

# LINGUISTIC GAMES WITH A PURPOSE

BUILDING A LARGE SEMANTICALLY  
ANNOTATED CORPUS

**Johan Bos**

**14/09/2012**

**Linguistic**

**Lunch**

# THIS IS JOINT WORK!

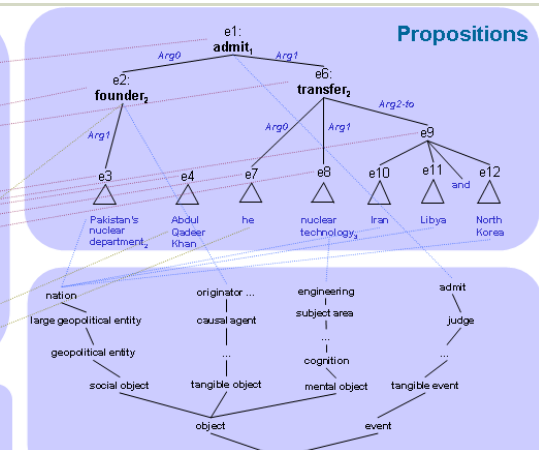
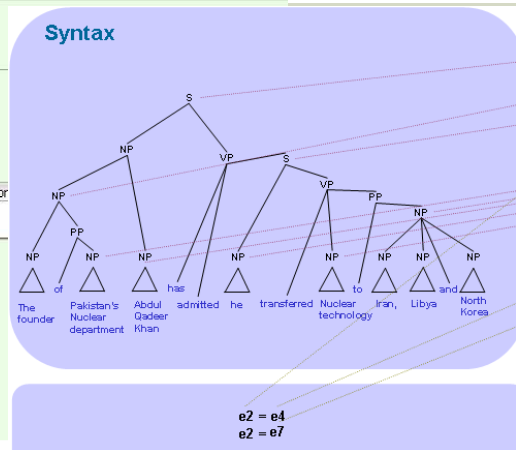
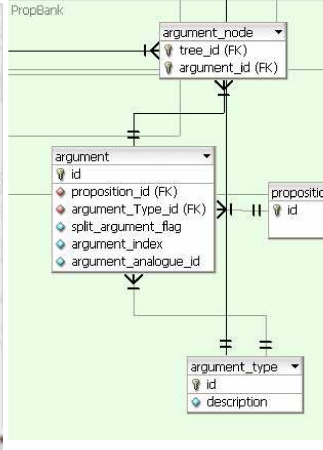
Kilian Evang

Noortje  
Venhuizen

Valerio  
Basile



# ANNOTATED CORPORA

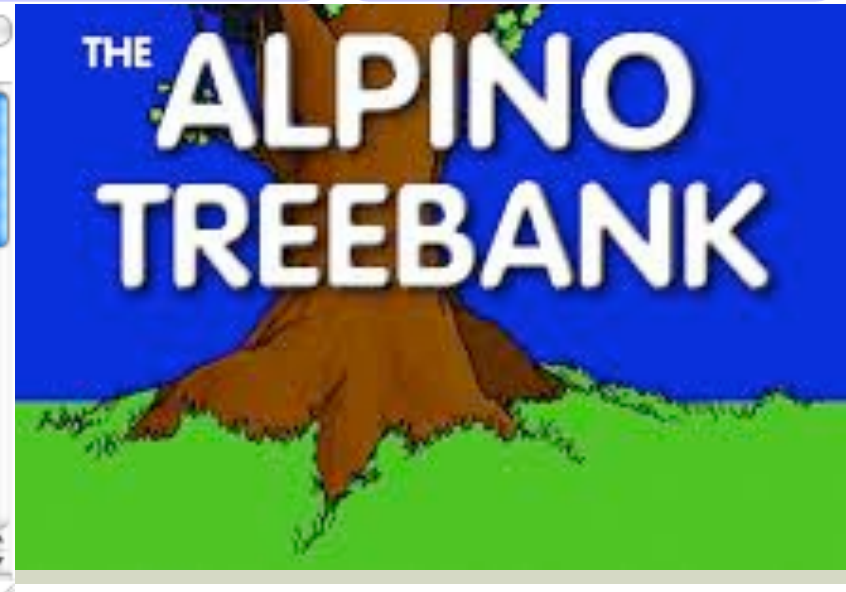
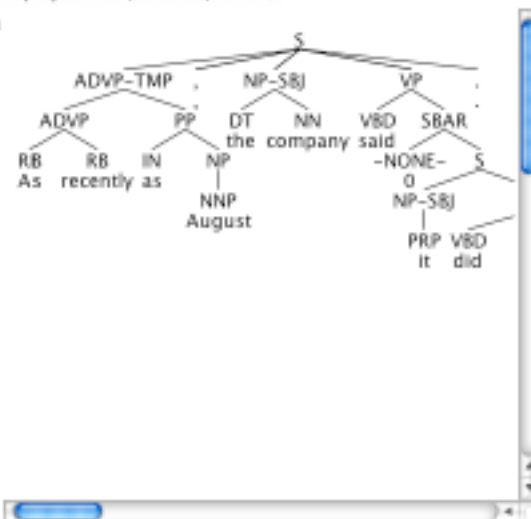


