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# AFFECTING CORPORA: EXPERIMENTS WITH AUTOMATIC AFFECT ANNOTATION SYSTEM

– A Case Study of the *2channel* Forum –

# Presentation Outline

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- Introduction
- Specificities of the Japanese language
- ML-Ask – Automatic affect annotation tool
- Contextual Valence Shifters
- Evaluation of ML-Ask
- Experiment on a large corpus
- Results
- Conclusions
- Future Works

# Introduction

## □ Some problems with today affect analysis systems (for Japanese)

- ① No standards for emotion type classification
- ② Simplified classification (+/- , happiness/sadness)
- ③ **How to tell if the utterance is emotive?**
- ④ **No evaluations on large corpora**

- ① **compare:**
- Endo, D., Saito, S. and Yamamoto, K. *Kakariuke kankei wo riyo shita kanjoseikihyogen no chushutsu*. (Extracting expressions evoking emotions using dependency structure), Proceedings of The Twelve Annual Meeting of The Association for Natural Language Processing. 2006
  - Tsuchiya, Seiji, Yoshimura, Eriko, Watabe, Hirokazu and Kawaoka, Tsukasa. *The Method of the Emotion Judgment Based on an Association Mechanism*. Journal of Natural Language Processing, Vol.14, No.3, The Association for Natural Language Processing. 2007
  - Ryoko Tokuhisa, Kentaro Inui, Yuji Matsumoto. *Emotion Classification Using Massive Examples Extracted from the Web*, In Proc. of Coling 2008, pp.881-888, 2008.
- ②
- Peter D. Turney. 2002. Thumbs Up or Thumbs Down? Semantic Orientation Applied to Unsupervised Classification of Reviews. In *Proceedings of ACL'02*, pp. 417-424
  - Jorge Teixeira, Vasco Vinhas, Eugenio Oliveira and Luis Reis. A New Approach to Emotion Assessment Based on Biometric Data. In *Proceedings of WI-IAT'08*, pages 459-500, 2008.
- ③
- Ryoko Tokuhisa, Kentaro Inui, Yuji Matsumoto. *Emotion Classification Using Massive Examples Extracted from the Web*, In Proc. of Coling 2008, pp.881-888, 2008.
- ④
- Junko Minato, David B. Bracewell, Fuji Ren and Shingo Kuroiwa. 2006. Statistical Analysis of a Japanese Emotion Corpus for Natural Language Processing. *LNCS 4114*.

# Specificities of the Japanese language

## Agglutinative language

- Morpheme : the smallest linguistic unit with semantic meaning
- Sentences are formed by joining morphemes together
- Syntax and semantics are closer than in, e.g. English

# ML-Ask – Automatic affect annotation tool

- Usual approach to affect analysis:
  - ▣ A database of emotive words \*
  - ▣ Processing (Matching input with databases, machine learning, Web mining, word statistics, etc.)
  - ▣ Example: “John is a **nice** person.”  
Emotive expression: “**nice**”  
emotion: liking, fondness  
...but that’s just a *declarative sentence*.  
In a real conversation:

“**Oh, but** John is **such a nice** person **!**”

\*) For example: WordNet Affect in English: Strapparava, C., Valitutti, A.: *An Affective Extension of WordNet*, Proceedings of LREC'04, pp.1083-1086.(2004)  
In Japanese: manually build: Seiji Tsuchiya, Eriko Yoshimura, Hirokazu Watabe and Tsukasa Kawaoka, Proposal of Method to Judge Speaker's Emotion Based on Association Mechanism, KES2007, Vol.1, pp.847-857, 2007; enriched with Web minig: Ryoko Tokuhisa, Kentaro Inui, and Yuji Matsumoto. Emotion classification using massive examples extracted from the Web. In Proceedings of the 22nd International Conference on Computational Linguistics (COLING-2008), pp881-888, Aug. 2008

# ML-Ask – Automatic affect annotation tool

## □ Our approach to affect analysis:

In language there are:

1. **Emotive/evaluative expressions\***
2. **Emotiveness indicators. “Emotemes” – Japanese emotive morphemes\*\***

“Oh, but John is such a nice person !”

“Oh, but John is such a rude person !”

\* ) A. Nakamura, *Kanjō hyōgen jiten* (Dictionary of Emotive Expressions), Tokyodo Publishing, Tokyo (1993)

\*\* ) M. Ptaszyński, *Moeru gengo - Intānetto kei-jiban no ue no nihongo kaiwa ni okeru kanjōhyōgen no kōzō to kigōrontekikinō no bunseki* – “2channeru, denshikeijiban o rei toshite – (Boisterous language. Analysis of structures and semiotic functions of emotive expressions in conversation on Japanese Internet bulletin board forum - 2channel -), UAM, Poznań (2006)

Michał Ptaszyński, Paweł Dybala, Rafał Rzepka and Kenji Araki. *Effective Analysis of Emotiveness in Utterances based on Features of Lexical and Non-Lexical Layer of Speech*. In Proceedings of NLP2008, pp 171-174, 2008.

