

Statistical NLP Spring 2010



Lecture 21: Coreference Resolution

Dan Klein – UC Berkeley



Natural Language Processing

Los Angeles Times

President Barack Obama received the Serve America Act after congress' vote. He signed the bill last Thursday. The president said it would greatly increase service opportunities for the American people.



Question Answering

Q: Who signed the Serve America Act?

A: Barack Obama

Los Angeles Times

President Barack Obama received the Serve America Act after congress' vote. He signed the bill last Thursday. The president said it would greatly increase service opportunities for the American people.



Machine Translation

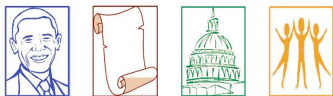
| | | |
|--------|-----------|-------------|
| او | قانونرا | امضاءکرد |
| oo | ganoon-ra | emza-kard |
| person | law-obj | signed-past |



He signed the bill



Discourse Structure



President Barack Obama received the Serve America Act after congress' vote. He signed the bill last Thursday. The president said it would greatly increase service opportunities for the American people.

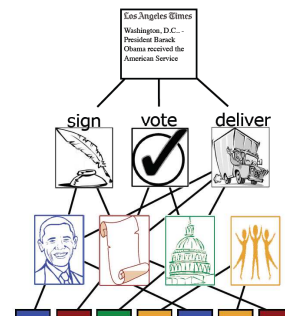


Discourse Structure

Narrative

Events

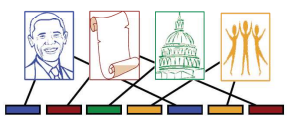
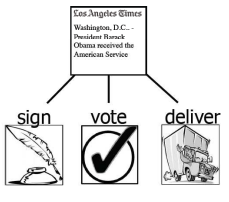
Entities



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Outline

- Entity Reference Resolution
- Multi-Document Summarization

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Entity Reference Resolution

Input:

President Barack Obama received the Serve America Act after congress close vote.
 He signed the bill last Thursday.
 The president said it would greatly increase service opportunities for the American people.

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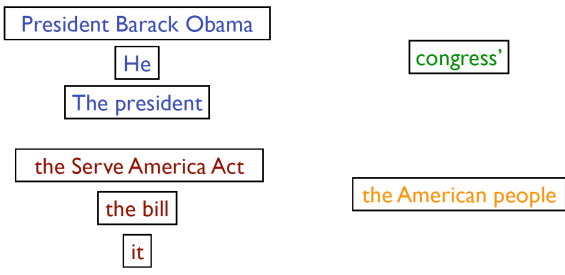
Entity Reference Resolution

Output:

President Barack Obama received the Serve America Act after congress close vote.
 He signed the bill last Thursday.
 The president said it would greatly increase service opportunities for the American people.

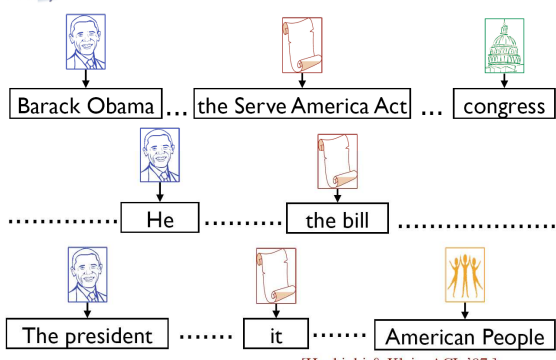
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Entity Reference Resolution



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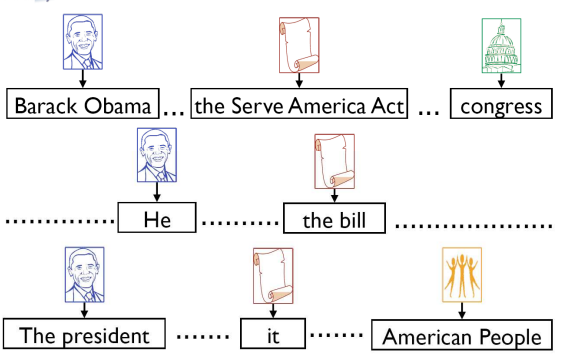
Entity Resolution Model