TREEBANK VIEWER Sandiway Fong University of Arizona (dec 2006: Beeware version)

Sentence File: /Users/sandiway/Desktop/freesearch/hw1.t Prolog Tree File: /Users/sandiway/Desktop/freesearch/hw1.t Load

Sentence Count: 49209 Displayed Tree (Sentence): 37975

The announcement, made after the close of trading, c  
 The company closed at \$ 12 a share, down 62.5 cents  
 Pinnacle West slashed its quarterly dividend to 40 cents  
 A company spokesman said the decision to eliminate th  
 He declined to elaborate.  
 Edward J. Tirello Jr., an analyst at Shearson Lehman Hu  
 Analysts have estimated that Pinnacle West may have to  
 The latest financial results at the troubled utility and th  
 Third-quarter net income slid to \$ 5.1 million, or six o  
 Utility operations, the only company unit operating in th  
 In other operations, losses at MeraBank totaled \$ 85.7  
 The latest quarter includes a \$ 42.7 million addition to  
 As recently as August, the company said it did n't fores  
 Pinnacle 's SunCor Development Co., real-estate unit 's  
 The latest period included a \$ 9 million write-down on  
 Losses at its Malpais Resources Co., uranium-mining ur  
 Losses at El Dorado Investment Co., the venture-capita  
 The latest quarter included a \$ 6.6 million write-down  
 Equitec Financial Group said it will ask as many as 100  
 Under the proposal by Equitec, a financially troubled ri  
 Shares of the new partnership would trade on an excha  
 Hallwood is a merchant bank whose activities include th  
 In a statement, Equitec Chairman Richard L. Saffold sa  
 While he did n't describe the partnerships' financial cor



Text Annotations Annotation Sets Print

The departure of Mr Hogan, who originally moved to British Midland as service director from Hertz International in 1997, surprised aviation analysts, as it was believed that he had been brought into the senior executive team of the airline, as part of the group's management succession planning.

He played a leading role in the strategic planning for the rebranding of the airline as BMI in preparation for its entry this year into the scheduled long haul market with the launch of services from Manchester to the US.

BMI has taken on the costs of entry into the North Atlantic market at an unfortunate time, as airlines in North America are facing the toughest conditions for 20 years with many carriers plunging into loss.

BMI, in which Lufthansa of Germany and SAS Scandinavian Airlines each own stakes of 20 per cent, suffered a 26 per cent fall in pre-tax profits last year from £11.1m (\$15.7m) to £8.2m on a turnover that grew 16.5 per cent to £739.2m.

In the first six months this year it is understood that passenger volumes have fallen by around two per cent. The share of available seats filled, the load factor, has declined by around two percentage points, but this has been offset by a strong increase in yields, or average fare levels, by more than ten per cent.

BMI's move to tighten its management structure follows a warning on Monday from British Airways that the industry faces challenging months with a "more difficult" winter ahead.