Michał Ptaszyński, Paweł Dybala, Rafał Rzepka and Kenji Araki. *Affecting Corpora: Experiments with Automatic Affect Annotation System - A Case Study of the 2channel Forum* -, The Conference of the Pacific Association for Computational Linguistics (PACLING-09), September 1-4, 2009, Hokkaido University, Sapporo, Japan

# ML-Ask – Automatic affect annotation tool

Gathered  
manually  
(907 items)

emotems  
DB

## exclamatives

すげえ *sugee* (great!)  
うおお *wooo* (whoa!)

## mimetics (*gitaigo*)

ワクワク *wakuwaku* (heart pounding)  
ドキドキ *dokidoki* (go pit-a-pat)

## vulgarities

–やがる *–yagaru* (fu\*\*ing do sth)  
くそ *kuso* (shit)  
馬鹿 *baka* (stupid)

## hypocoristics

–ちゃん *–chan* (name suffix)

textual representations of voice modulation  
and body language (emoticons)

“!” , “??” , “...” , (T\_T) , (-A-;) , \_|\_ |O

Nakamura's  
dictionary  
(2100 items)

①

②

emotive  
expressions  
DB

## nouns

愛情 *aijou* (love)  
安心 *anshin* (relief)  
恐怖 *kyofu* (fear)

## verbs

喜ぶ *yorokobu* (be glad)  
悲しむ *kanashimu* (feel sad)  
むかつく *mukatsuku* (get angry)

## phrases / idioms

虫酸が走る *mushizu ga hashiru* (give one the creeps)  
心が解ける *kokoro ga tokeru* (one's heart is melting in relief)  
歓天喜地 *kantenkichi* (delight larger than Heaven and Earth)

## adjectives

嬉しい *ureshii* (happy)  
悔しい *kuyashii* (mortifying)  
怖い *kowai* (scary)

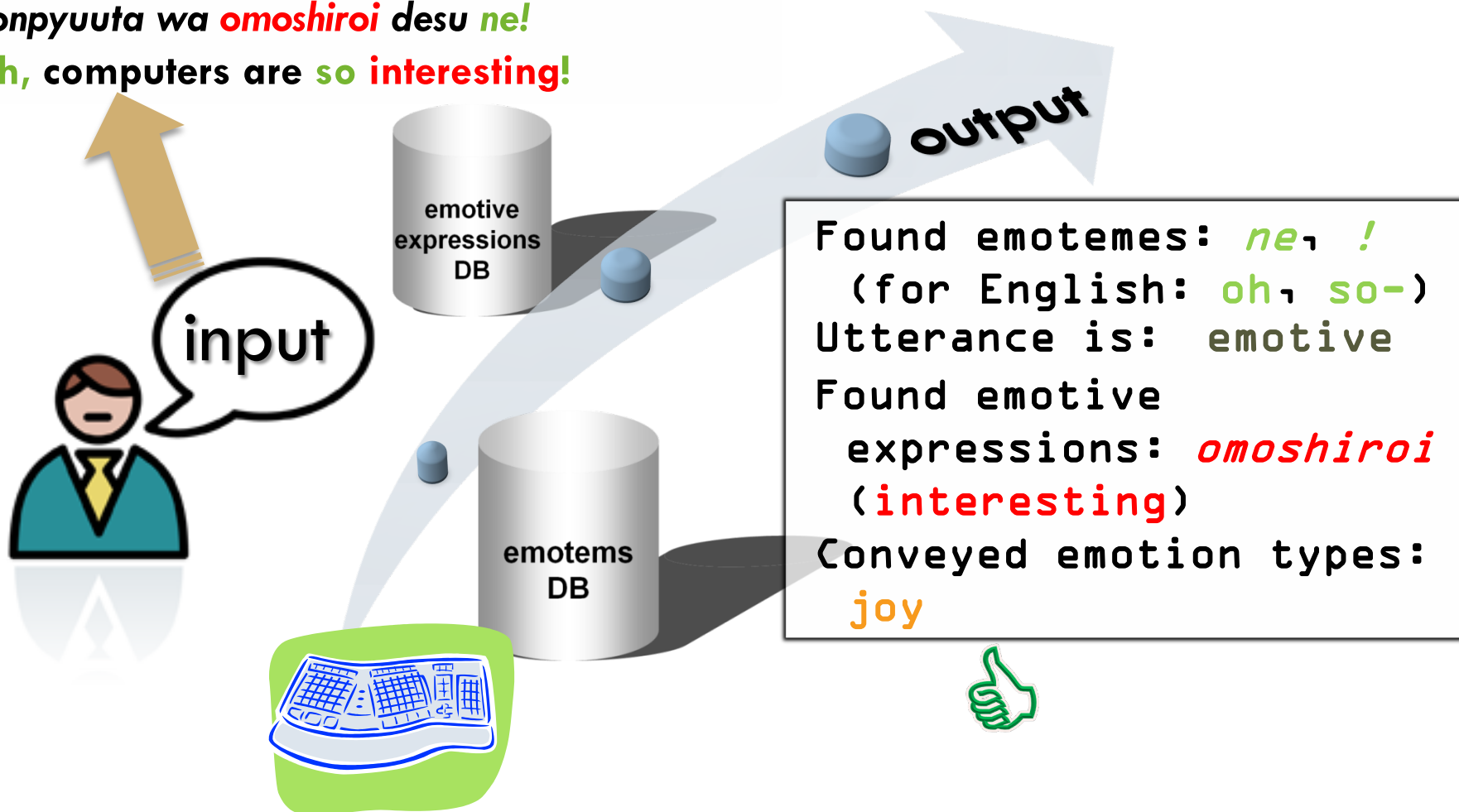


## 10-type emotion classification:

1. Joy, delight
2. Anger
3. Sorrow, sadness, gloom
4. Fear
5. Shame, shyness, bashfulness
6. Liking, fondness
7. Dislike, detestation
8. Excitement
9. Relief
10. Surprise, amazement

# ML-Ask – Automatic affect annotation tool

コンピュータは面白いですね!  
Konpyuuta wa **omoshiroi** desu **ne**!  
Oh, computers are **so interesting**!





