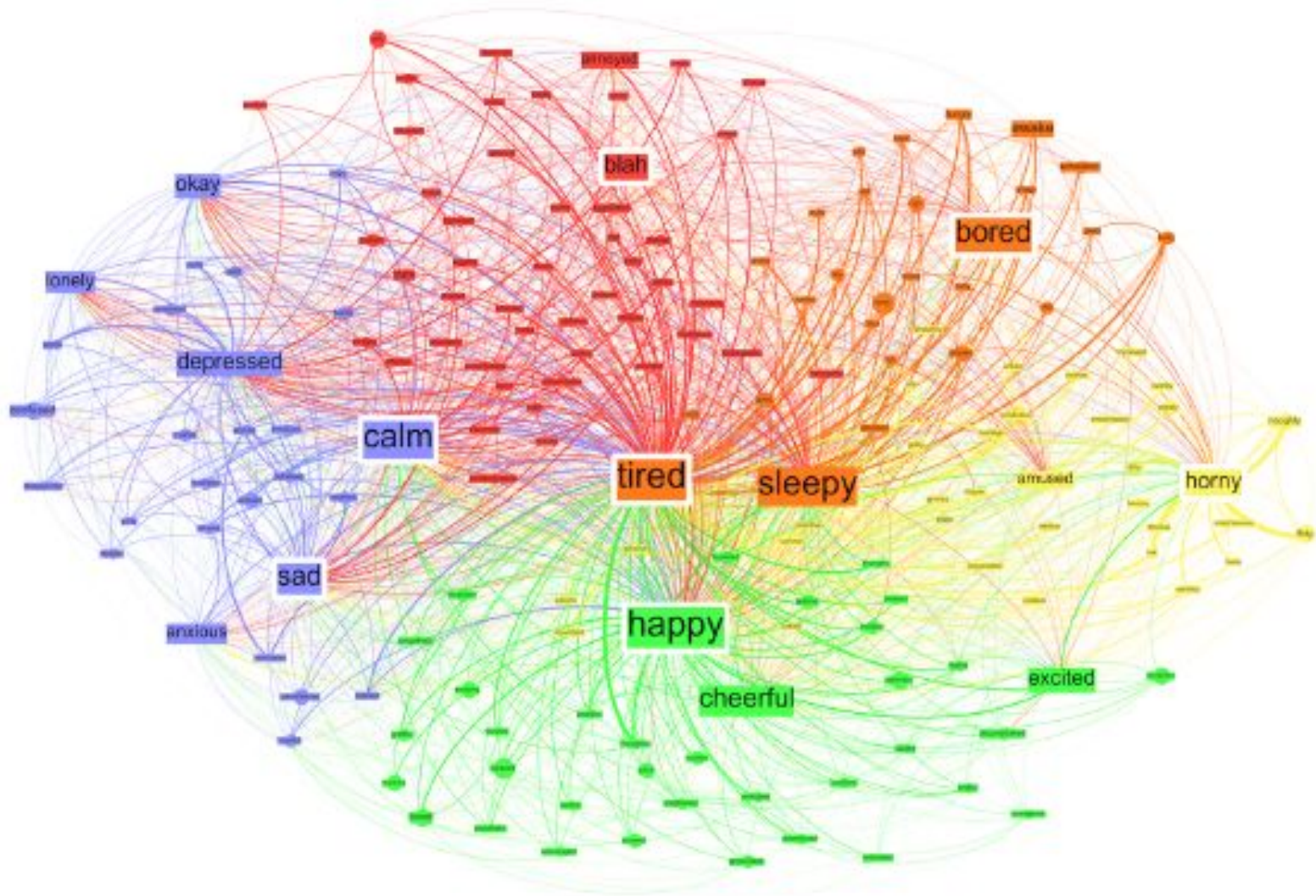
# Sentiment analysis

# Концептуальные проблемы

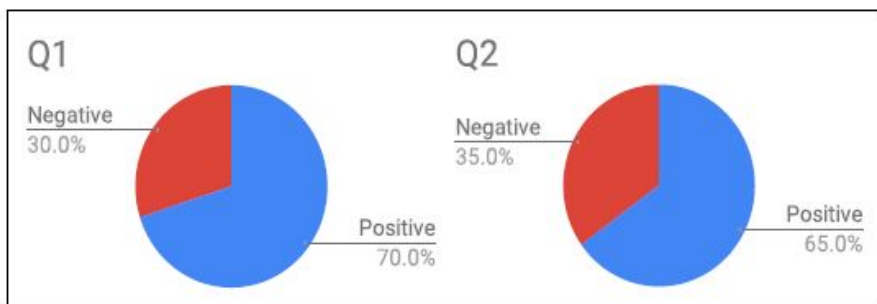
Какие из следующих высказываний выражают отношение (sentiment)? Какова полярность отношения (sentiment polarity: pos/neg), если оно выражено? Достаточно ли нам градации pos/neg?

1. There was an earthquake in California.
2. The team failed to complete the physical challenge. (We win/lose!)
3. They said it would be great.
4. They said it would be great, and they were right.
5. They said it would be great, and they were wrong.
6. The party fat-cats are sipping their expensive imported wines.
7. Oh, you're terrible!
8. Её муж – какой-то сантехник.
9. Отличное кино!
10. Опять надо выгуливать эту чертову собаку!
11. Of 2001, "Many consider the masterpiece bewildering, boring, slow-moving or annoying, . . ."
12. long-suffering fans, bittersweet memories, hilariously embarrassing moments, . . .

Измерения аффекта (valence=polarity; arousal = intensity),  
отношения между элементами, и переходы



Много потенциальных применений, но какова реальная цель?



- Картинки слева не помогают в принятии решений
- Даже если распределение отражает реальность, оно скрывает по-настоящему релевантные категории

# Связанные задачи

- Subjectivity (Pang and Lee 2008)
- Bias (Recasens et al. 2013; Pryzant et al. 2020)