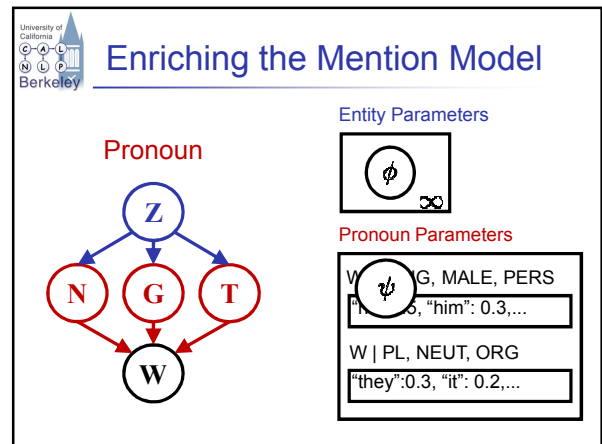
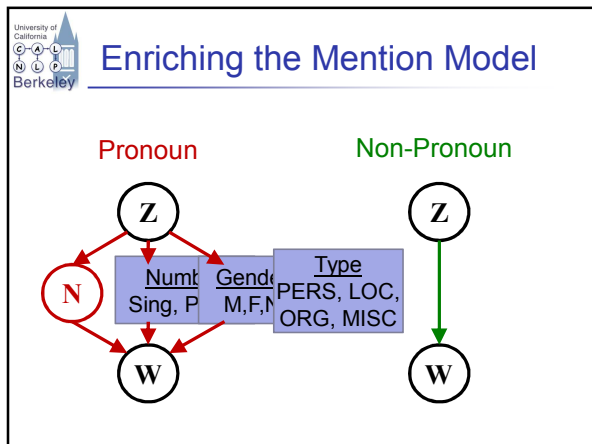
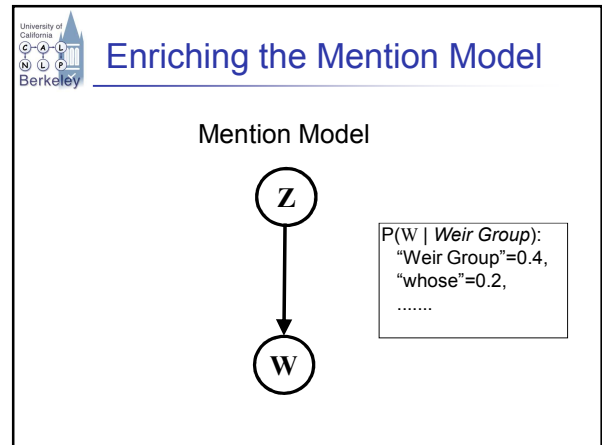
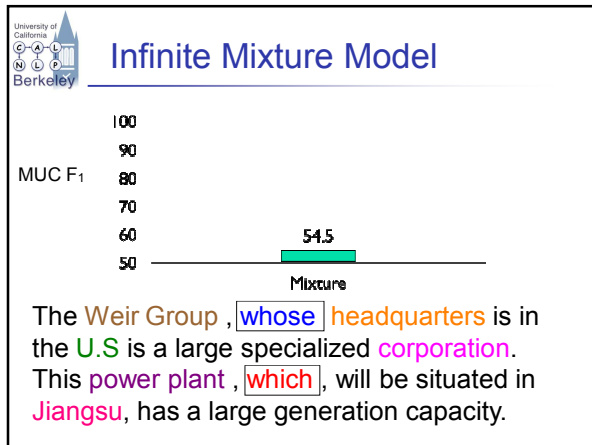
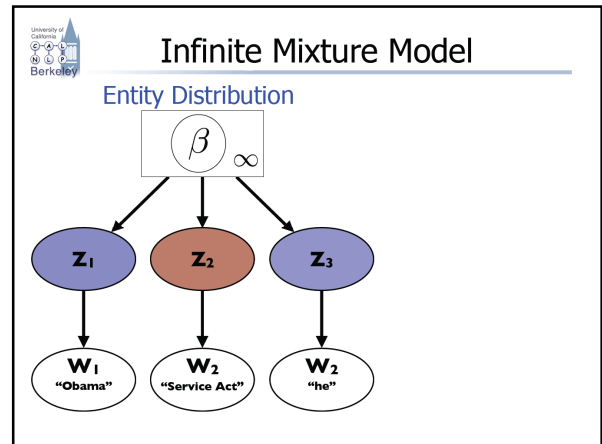
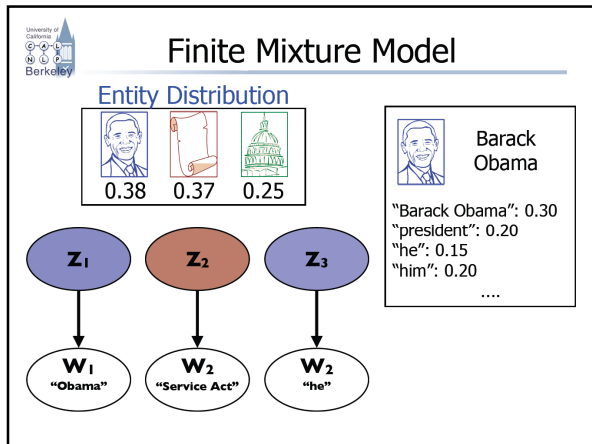