# ML-Ask – Automatic affect annotation tool

## Problematic inputs:

あんまり面白くなかったな...

Anmari **omoshiroku** nakatta **na...**

**Oh,** it wasn't that **interesting...**

Found emotemes: **na...**

(for English: **oh...**)

Utterance is: emotive

Found emotive

expressions: **omoshiroi**

(**interesting**)

Conveyed emotion types:

**joy**



# ML-Ask – Automatic affect annotation tool

## Problematic inputs:

あんまり面白くなかったな...

Anmari **omoshiroku** nakatta na...

Oh, it wasn't that **interesting**...

“not that-” changes the  
valence

Found emotemes: *na*, ...

(for English: *oh*, ...)

Utterance is: emotive

Found emotive

expressions: *omoshiroi*

(**interesting**)

Conveyed emotion types:

*joy*



# Contextual Valence Shifters

- Polanyi, L. and Zaenen, A. (2004) 'Contextual Valence Shifters', *AAAI Spring Symposium on Exploring Attitude and Affect in Text: Theories and Applications*.

(Published later by Springer : *Computing Attitude and Affect in Text: Theory and Applications*)

# Contextual Valence Shifters

## □ Definition:

The group of words and phrases, which change the semantic orientation (valence polarity) of an evaluative word.

**negations:** not- , never-, etc., in Japanese: *amari -nai* (not quite-), *mattaku -nai* (not at all-), or *sukoshi mo -nai* (not even a bit-).

**intensifiers:** very- , deeply- , etc., in Japanese: *totemo-* (very much-), *sugoku-* (-a lot), or *kiwamete-* (extremely).

# Contextual Valence Shifters

Examples:

John **is** clever vs. John **is not** clever.

*clever +1 combined with not -> not clever -1*

John **is** successful at tennis vs. John **is never**  
successful at tennis.

*successful +1 combined with not -> not successful -1*

**Each** of them is successful vs. **None** of them is  
successful.

# Contextual Valence Shifters

1. 諦めちゃいけないよ！

*Akirame cha ikenai yo!*

Don't *cha* give up!



\*) Emotive expressions – red  
Emotemes – green

CVS constructions:

-cha ikenai / -tewa ikenai (don't you, you cannot)

2.それほど面白くもなかったよ。

*Sore hodo omoshiroku mo nakatta yo.*

Oh, come on, it wasn't that interesting.



CVS constructions:

-mo nakatta / -mo nai (it is/was not that)

# Contextual Valence Shifters

1. 諦めちゃいけないよ！

*Akirame cha ikenai yo!*

Don't cha give up!



“Give up” in Nakamura’s dictionary  
= “dislike”  
which emotion type is  
“not-dislike” ??

2.それほど面白くもなかったよ。

*Sore hodo omoshiroku mo nakatta yo.*

Oh, come on, it wasn't that interesting.



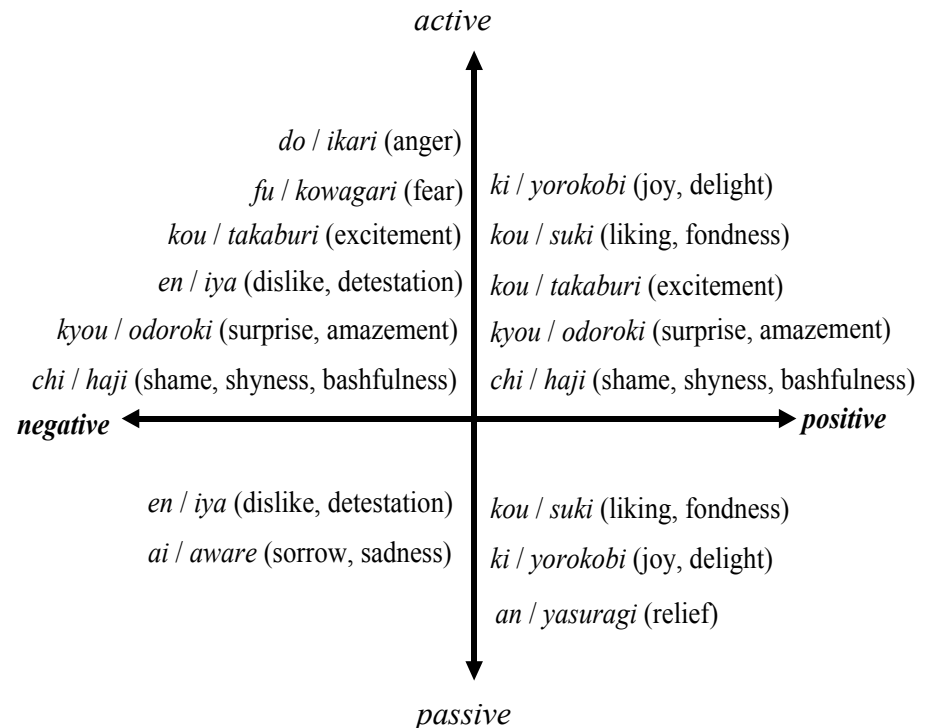
“interesting” in Nakamura’s  
dictionary = “joy”  
which emotion type is  
“not-joy” ??