- Stance (Anand et al. 2011)
- Hate-speech (Nobata et al. 2016)
- Microaggressions (Breitfeller et al. 2019)
- Condescension (Wang and Potts 2019)
- Sarcasm (Khodak et al. 2017)
- Deception and betrayal (Niculae et al. 2015)
- Online trolls (Cheng et al. 2017)
- Polarization (Gentzkow et al. 2019)
- Politeness (Danescu-Niculescu-Mizil et al. 2013)
- Linguistic alignment (Doyle et al. 2016)

# Некоторые релевантные дейтасеты:

- IMDb movie reviews (50K) (Maas et al. 2011).  
<http://ai.stanford.edu/~amaas/data/sentiment/index.html>
- Datasets from Lillian Lee's group:  
<http://www.cs.cornell.edu/home/llee/data/>
- Datasets from Bing Liu's group:  
<https://www.cs.uic.edu/~liub/FBS/sentiment-analysis.html>
- RateBeer (McAuley et al. 2012; McAuley and Leskovec 2013):  
<http://snap.stanford.edu/data/web-RateBeer.html>
- Amazon Customer Review data:  
<https://s3.amazonaws.com/amazon-reviews-pds/readme.html>
- Amazon Product Data (McAuley et al. 2015; He and McAuley 2016):  
<http://jmcauley.ucsd.edu/data/amazon/>
- Sentiment and social networks together (West et al. 2014)  
<http://infolab.stanford.edu/~west1/TACL2014/>
- Stanford Sentiment Treebank (SST; Socher et al. 2013)  
<https://nlp.stanford.edu/sentiment/>  
[https://nlp.stanford.edu/~socherr/EMNLP2013\\_RNTN.pdf](https://nlp.stanford.edu/~socherr/EMNLP2013_RNTN.pdf)

