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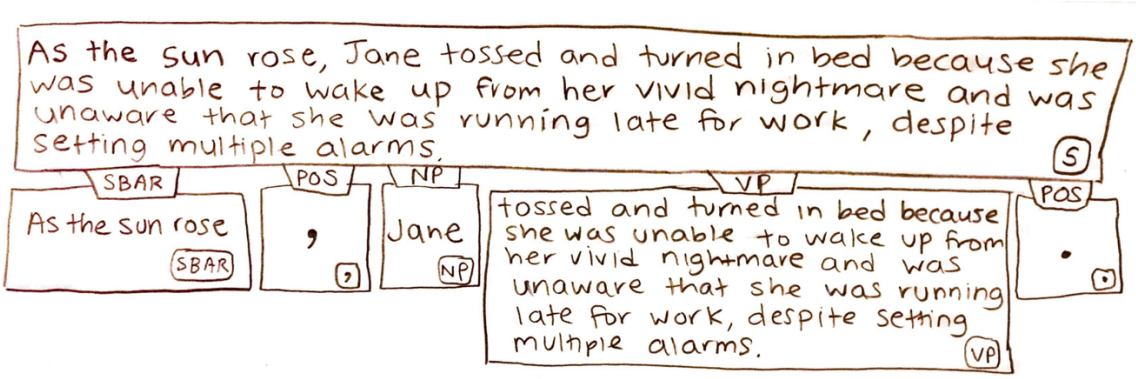
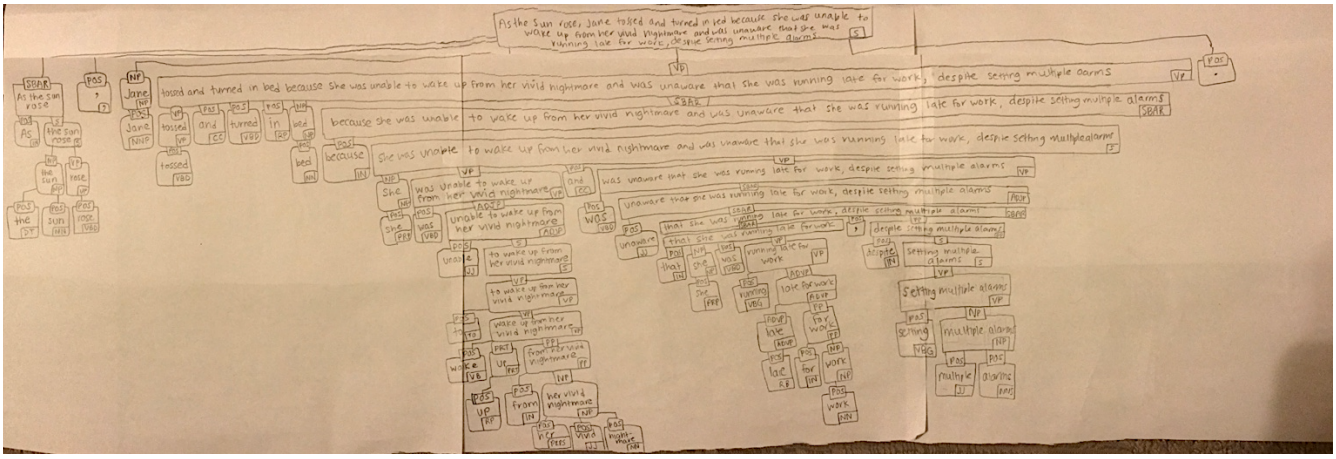
CS 6301.M02

Sentence Parsing

1. My Sentence: As the sun rose, Jane tossed and turned in bed because she was unable to wake up from her vivid nightmare and was unaware that she was running late for work, despite setting multiple alarms.
2. PSG Tree with POS labels (using AllenNLP):
   Top Level Phrase Structure:



   Expanded all nodes (panoramic photo):