# Contextual Valence Shifters

## □ 2-dimensional model of affect.

*“All emotions can be described in a space of two-dimensions: valence polarity (positive / negative) and activation (active / passive).”*

**Nakamura's emotion types mapped on Russell's model (all possibilities)**



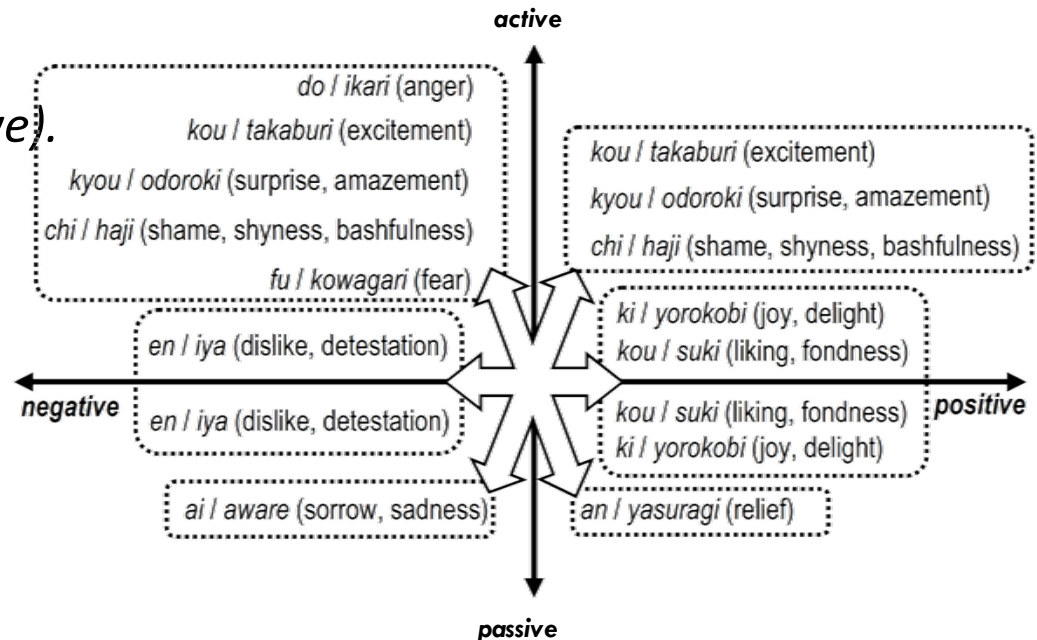


# Contextual Valence Shifters

## □ 2-dimensional model of affect.

*“All emotions can be described in a space of two-dimensions: valence polarity (positive / negative) and activation (active / passive).”*

Assumption:  
CVS negation changes  
both valence and  
activation parameters



# Contextual Valence Shifters

1. 諦めちゃいけないよ！

*Akirame cha ikenai yo!*

Don't cha give up!



“give up” = “dislike”  
“not-dislike” = “joy, fondness”  
(includes “encouragement”)

2.それほど面白くもなかったよ。

*Sore hodo omoshiroku mo nakatta yo.*

Oh, come on, it wasn't that ineteresting.



“interesting” = “joy”  
“not-joy” = “dislike”  
(includes “boredom”)

# Evaluation of ML-Ask

- Emotive / not-emotive
  - ▣ questionnaire (layperson): 80 sentences  
(40 emotive, 40 non-emotive)  
ML-Ask annotated correctly 72 from 80 utterances  
(90% of agreements)
  - ▣ The system's agreement with annotators was indicated  
as very strong ( $\kappa=.8$ ).
  - ▣ Error description:  
In 2 cases the system wrongly annotated utterances as  
"emotive"  
in 6 cases it was the opposite.

# Evaluation of ML-Ask

## □ Emotive / not-emotive

- questionaire (100 sentences): 50 sentences (40 emotive, 40 non-emotive)  
ML-Ask annotated correctly 72 from 80 utterances (90%)
- The system's agreement with annotators was indicated as very high (kappa .9).
- Error description:  
In 2 cases the system wrongly annotated utterances as "emotive"  
in 6 cases it was the opposite.

**ML-Ask proved its reliability in identifying emotive utterances. ③**

# Evaluation of ML-Ask

## □ Emotion types

- Emotive expressions extracted from 9 out of 40 emotive sentences (Recall = 0.225)
- All extracted correctly (Precision = 1.00)
- Balanced F-score = 0.367

# Evaluation of ML-Ask

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Why so low?

# Evaluation of ML-Ask

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Why so low?