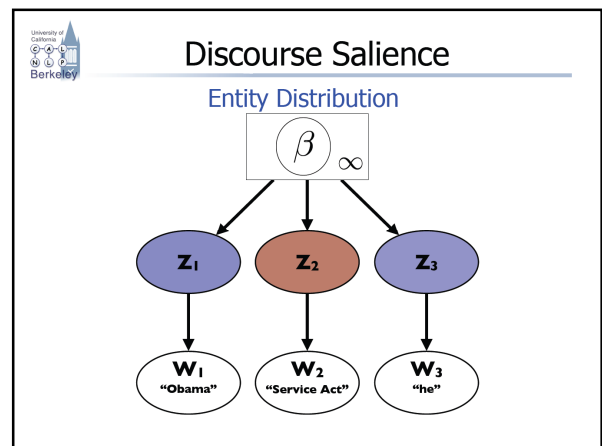
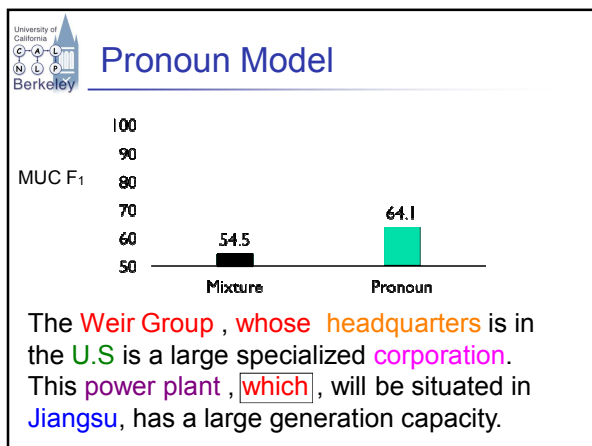
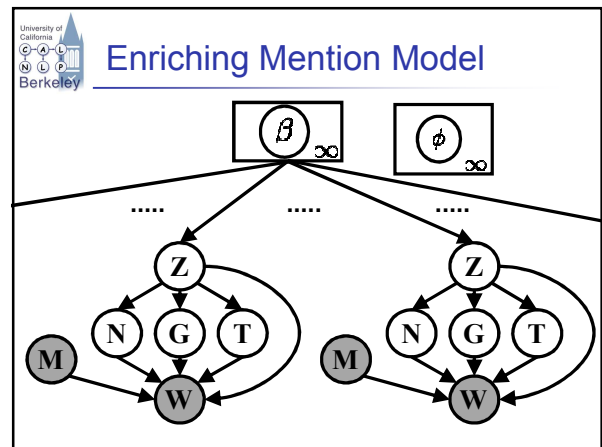
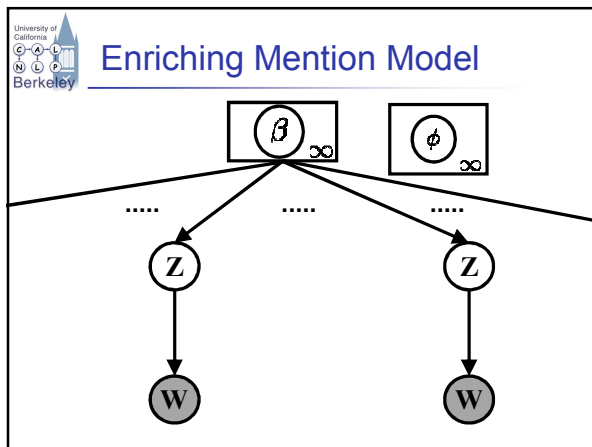
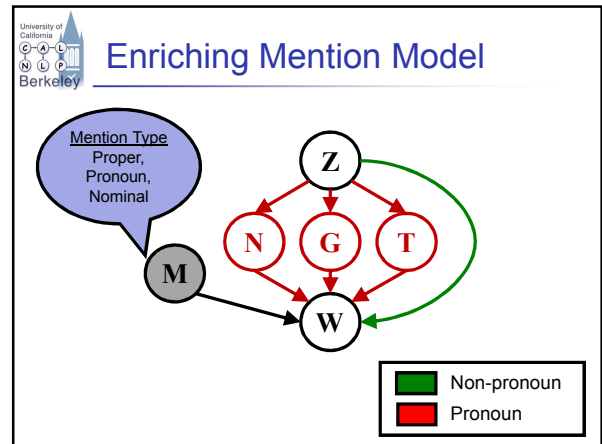
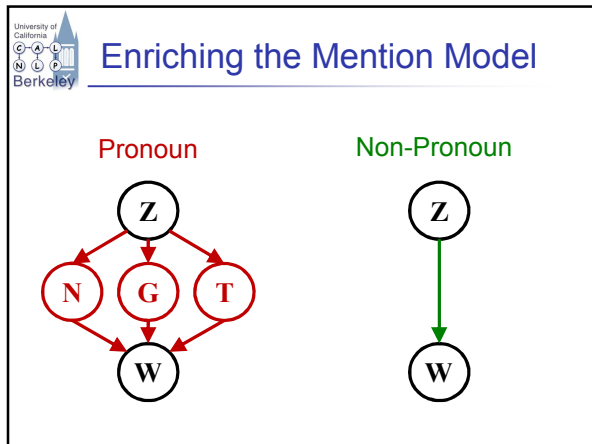
[Hashighi & Klein, ACL '07.]