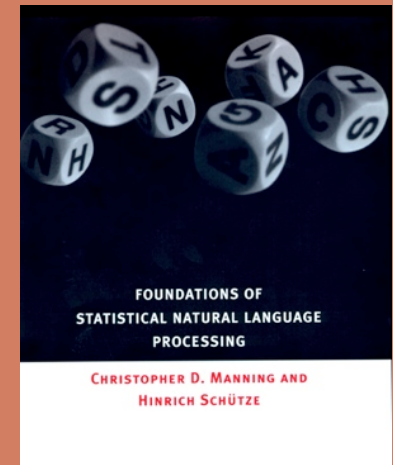
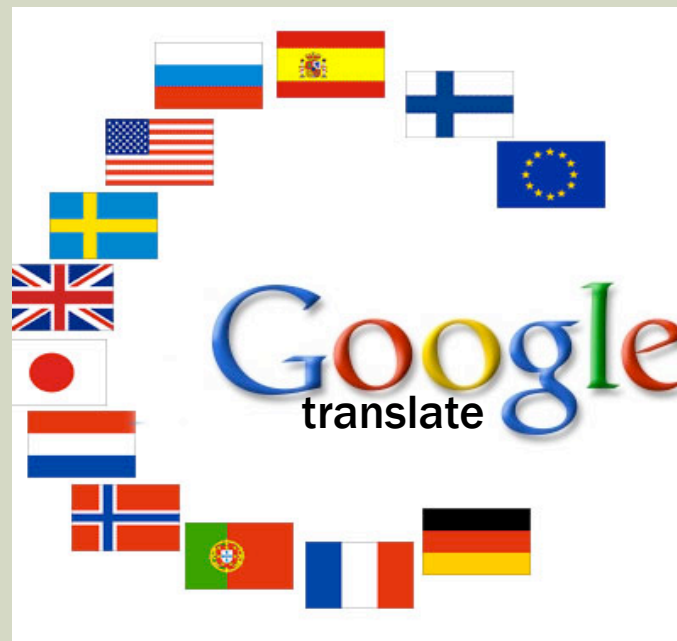
Key annotations