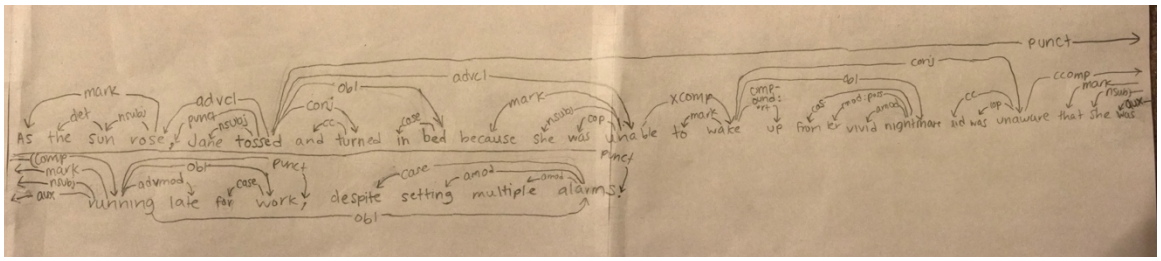
   Define:

   1. SBAR: Clause introduced by a (possibly empty) subordinating conjunction
   2. POS: Possessive ending, which means it is a suffix added to a noun to show possession or ownership of something.

3. IN: Preposition or subordinating conjunction. Preposition indicates time, direction, position, or location. A subordinating conjunction is a word that connects two clauses in a sentence, which makes one of the clauses dependents on each other.
4. S: simple declarative clause, i.e. one that is not introduced by a (possible empty) subordinating conjunction or a wh-word and that does not exhibit subject-verb inversion.
5. NP: Noun Phrase, which includes a noun, which is the main word, and other words that modify or describe the noun.
6. VP: Verb Phrase, which is the portion of a sentence that contains both the verb and either a direct or indirect object (the verb's dependents).
7. DT: Determiner, which is a word that modifies, describes, or introduces a noun.
8. NN: Noun, singular or mass, which is are either nouns that, by their very nature, are plural, or are singular.
9. VBD: Verb, past tense - which is a tense expressing an action that has happened or a state that previously existed.
10. NNP: Proper noun, singular - which is a noun that identifies a single and specific person, place, thing, or idea.
11. CC: Coordinating conjunction - which is a conjunction placed between words, phrases, clauses, or sentences of equal rank, such as and, but, or.
12. RP: Particle, which is a word that has a grammatical function but does not fit into the main parts of speech (i.e. noun, verb, adverb). As in, it is a function word that must be associated with another word or phrase to have meaning.
13. PRP: Personal pronoun, which is a short word we use as a simple substitute for the proper name of a person.
14. JJ: Adjective, which is a word or phrase naming an attribute, added to or grammatically related to a noun to modify or describe it.
15. TO: to, which is a preposition which indicate a destination or direction.

16. VB: Verb, base form - the verb as is—with no changes or conjugations.
17. PRT: Particle (Category for words that should be tagged RP). This is a word that has a grammatical function but does not fit into the main parts of speech (i.e. noun, verb, adverb).
18. PRP$: Possessive pronoun (prolog version PRP-S) - a pronoun used to indicate indicate ownership.
19. ADJP: Adjective Phrase, which is a phrase that functions just like an adjective in a sentence. It is a group of words that are put together in order to qualify the noun or pronoun that acts as the subject or object of a sentence.
20. VBG: Verb, gerund or present participle - A gerund is a verb that ends in -ing and functions as a noun or object. And a present participle verb is a word derived from a verb to form continuous verb tenses or be used as adjectives and more.
21. ADVP: Adverb Phrase, which is a group of two or more words that function as an adverb in a sentence
22. NNS: Plural noun, which is a noun that refers to more than one person, place, thing, or idea.

3. <u>Dependency parse of the sentence with Dependency Relation Labels (using CoreNLP) (Panoramic photo)</u>



Define:

1. Mark: marker is the word introducing a finite clause subordinate to another clause.
2. Det: determiner, is the relation between the head of an NP and its determiner.