# Лексика

- Bing Liu's Opinion Lexicon: `nltk.corpus.opinion_lexicon`
- SentiWordNet: `nltk.corpus.sentiwordnet`
- MPQA subjectivity lexicon: <http://mpqa.cs.pitt.edu>
- Harvard General Inquirer
  - Download:**  
[http://www.wjh.harvard.edu/~inquirer/spreadsheet\\_guide.htm](http://www.wjh.harvard.edu/~inquirer/spreadsheet_guide.htm)
  - Documentation:**  
<http://www.wjh.harvard.edu/~inquirer/homecat.htm>
- Linguistic Inquiry and Word Counts (LIWC): <https://liwc.wpengine.com>
- Hamilton et al. (2016): SocialSent  
<https://nlp.stanford.edu/projects/socialsent/>
- Brysbaert et al. (2014): Norms of valence, arousal, and dominance for 13,915 English lemmas



# Токенизация

@CompSem: can't wait for the Jun 23 #projects! YAAAAAY!!! >:-D

- Токенизируем по пробелам

@CompSem:

can't

wait

for

the

Jun

23

#projects

YAAAAAY!!!

>:-D

# Токенизация

@CompSem: can't wait for the Jun 23 #projects! YAAAAAAY!!! >:-D

- Токенизируем по пробелам

@CompSem:  
can't  
wait  
for  
the  
Jun  
23  
#projects  
YAAAAAAY!!!  
>:-D

Элементы токенайзера,  
полезного для выявления  
отношения:

- выделяет эмодзи
- определяет разметку твиттера и т.п.
- использует теги типа *<strong>*
- отлавливает замаскированные #\$\$%-ми ругательства
- оставляет заглавные буквы там, где это осмысленно
- нормализует удлиннения (например, YAAAAAAY→YAAAY)
- отлавливает важные составные выражения (например, *out of this world*)

nltk.tokenize.casual.TweetTokenizer

# Опасности стемминга

- Теряем информацию о форме слова

Positiv	Negativ	Porter stemmed
defense	defensive	defens
extravagance	extravagant	extravag
affection	affectation	affect
competence	compete	compet
impetus	impetuous	impetu
objective	objection	object
temperance	temper	temper
tolerant	tolerable	toler

# Опасности стемминга

- Теряем информацию о форме слова

Positiv	Negativ	Lancaster stemmed
call	callous	cal
compliment	complicate	comply
dependability	dependent	depend
famous	famished	fam
fill	filth	fil
flourish	floor	flo
notoriety	notorious	not
passionate	passe	pass
savings	savage	sav
truth	truant	tru