- Date
- Location
- Money
- Organization
- Percent
- Person

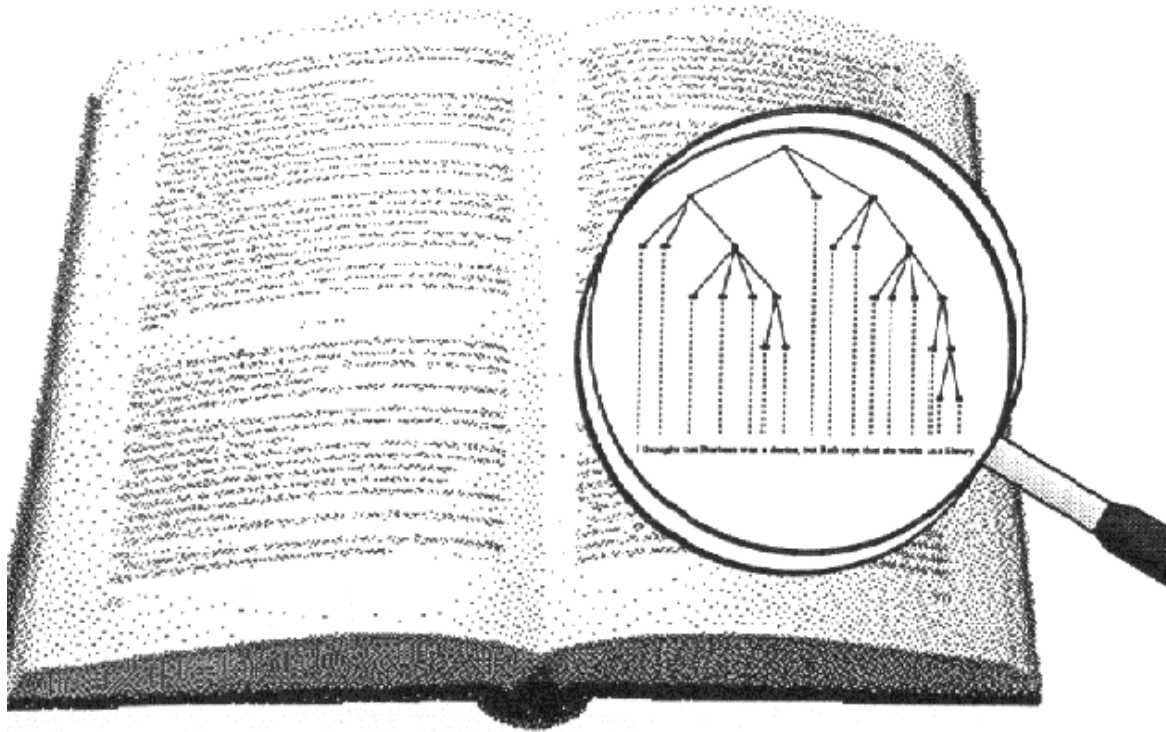
Original markups annotations

- a
- b
- body
- br
- font
- head
- html
- img
- link
- p
- script

ANNOTATED  
CORPORA  
HAVE  
CHANGED  
THE  
WORLD!







## SYNTACTIC ANNOTATION

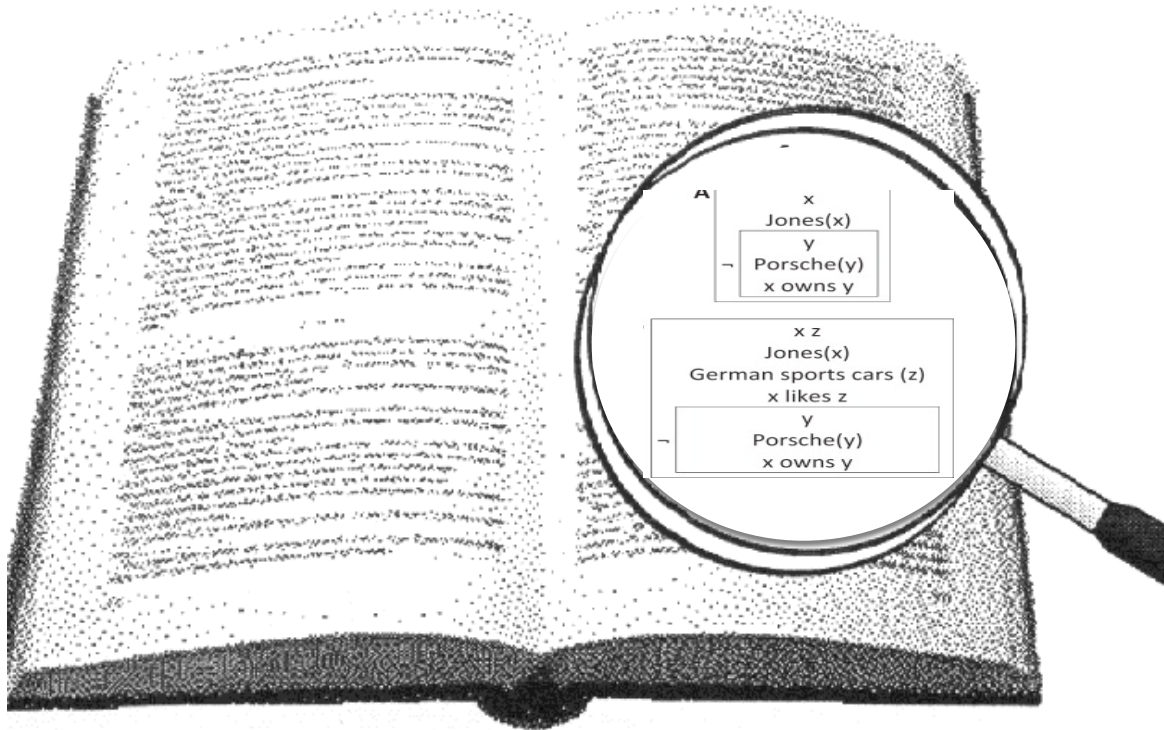
Examples:

- Penn Treebank
- Alpino
- Lingo Redwoods
- Negra

and many more!