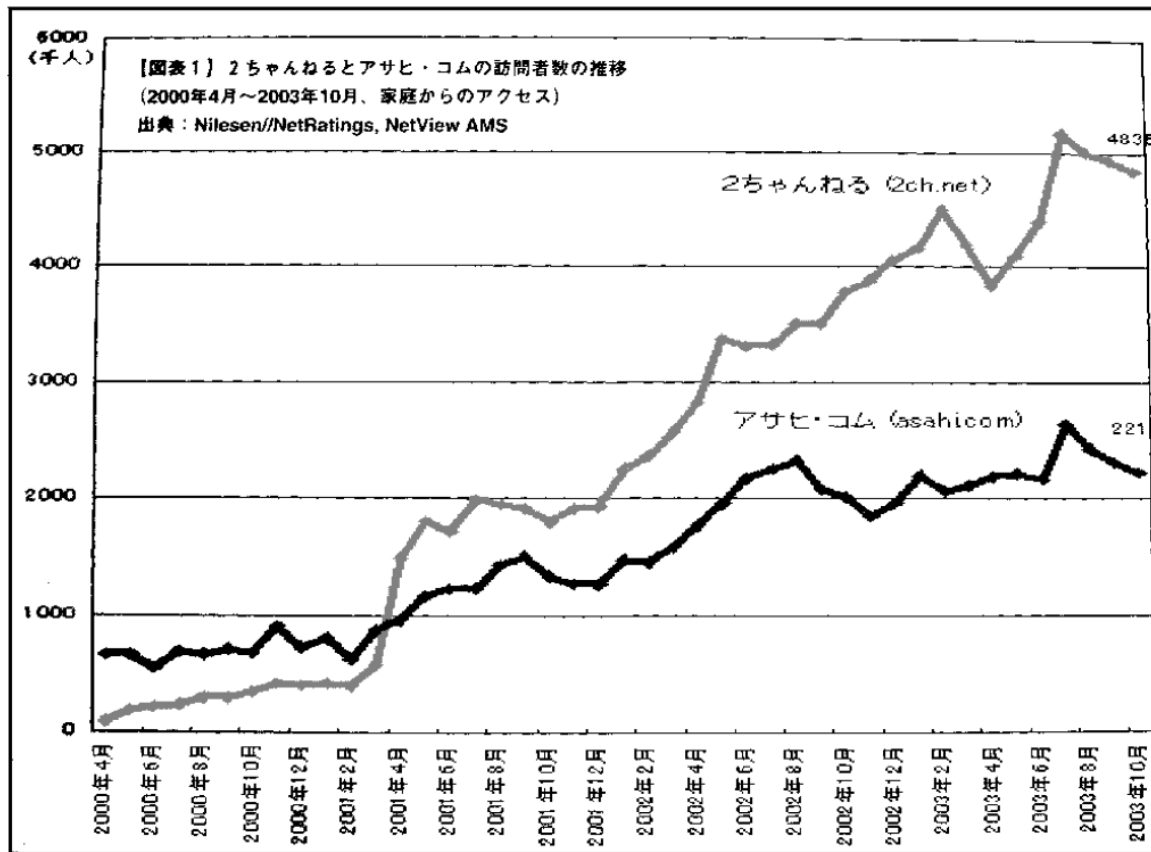
## □ Precision = 1.00, so Nakamura's dictionary is OK, but:

1. Nakamura's **lexicon is out-of-date** (only ~2100 expressions gathered till year 1993)
2. People use **ambiguous emotive utterances**, where **emphasis is based on context**

# Experiment on a large corpus ④

- 2channel BBS forum (<http://www.2ch.net/>)
- Special feature: lots of expressive contents

□ ROBUST!!!



For 2003.10  
number of  
comments on  
*2channel* was  
TWO TIMES as  
on asahi.com !



# Experiment on a large corpus

- Processing all is... difficult
- Lets take only a part of it:
  - ▣ *Densha otoko* 電車男 (Train man)\*
  - ▣ 177,553 characters
  - ▣ in 1,840 utterances
  - ▣ divided into 6 parts/chapters.



\* Hitori Nakano. 2005. *Densha otoko* [Train man]. Tokyo, Shinchosha.

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- ...Its annotated!
  - ▣ Manual affect annotation (Ptaszynski 2006)\*\*
  - ▣ 2 annotators
  - ▣ Only utterances containing emotive expressions  
(ambiguously emotive utterances appeared too frequently)

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  - ▣ 2 annotators
  - ▣ Only utterances containing emotive expressions  
(ambiguously emotive utterances appeared too frequently)
  - ▣ We annotated the corpus using ML-Ask and compared the results.