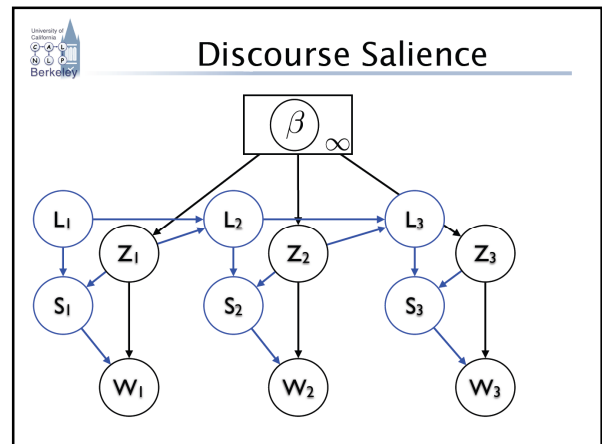
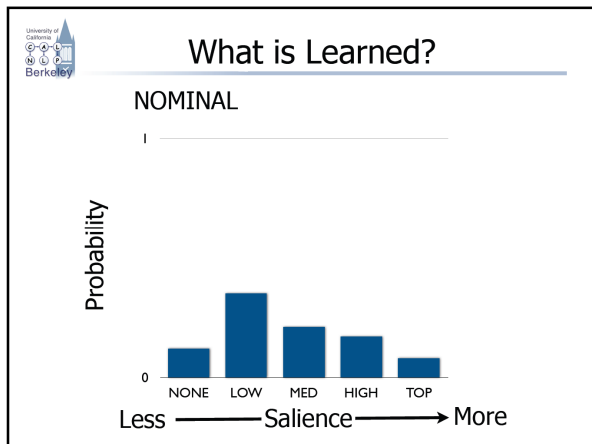
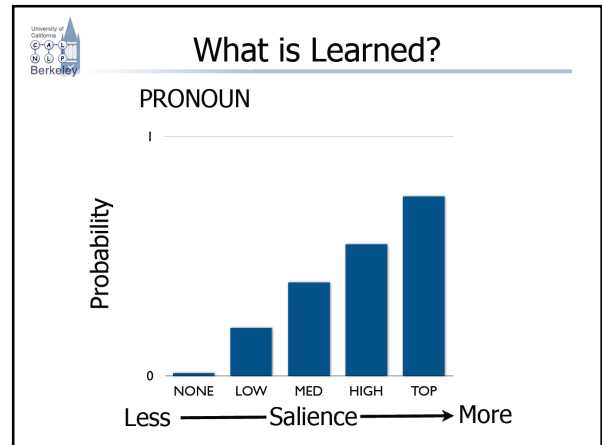
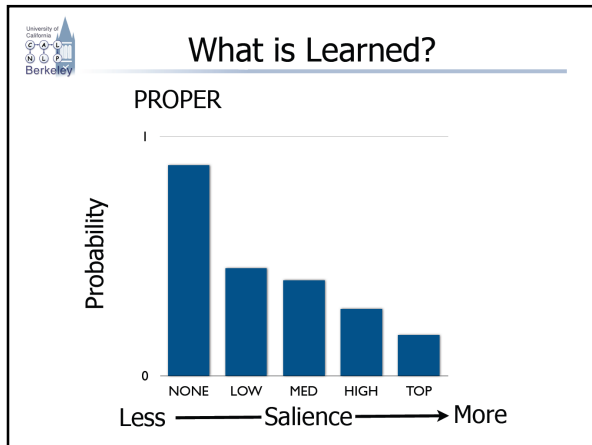
