Big Picture

- Knowledge is encoded in text
- There’s far too much text!
  - Text summarization
  - Document classification
- Maximum Accuracy of 70-90%
  - That’s one mistake in 10 words!
- We need more accuracy
  - Semantic relations
Overview

• Build structure using word features
  • (Harley 2006, Marantz 1997)
• Detect semantic operators using agreement
  • Goal of this talk

Question 1

No Agreement

Question 2

Gender Agreement

Person Agreement
Isabelle gave John *the boot*

Isabelle gave *birth* to Joey

John got *the boot*

# Joey got *birth*
Words are unsystematic

English
    Get Married = (BECOME MARRIED)

French
    Se Marier = (CAUSE MARRIED RECIPROCAL)

Hindi
    Shadi Kar = (DO MARRIAGE)
However, words in context are predictable

• They **helped** him right away.  \( \exists w : Q(\text{they}, w) = 1 \)
  – Verb
• Thank you for your **help**.  \( \exists x : Q(x) = 1 \)
  – Noun
• They clicked on **the help icons**.  \( \exists x : (P\&Q)(x) = 1 \)
  – Adjective
Predicates vs. Entities

I have two paper flowers. | I found a little paper. | I have a paper to submit

Play time is good for kids. | He played two games in 1 hour. | He played for the entire day.

.paper
∃x : paper(x)=1
∃x : paper(x)=1

.play
∃w : play(w)=1
∃w : play(w)=1
Bound Variables

Predicate
paper

Bound Entity
\( \exists x : \text{paper}(x) = 1 \)

<table>
<thead>
<tr>
<th>Beef</th>
<th>Paper</th>
<th>Play</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Broken</td>
<td></td>
</tr>
</tbody>
</table>

A cow
The cow
Cows
The cows

A paper
The paper
Papers
The papers

He plays everyday
He played yesterday.
Is it Bound?

Person Agreement: finite verbs
1. Mathieu prends souvent le metro
   Mathieu takes often the metro

2. Isabelle et Marie sont tombées
   Isabelle and Marie fell

3. Mira has rehi hai
   Mira laugh -ing is

Gender Agreement: non-finite verbs, adjectives
1. Mes belles grandes tables blanches
   My nice large tables white

2. Mere atje baqe kale gadjhe
   My nice big black donkeys
Agreement = Semantic operators

Entity?

P  NO
No Agreement

YES

Finite?

∃x : P(x) = 1

∃x : (P & Q)(x) = 1

Gender Agreement

NO

YES

∃x ∃w : P(x) & Q(x,w) = 1

Person Agreement
Take Home Message

- A paper ≠ The paper ≠ Paper ≠ Papers
- Beef ≠ A cow ≠ Herd

However:
- Beef ≈ Cow material
- Suffixes = meaning
- Context = meaning
References


References (in more detail)

Agreement


Agreement continued


References (in more detail)

Clause structure:
Raposo, E., & Uriagereka, J. 1995. *Two types of small clauses (toward a syntax of theme/rheme relations).*

Syntax/Semantics of want
References (in more detail)

Hindi