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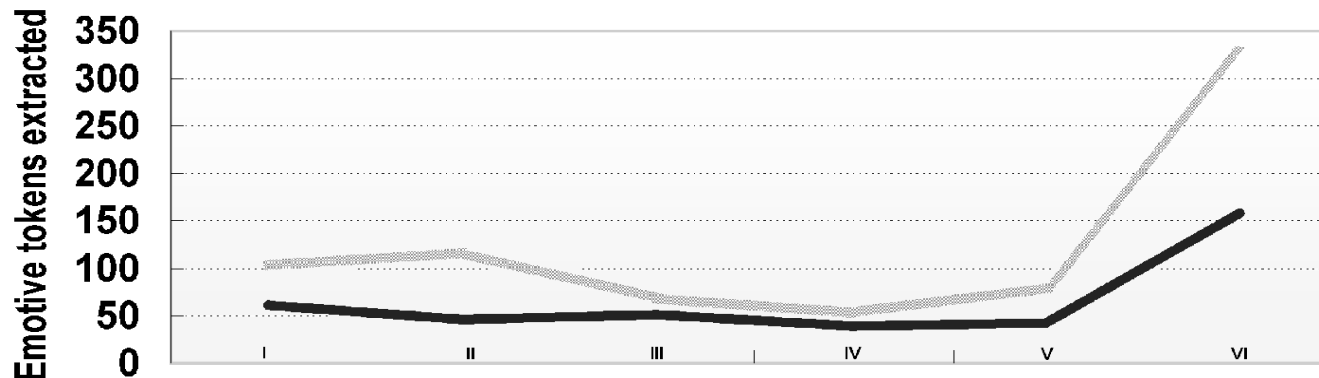
# Results

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- There were 1560 emotive utterances (81% of all corpus)

# Results

- Emotive utterances containing specified emotive expressions:
- 19% to 25% of the corpus contained emotive expressions = its 40% to 75% (Average of 58%) of the human level annotations, + similar tendency
- Results were very statistically significant, P value = .0052

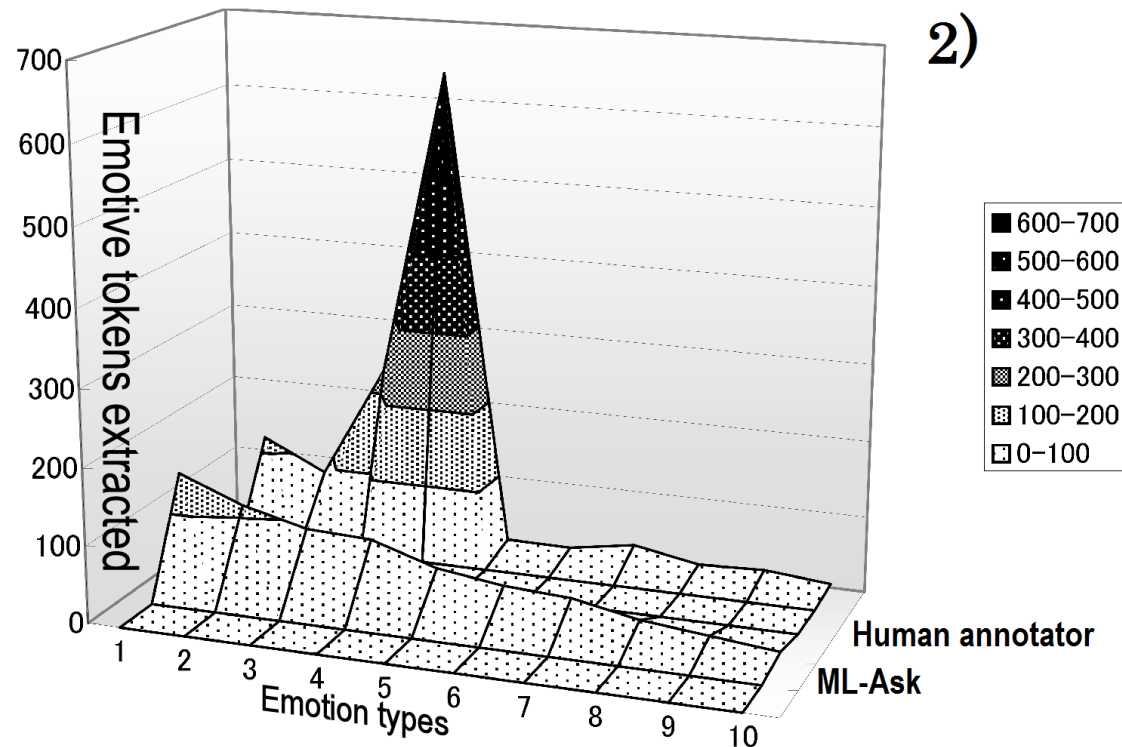


1)

| Parts of corpus | I: 1-299 (299) | II: 300-535 (236) | III: 536-770 (235) | IV: 771-924 (154) | V: 925-1131 (207) | VI: 1132-1840 (709) | Summary              |
|-----------------|----------------|-------------------|--------------------|-------------------|-------------------|---------------------|----------------------|
| ML-Ask          | 61(20%)        | 46 (19%)          | 51 (22%)           | 39 (25%)          | 42 (20%)          | 158 (22%)           | 397 (22%)            |
| Human annotator | 103 (34%)      | 116 (49%)         | 68 (29%)           | 53 (34%)          | 79 (38%)          | 328 (46%)           | 747 (41%)            |
| Accuracy ratio  | 59%            | 40%               | 75%                | 74%               | 53%               | 48%                 | 58%<br>P value=.0052 |