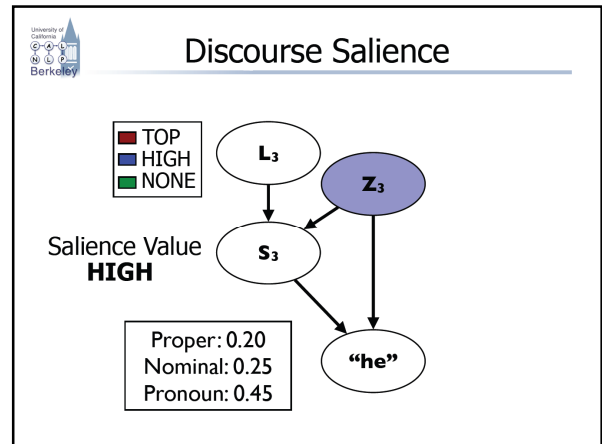
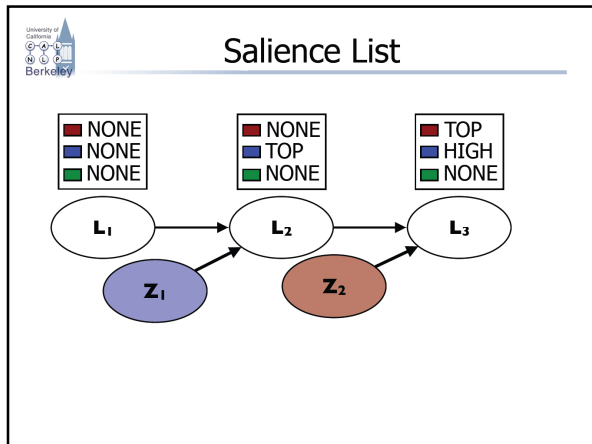
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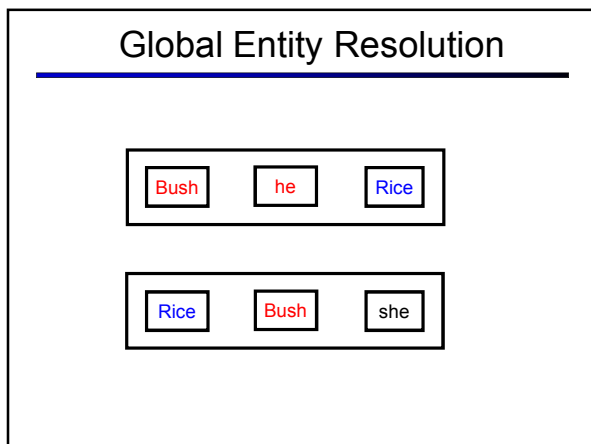