# SEMANTIC ANNOTATION

Examples:



# THE GRONINGEN MEANING BANK

- large (English) corpus of public domain texts
- texts are aligned with semantic representations (DRT)
- automatically produced, manually corrected



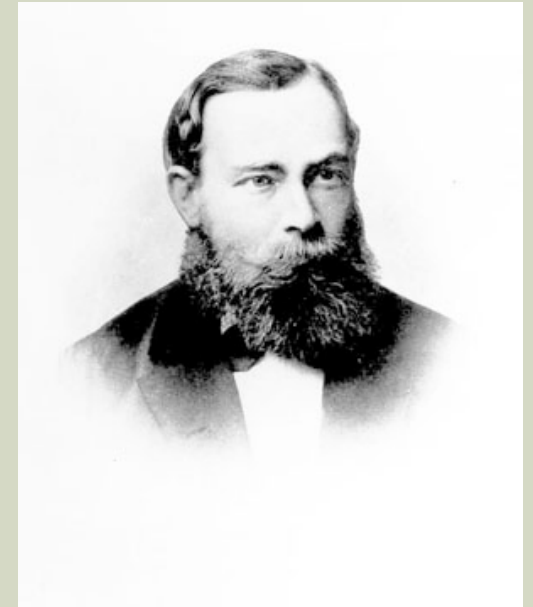
# INGREDIENTS OF THE MEANING BANK

- PTB part of speech tags
- CCG supertags (lexical categories)
- Named entities
- WordNet senses
- VerbNet roles
- CCG derivations (syntax)
- DRT boxes (semantics)
- SDRT rhetorical relations (discourse)



# THEORETICAL BACKBONE

- Discourse Representation Theory
- First-order logic as model theory
- Neo-Davidsonian event semantics
- Phenomena:
  - scope
  - quantification
  - pronouns
  - presupposition (Van der Sandt)
  - thematic roles (VerbNet)
  - rhetorical relations (SDRT)
  - tense and aspect (Kamp & Reyle)



# ITERATIVE DEVELOPMENT

- The Meaning Bank Project is (ridiculously) ambitious!
- A lot of it is done by NLP tools
- But substantial human annotation cannot be avoided
- Note however: iterative development of tools