# Results

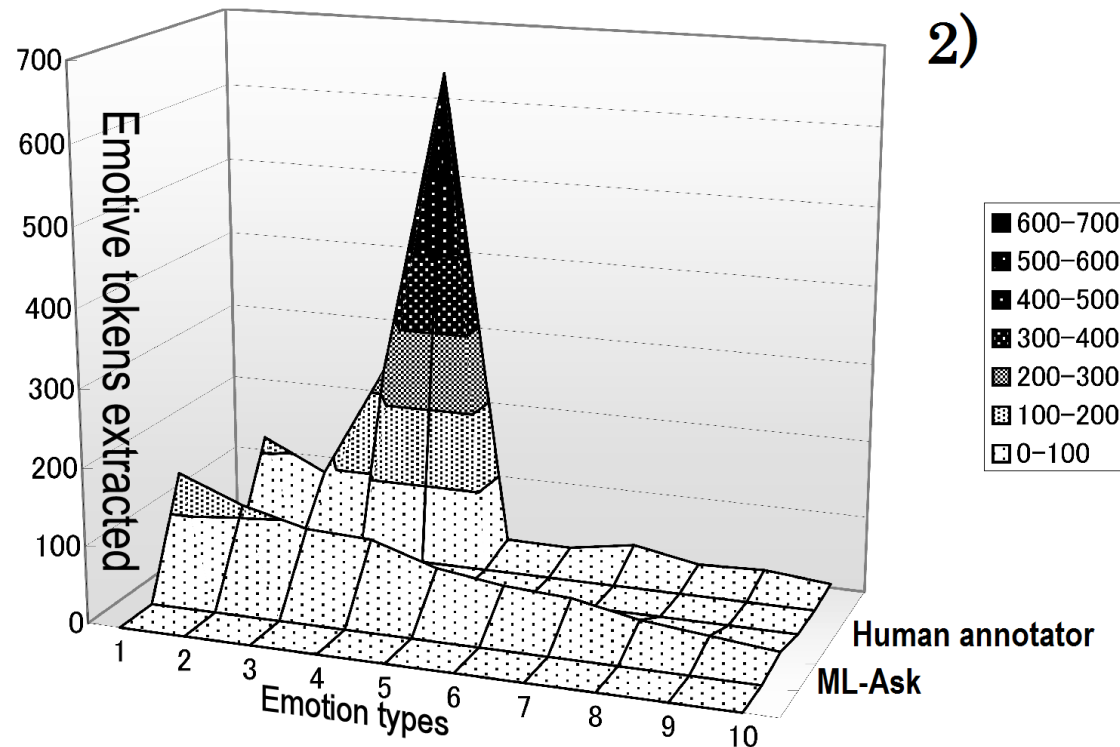
- Emotion type annotation tendencies
  - ▣ Similar: 8/10 types (joy, anger, gloom, fear, shame/shyness, fondness, relief and surprise)
  - ▣ Problematic: 2/10 types (dislike, excitement)



# Results

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**WHY?**

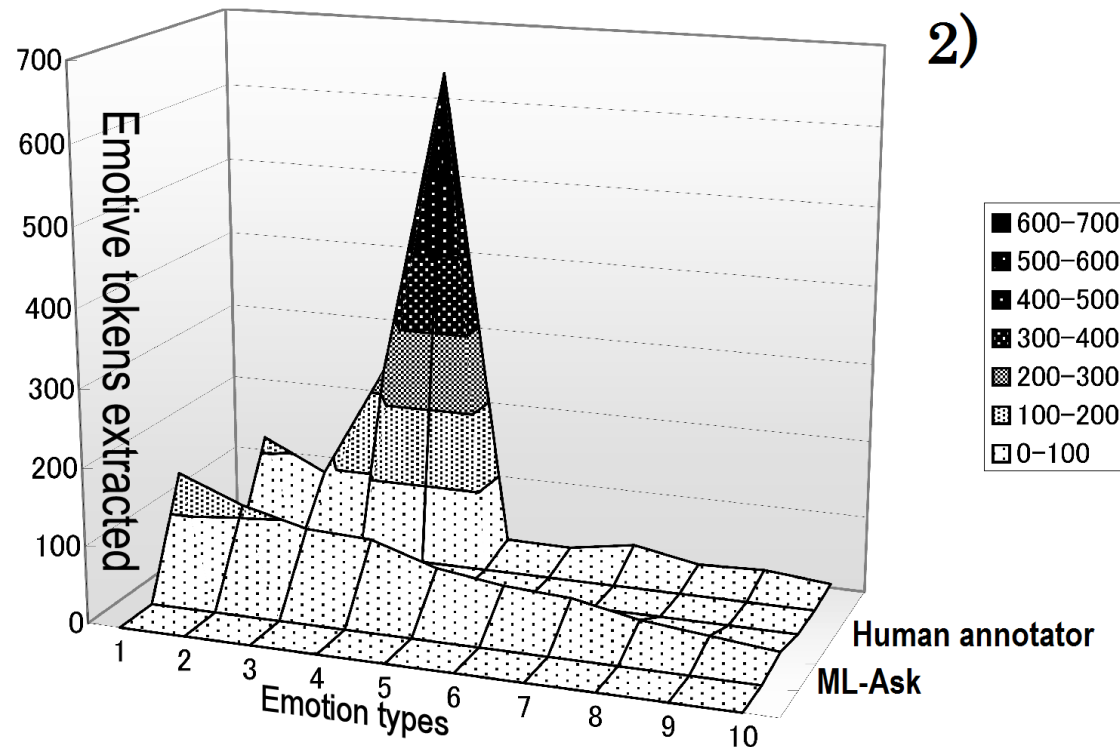


# Results

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## WHY?