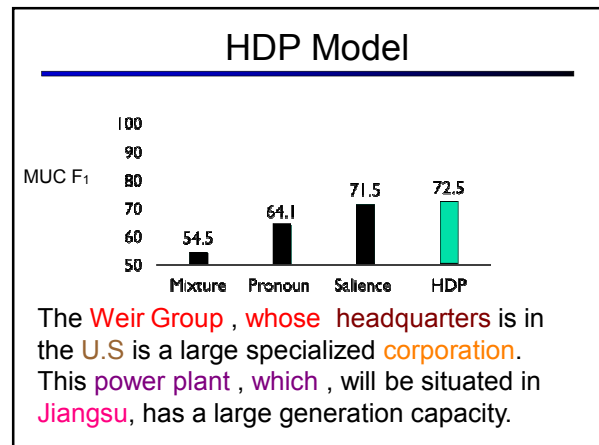
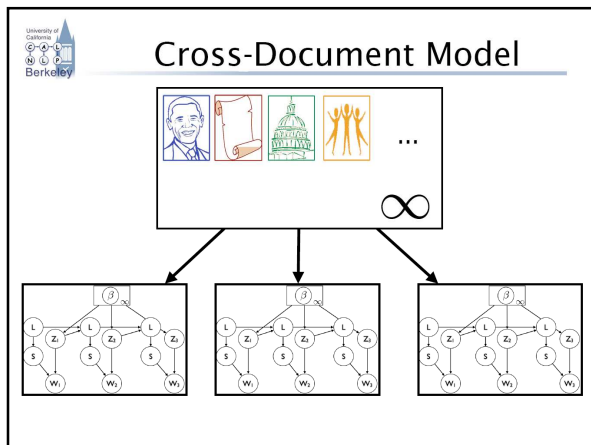
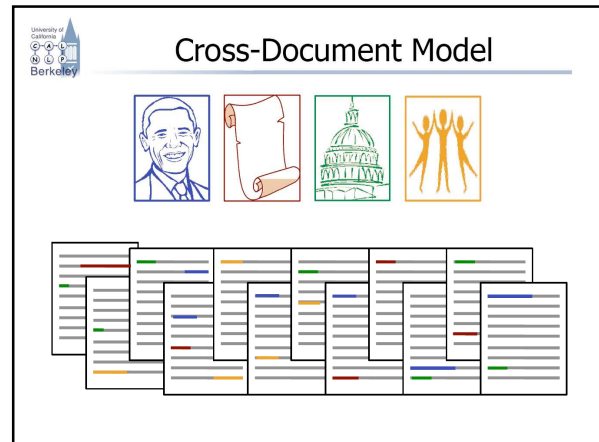
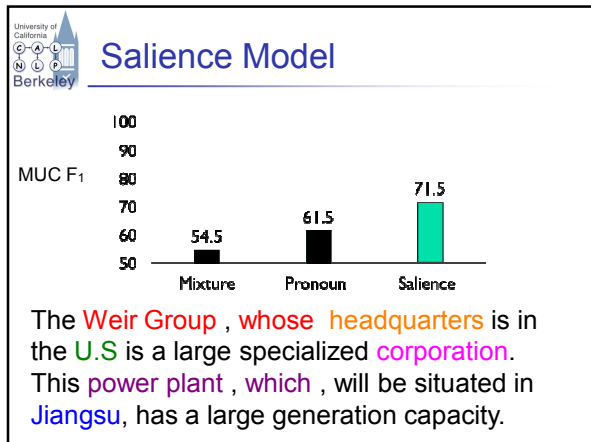
Entity Resolution Model



