# Design (Q2)

## Design-Grammar

First approach was to map out the non-terminal rules with extreme specificity (i.e. S -> NP VPpast, VPpast -> Vpast inf\_clause, inf\_clause -> toinf VPpresent, etc). This was done to get an understanding of the features that would be needed. Then I grouped them together to simplify the grammar (i.e. S -> NP VP, VP -> V inf\_clause). After that it was a matter of looking over the starter code and figuring out how to implement it with the rules and which new subtypes/features needed to be added. I implemented a “pass” and “receive” feature was implemented on verbs and infinitive phrases to keep track of what the new agent would be should the sentence contain more than 1 verb and more than 1 noun phrase.

## Design-Lexica

For nouns the lexicon contains both singular and plural forms. While for verbs only base form and past-final forms were accounted for. Verbs were given features to keep track of their thematic roles (i.e., who their agent, theme, experiencer, and beneficiary are (where applicable)).

# Limitations

The current grammar cannot handle present tense (“students sleep”) and as such it can also not handle all subject-verb agreements (i.e. “the student sleeps”). It also cannot accept a sentence that ends on “persuade” due to the fact that sentences cannot end on promise. (i.e. “Students promised to persuade the teacher” is usually grammatical, but “Students promised to promise the teacher” is not). It also fails to parse sentences where a role may be missing. An example is “the teacher promised to sleep”. This is grammatical, but because it does not have an implicit beneficiary it cannot be parsed. It also does not account for when a sentence ends in a noun phrase. (i.e. “The student expected the teacher”).

# Testing Strategy

Basic testing focused on ensuring that noun phrases were properly handled (i.e. singular nouns could not appear without a determiner). More complex testing involved ensuring that nothing could attach to sleep (\*”the teacher expected the student to sleep to sleep”) and all other verbs had the proper number of roles (“the student promised the teacher to sleep”, \*”the student expected”). Further complex testing was done to ensure that it could handle stringing along infinite clauses. (i.e. “the, teacher, expected, to, expect, to, promise, the, students, to, sleep”.) Testing was also done to make sure that only base verbs could be attached to the infinitive to.