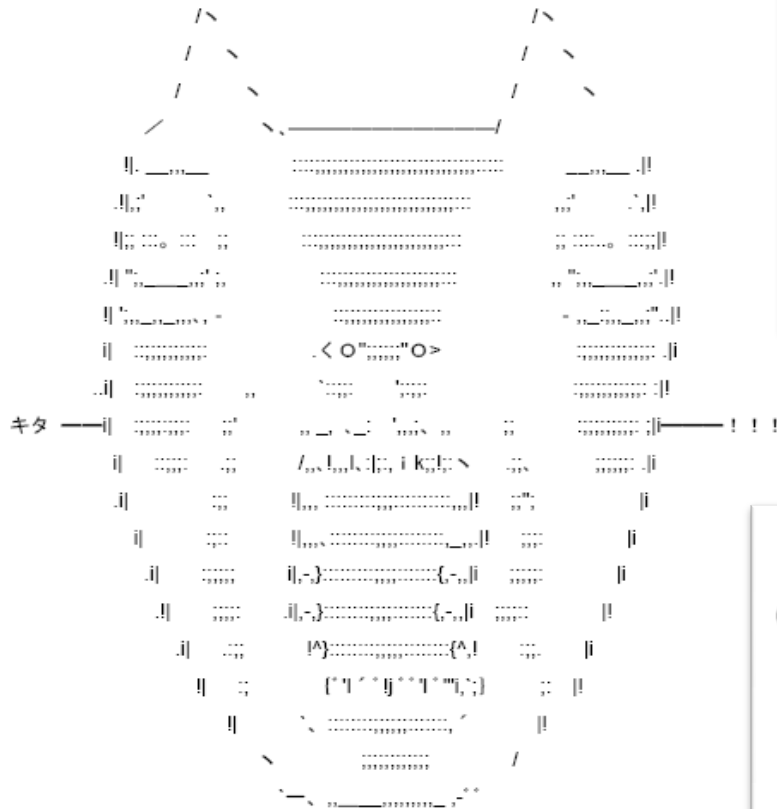
To express these two emotions in particular, *2channel* users mostly use slang (ASCII, unusual emoticons, etc. – difficult to process mechanically!).



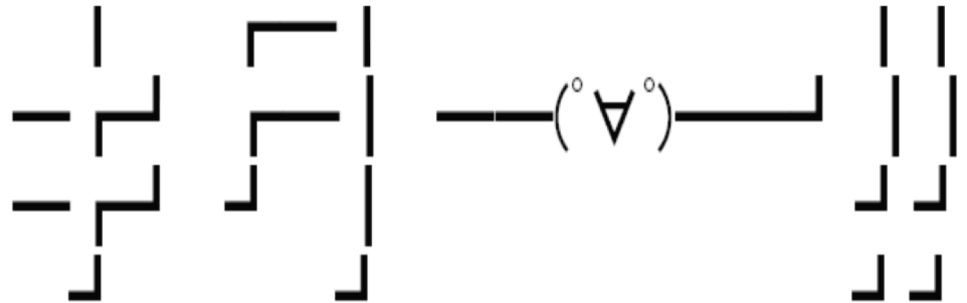


# Results

581 名前 : Mr. 名無しさん 投稿日 : 04/05/09 07:02



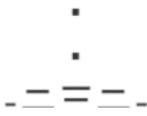
Excitement



dislike, excitement)

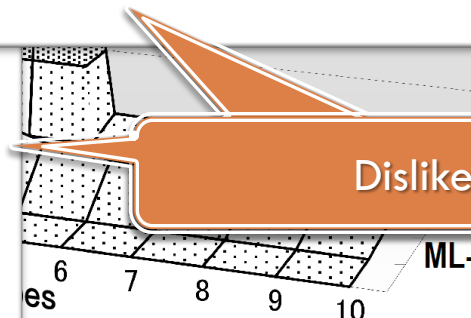


2)



no no no no no no no no no no no no no no no no  
no no no no no no no no no no no no no no no  
no no no no no no no no no no no no no no no

Dislike



ML-Ask

# Results

- Except of these two emotion types:
- 90% of agreements with human annotators
- with a good strength of agreement coefficient (Kappa = .681)
- Results were very statistically significant (P value = .0035).

# Conclusions

- We presented ML-Ask, a system for automatic annotation of corpora with emotive information.
  - ▣ Emotive / non-emotive – high accuracy
  - ▣ Emotion types – high precision, low recall
- We performed an annotation experiment on a large corpus (discussions from a popular Japanese forum *2channel*).
- Manual annotation of the corpus was the gold standard
- ML-Ask was successful in providing information on tendencies of emotive utterances in conversations.

# Future Work

- Updating the emotive expressions lexicon
- Statistically disambiguate emotive affiliations of emotemes (e.g. an exclamation mark would be used with "excitement", rather than with "gloom")
- Experiments including large scale annotations of other natural dialogue corpora
- Find out about the functions emotive utterances play in different contexts and conversation environments.

Thank you for your attention!

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