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# Computational Syntax: Introduction

## Exercises. Parsing.

**1.** Think of 5 examples of ambiguity cases in the different steps of analysis: tokenization, morphology, Syntax (PoS, coreference, PP attachment...). Check also supposedly unsolvable examples.

If possible, try to find examples different from the ones in the handouts.

**1.1** Parse the sentences using **Freeling** and **CoreNLP**.

**1.2.** Explain how the ambiguity has been resolved for each case in both parsers. Add screenshots and explain.

**2.** In Universal Dependencies, the heads of the dependency relation are typically lexical words (content words).

**2.1** Compare the dependency trees produced by **Freeling** and **CoreNLP** parses in the way they deal with: prepositional phrases, determiners and auxiliary verbs. Add screenshots and explain briefly.

**2.2.** Which of the two parsers best meets the universal dependencies?

Upload your answers to the Moodle platform (eGela)

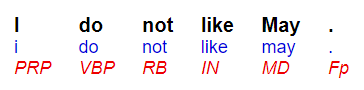
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| **PARSERS**  **- Freeling**: <https://nlp.lsi.upc.edu/freeling/demo/demo.php>  **- Stanford CoreNLP**: <https://corenlp.run/> |

**1.1. Lexical**

Lexical ambiguity can happen when a word has more than one PoS or meaning. For example, in the next example May can be a modal verb, or a noun that refers to a person or a noun that refers to a month. Surprisingly, the Freeling parser makes a mistake and classifies it as a modal verb, which makes no sense. The CoreNLP parser classifies correctly as noun and detects the date entity.

*I do not like May.*

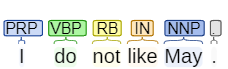
**Freeling**

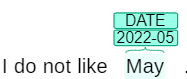


Interfaz de usuario gráfica, Aplicación

Descripción generada automáticamente

**CoreNLP**





**1.2. Morphological**

Morphological ambiguity happens when a word can have multiple morphological analyses. For example, leaves can be a plural noun of leaf or a verb in present, third person and singular. In this example, it is a verb and both parsers tag it correctly. In the Freeling parser we can see the other possible analyses.

*What should you do when she leaves you?*

**Freeling**

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**CoreNLP**

Imagen que contiene Texto

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**1.3 PoS**

Occurs when at least two words can belong to two or more parts of speech. This is quite rare despite the large numbers of words that can be both nouns and verbs in English. In the following example, the most common analysis is that can is a modal verb and fish a verb. However, can could also mean to put into a can and then fish would be a noun. Both parsers tag the most common use, which is the best answer.

*They can fish.*

**Freeling**

Imagen que contiene Texto

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**CoreNLP**

Texto

Descripción generada automáticamente

**1.4 PP**

Prepositional phrase attachment ambiguity happens because PPs can modify VPs as well as NPs. For example, in the Freeling parser with modifies saw, and in CoreNLP it modifies a man.

*She saw a man with a telescope.*

**Freeling**

Diagrama, Diagrama de Venn

Descripción generada automáticamente

**CoreNLP**

Diagrama

Descripción generada automáticamente

**1.5 Coreference**

Coreference ambiguity happens when a pronoun can refer to more than one entity. For example, he can refer to John or Tom in the next sentence, and both are correct. Both parsers interpret that he refers to John, which is the one that makes more sense in my opinion.

*John told Tom he had to go.*

**Freeling**

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**CoreNLP**

Texto

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**2. Dependency trees**

I have chosen the following sentence because it has the three elements that are mentioned, prepositional phrases, determiners and auxiliary verbs. As those are function words, it is expected that they are not the head of dependency relations in Universal Dependencies. In Universal Dependencies, the heads of the dependency relation are typically content words.

In Freeling the preposition with is tagged as the head of the prepositional phrase, whereas in CoreNLP the head is telescope. Similarly, the auxiliar verb have is the root in Freeling, instead of the verb seen. Finally, determiners are tagged more equally, nouns are the head in both cases. The only thing that changes is the tag of the dependency, Freeling uses nmod instead of det. Therefore, CoreNLP meets the universal dependencies better.

*I have seen a man with a telescope.*

**Freeling**

Diagrama, Diagrama de Venn

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**CoreNLP**

Diagrama

Descripción generada automáticamente