# TRADITIONAL HUMAN ANNOTATION

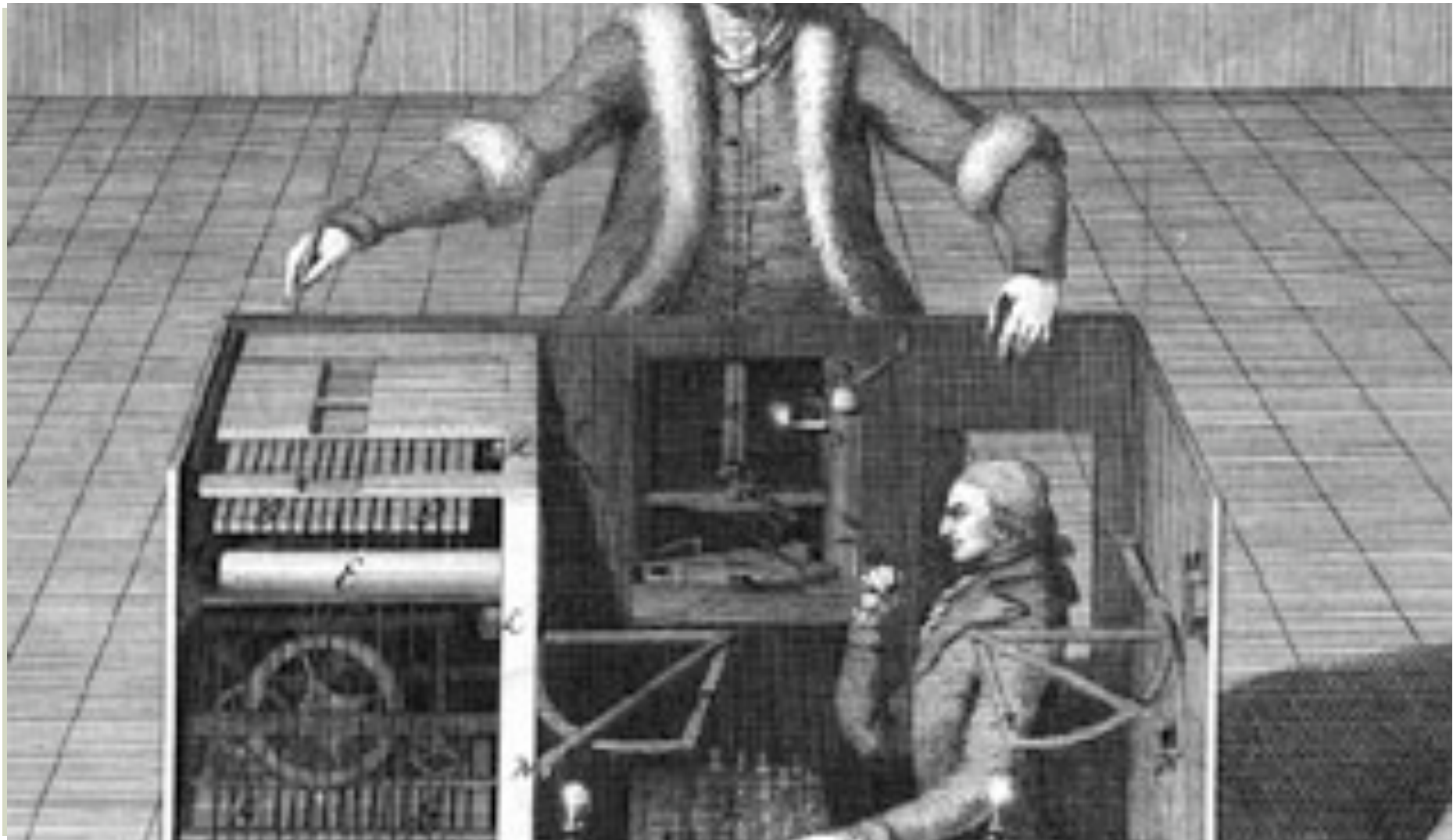


# CROWDSOURCING

- outsourcing tasks to a distributed group of people
- the internet provides infrastructure
- the “crowd” is motivated: establishing social contacts, killing time, financial gain
- best example: wikipedia



# AMAZON'S MECHANICAL TURK





# GAMES WITH A PURPOSE



Play the Games,  
Change the Web.

When you play a game at Gwap,  
you aren't just having fun.

[Learn More](#)

[Register](#)

Gender  
Guesser

Prizes

Best  
Images

 **Matchin**  
A Question of Taste

Do you prefer babies over  
flowers? Score high by reading  
your partner's mind and matching  
on the same images.



With **Duolingo** you learn a language for free  
while helping to translate the web



**PHRASE**  **DETECTIVES**



# ?

# wordrobe

play what you mean

[WWW.WORDROBE.ORG](http://WWW.WORDROBE.ORG)

Developed by  
the University  
of Groningen!

Operational  
since  
12 Sept 2012

# WORDROBE PHILOSOPHY

- not a single game, but a series of games that share same structure and scoring strategies
- each linguistic phenomenon that requires annotation corresponds to a different game
- every game consists of multiple-choice questions
- each question is presented by a text fragment plus a (small) number of possible answers
- these questions (and answers) are automatically generated from the corpus



PLAY POINTERS



PLAY SENSES



PLAY TWINS



PLAY TWINS

## HOMOGRAPHS

annotate part  
of speech of  
words that can  
both be noun  
and verb

difficult for  
machines (in  
some contexts)

# PART OF SPEECH (NOUN OR VERB)



Twins Questions left until drawer is completed: 2



U.S.-led forces are hunting down remnants of Afghanistan's ousted Taliban regime who frequently carry out hit and run attacks on coalition and Afghan government **forces**, mainly in the country's eastern and southern regions.