3. Nsubj: nominal subject, is a a noun phrase which is the syntactic subject of a clause.
4. Advcl: adverbial clause modifier; an adverbial clause modifier of a VP or S is a clause modifying the verb (temporal clause, consequence, conditional clause, purpose clause, etc.).
5. Punct: Punctuation; this is used for any piece of punctuation in a clause, if punctuation is being retained in the typed dependencies. By default, punctuation is not retained in the output.
6. Cc: coordination, is the relation between an element of a conjunct and the coordinating conjunction word of the conjunct.
7. Conj: conjunct, is the relation between two elements connected by a coordinating conjunction, such as “and”,“or”, etc.
8. Obl: oblique nominal, the obl relation is used for a nominal (noun, pronoun, noun phrase) functioning as a non-core (oblique) argument or adjunct. This means that it functionally corresponds to an adverbial attaching to a verb, adjective or other adverb. It’s used to add case marker information to oblique modifier relations.
9. Case: shows a noun's or a pronoun's relationship with the other words in a sentence.
10. Cop: copula, a is the relation between the complement of a copular verb and the copular verb.
11. XComp: open clausal complement, An open clausal complement (xcomp) of a verb or an adjective is a predicative or clausal complement without its own subject.
12. Compound:prt: phrasal particles, are used in connection with phrasal verbs, where the particle is considered an integral part of the verb expression.
13. Nmod:poss: possessive nominal modifier, is used for a nominal modifier which occurs before its head in the specifier position used for *'s* possessives.
14. Amod: adjectival modifier; an adjectival modifier of an NP is any adjectival phrase that serves to modify the meaning of the NP.

15. Aux: auxiliary; an auxiliary of a clause is a non-main verb of the clause, e.g., a modal auxiliary, or a form of “be”, “do” or “have” in a periphrastic tense.
16. Ccomp: clausal complement; a clausal complement of a verb or adjective is a dependent clause with an internal subject which functions like an object of the verb, or adjective.
17. Advmod: adverb modifier; an adverb modifier of a word is a (non-clausal) adverb or adverb-headed phrase that serves to modify the meaning of the word.

4. <u>SRL parse - list the predicate, all arguments (numbered) and modifiers (TMP, LOC, etc.) for each verb in the sentence</u>

List of predicates in the sentence:

1. rose
2. tossed
3. turned
4. was
5. wake
6. was
7. was
8. running
9. setting

Definitions:

- ARG0: The agent or doer of the action. The agent of the sentence, the one doing the action.
- ARG1: The thing or entity affected by the action. The passive actor.
- ARG2: The instrument or means used to accomplish the action. The instrument, which can be a PP as well as a NP.
- ARGM-TMP: When the action happened.

- ARGM-LOC: Where the action happened.
- ARGM-CAU: Reason for the action
- ARGM-ADV: An adverbial argument, that provides additional information about how, when, where, or to what extent the action or event expressed by the verb takes place.

The Relation to each verb:

1. Rose
    a. ARG1: The Sun
        i. This is because the sun is what is affected by the verb, being that the sun rose.
    b. Verb: rose
2. Tossed
    a. ARGM-TMP: As the sun rose
    b. ARG0: Jane
        i. This is because Jane is the one who was doing the action of tossing in bed.
    c. Verb: Tossed
    d. ARGM-LOC: in bed
    e. ARGM-CAU: because she was unable to wake up from her vivid nightmare and was unaware that she was running late for work, despite setting multiple alarms.
3. Turned
    a. ARGM-TMP: As the sun rose
    b. ARG0: Jane
        i. This is because Jane is the one who was doing the action of turning in bed.
    c. Verb: Turned
    d. ARGM-LOC: in bed
    e. ARGM-CAU: because she was unable to wake up from her vivid nightmare and was unaware that she was running late for work, despite setting multiple alarms.
4. Wake

a. ARG1: she
    i. She, as in Jane, is affected by not *waking* up, so that is why it's ARG1.
b. Verb: Wake
c. ARG2: from her vivid nightmare
    i. This is ARG2 for wake, because this fragment is the instrument of the sentence, since Jane was not able to wake from what? It's her vivid nightmare.