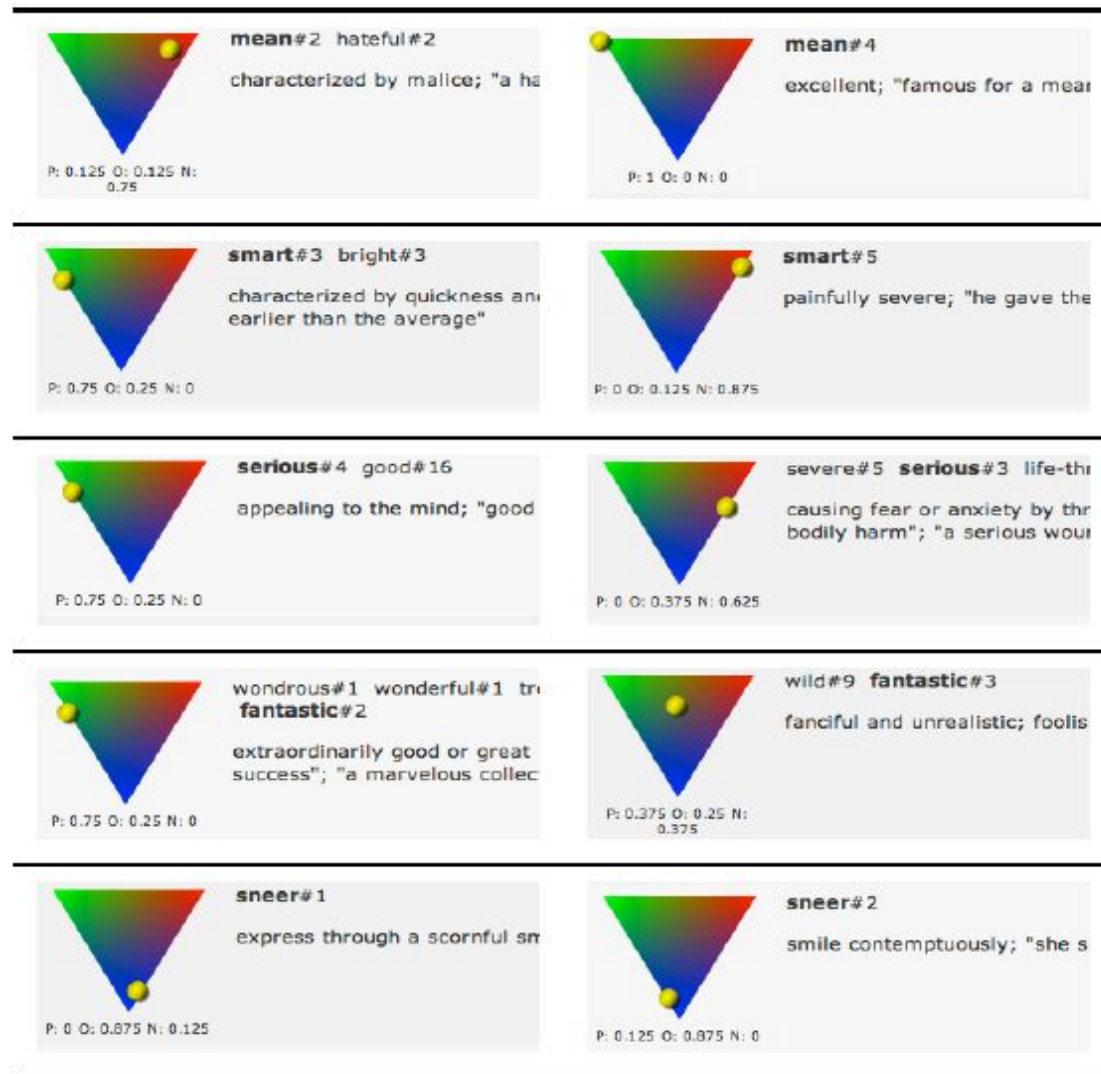
# Опасности стемминга

- WordNet stemmer отлично справляется, кроме сравнительной степени

Positiv	WordNet stemmed
(exclaims, v)	exclaim
(exclaimed, v)	exclaim
(exclaiming, v)	exclaim
(exclamation, n)	exclamation
(proved, v)	prove
(proven, v)	prove
(proven, a)	proven
(happy, a)	happy
(happier, a)	happy
(happiest, a)	happy

# Опасности разметки по частям речи

Пара (слово, часть речи) может нести как позитивное, так и негативное отношение на уровне леммы



# Опасности отрицания

1. I didn't enjoy it.
2. I never enjoy it.
3. No one enjoys it.
4. I have yet to enjoy it.
5. I don't think I will enjoy it.

# Опасности отрицания

1. I didn't enjoy it.
2. I never enjoy it.
3. No one enjoys it.
4. I have yet to enjoy it.
5. I don't think I will enjoy it.

Метод, предложенный в (Das and Chen 2001; Pang et al. 2002):

Append a \_NEG suffix to every word appearing between a negation and a clause-level punctuation mark.



# Опасности отрицания

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No one enjoys it.

no  
one\_NEG  
enjoys\_NEG  
it\_NEG

.

---

I don't think I will enjoy it, but I might.

i  
don't  
think\_NEG  
i\_NEG  
will\_NEG  
enjoy\_NEG  
it\_NEG

,

but

i

might

.

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