- noun
- verb

Place your bet: low  high

answer

skip



**PLAY SENSES**

## **WORD SENSES**

annotate sense of word (noun or verb) using the WordNet sense inventory

difficult for machines (and humans too)

# SENSES (WORDNET SENSES)

 Senses Questions left until drawer is completed: 1 

gameimage

Russian **officials** say at least five more people have died from a wave of extremely cold weather gripping the nation, bringing the death toll to 43 in the past week.

- a worker who holds or is invested with an office
- someone who administers the rules of a game or sport

Place your bet: low  high

answer

skip





## PRONOUNS

annotate  
antecedent of a  
pronoun  
(singular third-  
person)

very difficult  
for machines!

# POINTERS (PRONOUNS)

 Pointers Questions left until drawer is completed: 3



*Venezuela's* *president* is urging *President Bush* to use **his** second term in office to strengthen ties with Latin American nations.

- 1) Venezuela
- 2) president
- 3) President Bush

Place your bet: low  high

answer

skip

# SCORING IN WORDROBE

- every answer increases the score of a player
- the more overlap of a player's answer with other players, the higher the score
- total scores for a game are calculated over answers given in the last N days (currently N=50)

1		Aristotle		4186 points
2		Kilian		2399 points
3		Nynke		1473 points
4		Valerio		1058 points
5		Leo van Maanen		1004 points
6		Potato		618 points
7		Erik		471 points
8		Noortje		466 points

# A SCORE WITH A TWIST

- In addition, Wordrobe players can take risks and bet on the correctness of an answer
- The higher the bet, the more points you can win (or loose)



Senses Questions left until drawer is completed: 4



One Afghan soldier was killed and four others, **including** a U.S. soldier, were injured in the fighting.

- have as a part, be made up out of
- consider as part of something
- add as part of something else – put in as part of a set, group, or category
- allow participation in or the right to be part of – permit to exercise the rights, functions, and responsibilities of (synonyms: admit, let in)

Place your bet: low  high

answer

skip

# Kilian



Facebook page

## Personal information

Name: Kilian

Completed drawers: 33

Senses: 10

Pointers: 13

Twins: 10



## WHY WILL PEOPLE PLAY WORDROBE?

- unlocking achievements
- outperforming other players
- learning about language
- to win amazon vouchers!

# Enjoy a language game with Wordrobe!

There are many games to choose from!

PLAY TWINS

the other games the other games

Play with words, play Wordrobe!

Become a new Wordrobe wizard!

Fascinated by language? Play!

Synchronize wordrobe with your social network

Facebook sync

Twitter sync

## Play Wordrobe *play*

## Top scores



PLAY TWINS



PLAY SENSES









Is it a noun or a verb? Easy game for beginners. Double the trouble, twice the fun!

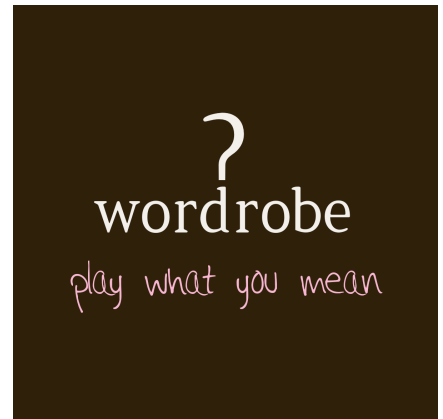
Identify the correct sense of a word. Quite a challenging game. Does it make sense?

1 Aristotle | 2791 points

1 Kilian | 602 points

Choose another game

1		Aristotle		4526 points
2		Kilian		2572 points
3		Nynke		1542 points
4		Valerio		1083 points
5		Leo van Maanen		1024 points
6		Potato		631 points
7		Noortje		581 points
8		MichaelHahn		503 points



WWW.WORDROBE.ORG