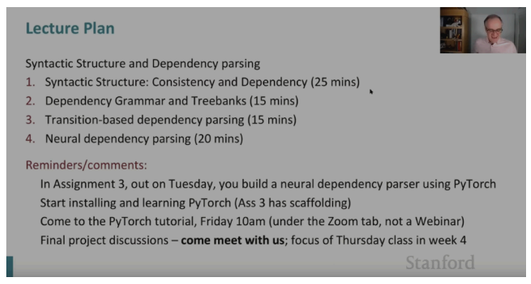
Notes

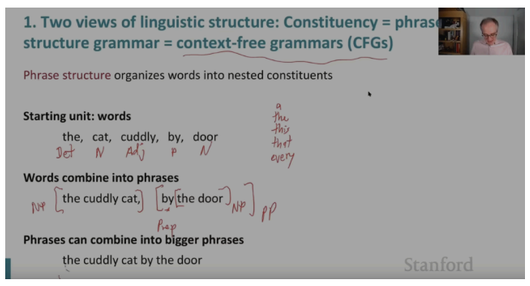
19 February 2024 07:05

Lecture Outline:



Structure of the Language:

- Words: basic component of the language. Can convey limited information by itself.
- Phrases: Combination of words. Adds bit more context to a single word. E.g. the Cuddly cat -> tell you more about a cat than just a single world cat.
- Sentences: Combination of phrases. Convey meaningful information. E.g. the cuddly cat by the door. Combines two different phrases with a preposition 'by'

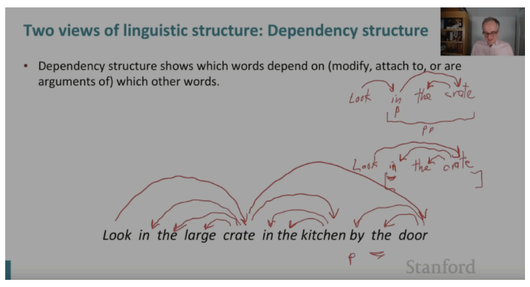


Dependency Structure:

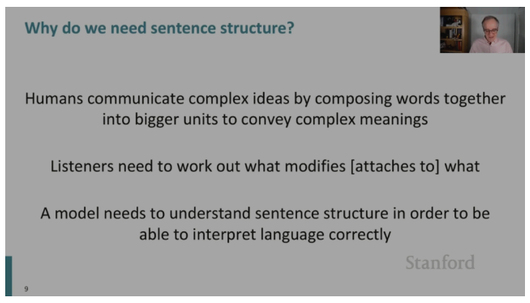
A sentence is a combination of different phrases. These phrases are built using several words.
To extract the meaning out of a sentence, we (humans) look at the words, the role they play in a sentence (I.e. Lexicon. Verb, noun, adjective etc) and mainly relationship of the words to other words in the sentence

Dependency Structure: is finding out which word depend other words to find the meaning in the sentence.

e.g. as shown below – the arrows denote the dependency.
e.g. 1: Look: Where to look? -> in the Crate
e.g. 2: Create: Where is the crate? -> in the Kitchen
e.g. 3: Create: How is the crate? -> Large...



Why to learn this all?



Types of Ambiguities in Dependency Parsing:

Prepositional Phrase attachment:

Cop kills man with knife? Or cop kills a man who had knife?


San Jose cops kill man with knife

Text Paper Translate Listen Close

San Jose cops kill man with knife

Ex-college football player, 23, shot 9 times allegedly charged police at fiancee's home

By Hamed Aleaziz and Vivian Ho

A man fatally shot by San Jose police officers while allegedly charging at them with a knife was a 23-year-old former football player at De Anza College in Cupertino who was distraught and depressed, his family said Thursday.

Police officials said two officers opened fire Wednesday afternoon on Phillip Watkins outside his fiancee's house because they feared for their lives. The officers had been drawn to the house, officials said, by a 911 call reporting an armed home invasion that, it turned out, had been made by Watkins himself.

But the mother of Watkins' fiancee, who also lives in the house on the 1300 block of Sherman Street, said she witnessed the shooting and described it as excessive. Faye Buchanan said the confrontation happened shortly after she called a suicide intervention hotline in hopes of getting Watkins medical help.

Watkins' 911 call came in at 3:01 p.m., said Sgt. Heather Randol, a San Jose police spokeswoman. "The caller stated there was a male breaking into his house armed with a knife," Randol said. "The caller also stated he was locked in an upstairs bedroom with his children and requested help from police."

She said Watkins was on the sidewalk in front of the home when two officers got there. He was holding a knife with a 4-inch blade and ran toward the officers in a threatening manner, Randol said.

"Both officers ordered the suspect to stop and drop the knife," Randol said. "The suspect continued to charge the officers with the knife in his hand. Both officers, fearing for their safety and defense of their life, fired at the suspect."

On the police radio, one officer said, "We have a male with a knife. He's walking toward us."

"Shots fired! Shots fired!" an officer said moments later.

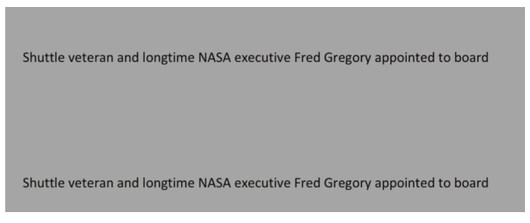
A short time later, an officer reported, "Male is down. Knife's still in hand."

Buchanan said she had been prompted to call the 3[illegible] continues on B6

Back Continue

Coordination scope ambiguity:

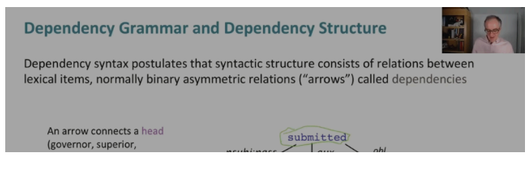
Shuttle veteran and longtime NASA executive – are these two different persons or single person with two different designations?