5. Was
    a. Verb: was
    b. ARG1: she
        i. She (Jane) is <u>was</u> not able to do the action of waking up. She was affected by the situation, not the do-er. In this case, for this verb, she is affected by the verb, and not the subject.
    c. ARG2: unable to wake up from her vivid nightmare
        i. For this verb, Jane was not able to do what? As an instrument, "unable to wake up from her vivid nightmare," is something she <u>was</u> not able to do.
    d. ARG2: unaware that she was running late for work , despite setting multiple alarms
        i. For this verb, Jane was also not able to do? As an instrument, "unaware that she was running late for work , despite setting multiple alarms," is something she <u>was</u> not aware of. It serves an instrument, to help explain what *was* not happening, with Jane.

6. Running
    a. ARG0: she
        i. She, Jane, the subject, is the one who was running late.
    b. Verb: Running
    c. ARGM-TMP: late for work

    d. ARGM-ADV: despite setting multiple alarms
7. Setting
    a. ARG0: she
        i. She, Jane, set her alarms. She was the one who is associate with this verb.
    b. Verb: Setting
    c. ARG1: multiple alarms
        i. The alarms are being affected by this verb, the action of setting the alarms.

List of Arguments used:

1. ARG1
    a. Examples from my sentence: the sun, Jane, she, multiple alarms
2. ARG0
    a. Examples from my sentence: Jane, she
3. ARG2
    a. Examples from my sentence: unable to wake up from her vivid nightmare, from her vivid nightmare, unaware that she was running late for work, despite setting multiple alarms.

List of Modifiers used:

1. ARGM-TMP
    a. Examples from my sentence: as the sun rose, late for work
2. ARGM-LOC
    a. Examples from my sentence: in bed
3. ARGM-CAU
    a. Examples from my sentence: because she was unable to wake up from her vivid nightmare and was unaware that she was running late for work, despite setting multiple alarms.
4. ARGM-ADV

a. Examples from my sentence: despite setting multiple alarms

Pros/Cons of Each Parse Type

I believe for the PSG parse type, one of the biggest pros is to see the hierarchal breakdown of the sentence, and to see how each part of speech is affected by each fragment of the sentence. This method makes the part of speech breakdown more digestible, since you can see the relationships between the words or phrases. One of the cons using this is that maybe it might be able to detect new slang, sarcasm/idioms, new words that are added to the English language. A pro of the dependency parse is that you can see a clear visualization of the structure of the sentence, and it gives you an understand the primal dependencies of how each word was derived. For example, I mentioned, "…despite setting multiple alarms," and this tool was able to accurately show that it is the alarms that are being set (the verb). Thus, it's a pretty accurate tool, with my sentence, that helps you understand where each word is referring to. However, sentences can get even more complex than the one I wrote, so one of the cons could be that it might not be able to show every complex dependency in the sentence. And it seems that your sentence has to be pretty grammatically accurate and structured clearly, in order for the parser to completely understand the dependencies. Thus, if a sentence does not have the order or punctuation properly placed, then it could affect the parser's results. Some pros of the SRL, is that you are able to get a breakdown of how the words, and the words around the verb, are impacted by the verb itself. So it is interesting to see how the tool is able to detect that for the verb 'setting,' she is the subject, and alarms are what is affected by verb. One of the cons is that it might be also sensitive to the way a sentence is arranged; or if a sentence is grammatically incorrect, it will have a hard time in determining the arguments for each verb. And new verbs are being added to the English language, so there is also a chance that the tool might be able to pick it up. In my preference, I prefer the dependency parser, since the context of each word is a lot easier to understand because the results of this parser is a lot more detailed with

how the structure of the sentence affects the words that are related to each other.