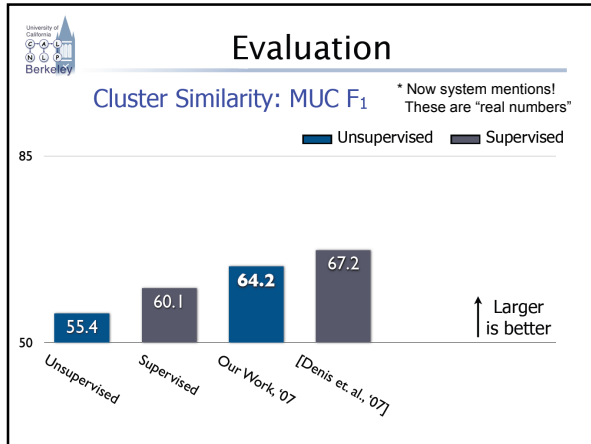








- ## Experiments
- MUC6 English NWIRE (all mentions)
 - 53.6 F₁* [Cardie and Wagstaff 99] Unsupervised
 - 70.3 F₁ [Haghighi & Klein 07] Unsupervised
 - 73.4 F₁ [McCallum & Wellner 04] Supervised
 - 81.3 F₁ [Luo et al 04] Supervised+Oracle
 - MUC score, not all systems are completely comparable
 - Why not: some assume oracle gives boundaries, NER types, etc.



Errors

Input
 America Online announced on Monday that the company plans to update its instant messaging service.

Correct
 America Online the company its instant messaging service

Guess
 America Online the company its instant messaging service

Adding Semantic Knowledge

America Online ← → company

America Online, LLC (commonly known as AOL) is an American global Internet services and media company operated by Time Warner. It is headquartered at 770 Broadway in Midtown Manhattan, New York City.^{[2][3]} Founded in 1983 as Quantum Computer Services, it has franchised its services to companies in several nations around the world or set up international versions of its services.^[4]

America Online
 Type: Subsidiary of Time Warner
 Founded: 1983 as Quantum Computer Services

Adding Semantic Knowledge

America Online, LLC (commonly known as AOL) is an American Global Internet services and media **company**

George W. Bush, the 43rd **president**, is already the subject of more than 100 books

trade union: an **organization** whose members belong ...

Richer Semantic Modeling

The Federal Reserve announced that the dollar dropped this week. It fell ...

The Federal Reserve announced that the dollar dropped this week. It predicted ...