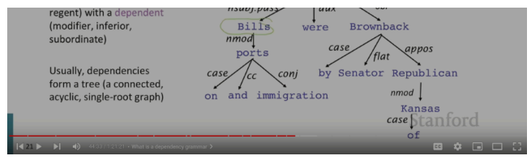


Adjective Modifier ambiguity:

NSFW: Feel free to find the ambiguity.

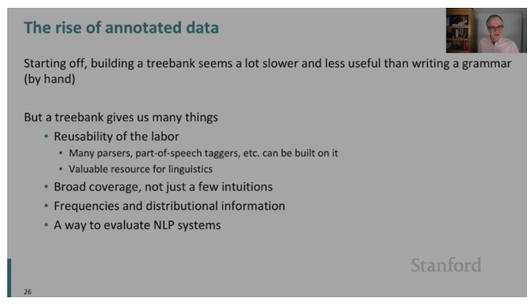
Formal definition of Dependency Grammer:





Dependency Tree Banks:

Annotating the sentences with dependencies in between the different words.

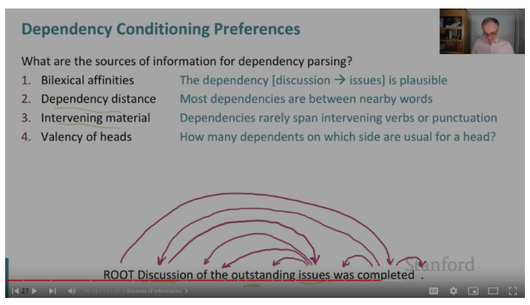


How to build a Parser once we have dependency trees?

A rule based system:

Dependency should be:

Plausible (should make sense...)
Close to the root word
spans from a ROOT word to a verb or a punctuation
Have limited words to either side of the ROOT.

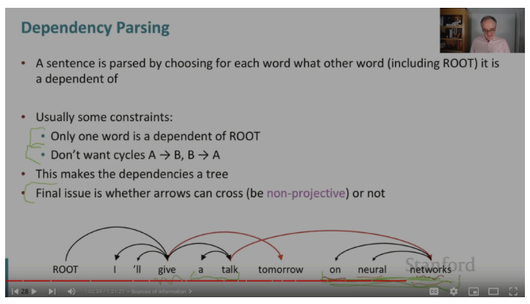


Steps:

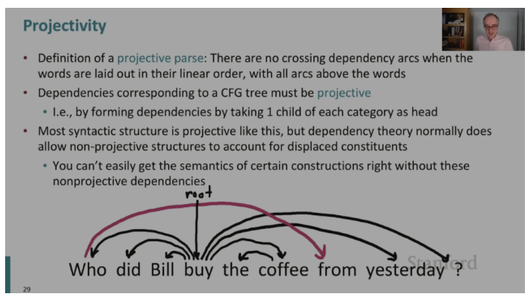
Choose each word and find what other word it is a dependent of?

and some constraints:

Arrows should be acyclic.
Arrows should/should not cross other arrows (projectivitiy)



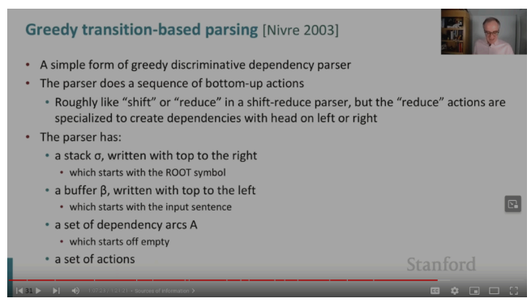
Definition of Projectivity:



3 methods of building Dependency parser:

- Dynamic programming
- Graph algorithms
- Constraint Satisfcation (rule based)
- Transition-based parsing (discussed in detail)

Transition-based Parsing:

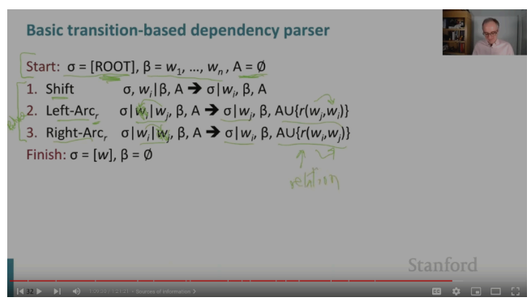


Algorithm:

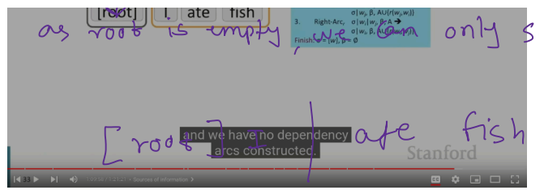
Start with a Stack containing root.
Use a buffer ß to work (a buffer is a collection of words)
At any point, 3 actions are allowed:

Shift: move next word to the Stack. When only one word on the stack, you always shift.
(Reduce actions) - take top 2 items on the stack and make one of them dependent of the other. End result is one item from stack is removed and a dependency is created

Left-arc: action making left word dependent
Right-arc: action of making right word dependent



Example:



as root is empty, only shift operation

[root] | I ate fish → have for some reason we don't establish dependency bet'n root & I.

shifting again,

[root] I ate | fish. → ate → I (left arc)

⇓

[root] ate | fish → once again, we don't establish dependency bet'n root & ate. why?

shift again

[root] ate fish | [empty buffer] → ate → fish (right arc reduce)

⇓

[root] ate | [empty buffer] → root → ate (right arc)

How to choose operation when Stack has more than one element?