

Linguistics 409
Computational Linguistics
Intro Day 2

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Main points

Computers would be a lot more useful if they could handle our email, do our library research, summarize boring readings, talk to us ...

But they are fazed by natural human language in ways that humans simply are not.

Main points

How can we tell computers about language? (Or help them learn it as kids do?)

What can the problems that computers have with language teach us about theoretical linguistics?

Levels of Language

- **Phonetics/phonology:** what sounds are being used?
- **Morphology:** what words/subwords are we dealing with?
- **Syntax:** which words modify one another?
- **Semantics:** What's the literal meaning?
- **Pragmatics:** What should you conclude from the fact that I said something? How should you react?

Ambiguity: More than humans can believe...

- I saw the man with his telescope.

The levels of language can be thought of as ambiguity-resolving components.

How many different interpretations does the above sentence have?

How can each ambiguous piece be resolved?

Does speech input make the sentence more or less ambiguous?

Ambiguity: Favorite Crash Blossoms

- Japan Violinist linked to JAL crash blossoms
- Iraqi Head seeks Arms
- Is There a Ring of Debris Around Uranus?
- Juvenile Court to Try Shooting Defendants
- Teacher Strikes Idle Kids
- Stolen Painting Found by Tree
- Kids Make Nutritious Snacks
- Local HS Dropouts Cut in Half
- Obesity Study Looks for Larger Test Group

Ambiguity: Favorite Crash Blossoms

- British Left Waffles on Falkland Islands
- Never Withhold Herpes Infection from Loved One
- Red Tape Holds Up New Bridges
- Man Struck by Lightning Faces Battery Charge
- Clinton Wins on Budget, but More Lies Ahead
- Hospitals Are Sued by 7 Foot Doctors

Subtler Ambiguity

- Time flies like an arrow.
- Fruit flies like a banana. (*rim shot*)

bigamy!

Context is hugely important

My blackberry is not working...

What's hard about this story?

John stopped at the donut store on his way home from work. He thought a coffee was good every few hours. But it turned out to be too expensive there.

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To get a donut (spare tire) for his car?

What's hard about this story?

John stopped at the **donut store** on his way home from work. He thought a coffee was good every few hours. But it turned out to be too expensive there.

store where donuts shop? or is run by donuts?

or looks like a big donut? or made of donut?

or has an emptiness at its core?

What's hard about this story?

I stopped at the first sign of trouble, but

John stopped at the donut store on his way home from work. He thought a coffee was good every few hours. But it turned out to be too expensive there.

What's hard about this story?

John stopped at **the donut store on his way home from work**. He thought a coffee was good every few hours. But it turned out to be too expensive there.

Describes where the store is? Or when he stopped?

What's hard about this story?

John stopped at the donut store on his way home **from work**. He thought a coffee was good every few hours. But it turned out to be too expensive there.

Well, actually, he stopped there from hunger and exhaustion, not just from work.

What's hard about this story?

John stopped at the donut store on his way home from work. He **thought** a coffee was good every few hours. But it turned out to be too expensive there.

At that moment, or habitually?
(cf: Mozart composed music.)

What's hard about this story?

John stopped at the donut store on his way home from work. He thought a coffee was good **every few hours**. But it turned out to be too expensive there.

That's how often he thought it?

What's hard about this story?

John stopped at the donut store on his way home from work. He thought **a coffee was good every few hours**. But it turned out to be too expensive there.

But actually, a coffee only stays good for about 10 minutes before it gets cold.

What's hard about this story?

John stopped at the donut store on his way home from work. He thought **a coffee was good every few hours**. But it turned out to be too expensive there.

Similarly: In America a woman has a baby every 15 minutes. Our job is to find that woman and stop her.

What's hard about this story?

John stopped at the donut store on his way home from work. He thought a coffee was good every few hours. But **it** turned out to be too expensive there.

the particular coffee that was good every few hours? the donut store? the situation? life?

What's hard about this story?

John stopped at the donut store on his way home from work. He thought a coffee was good every few hours. But it turned out to be **too expensive** there.

too expensive for what? what are we supposed to conclude about what John did?

how do we connect “it” to “expensive”?

The Turing Test

- Alan Turing: the *Turing test* (language as proxy for intelligence)
- Three participants: a computer and two humans (one is an interrogator)
- Interrogator's goal: to tell the machine and human apart
- Machine's goal: to fool the interrogator into believing that a person is responding
- Other human's goal: to help the interrogator reach his goal

Q: Please write me a sonnet on the topic of the Forth Bridge.

A: Count me out on this one. I never could write poetry.

Q: Add 34957 to 70764.

A: 105621 (after a pause)

TURING TEST EXTRA CREDIT:
CONVINCE THE EXAMINER
THAT HE'S A COMPUTER.

YOU KNOW, YOU MAKE
SOME REALLY GOOD POINTS.

/

I'M ... NOT EVEN SURE
WHO I AM ANYMORE.

