

Design of Grammar and Lexicons

Part1:

For Grammar 1, I followed the grammar and the lexicons as they exactly are in the handout, with different types of NPs. The single/plural feature for the verbs and nouns are strictly defined into different types of NP in grammar 1 while Grammar 2 takes single/plural as Amount feature and passes the value of the feature into the rules and defines the lexicons with appropriate values(single/plural).

And these two grammars have a lot of limitations since tenses are not considered except for the simple present tense, pronouns are not considered and not defined into single/plural, and gapping is not considered either so passive voice and questioning sentences cannot be taken care of either.

Part2:

For this part, I started with writing simplest grammar rules to fit the four sentences given in the handout. After the rules are able to parse the sentences with “sleep” in the present tense and other lexicons in the past tense, I moved on to assigning verb tense as a feature and put it into `v_sem`, so that all the VPs and verbs will have the appropriate tense in one sentence. Since five different verbs have different thematic roles, I also have to assign each necessary thematic role to each verb as features declared in the handout, with subcategorization. For example, in my grammar, the lexicon “promise” has three thematic roles: agent, theme, beneficiary. For each of the thematic roles, I will assign a unique value/type to it: agent:A, theme:B, beneficiary:C, where my subcategorization will look like [A,B,C] meaning that the first element in the list is agent, second element is theme, third element is beneficiary. In this case, when parsing the sentences using grammar rules, the value/type passed into the subcategorization list will be according to the variables in the lexicons, therefore, the thematic role will be assigned to the lexicons.

The limitations of this grammar would be lack of tenses and also pronouns. Also, the drawback would be, for example, sentences like “the teacher tried the student to sleep” would be parsed as well, where it will “the student to sleep” as the theme. However, it is not allowed given this assignment and also under this context. But in real life, phrases such as “tried the approach to solve problems” exists.

Testing Strategy

Part1

I tried to cover all situations for grammar 1 and 2, including the following:

1. singular nouns cannot be without a determiner except for proper nouns.
2. proper nouns cannot be followed by PP.
3. singular nouns have to be followed by verbs in singular form. Plural nouns have to be followed by verbs in plural form.
4. recursive PP.

Part2

The core part of this grammar is to ensure that each verb has its correct thematic roles parsed. In this case, I put all possible combinations of four verbs into the test cases.

To build up positive cases, I started the cases given in the handout and expanded the test cases by replacing “to sleep” with other possible NP VP combinations with required thematic roles. Upon doing these, I also make the sentences recursive on the VPs to test the grammar exhaustively. I also used noun + ‘slept’ to make sure it has only one thematic role, experiencer. I also went through the parse trees of these sentences to make sure the thematic roles are properly passed in.

To build up negative cases, I started with the positive cases I built up previously, and modified them by adding extra/not allowed thematic roles to the sentences, removing required thematic roles from the sentences, changing the forms of the verb(both in VP and in infinitive clause) and removing determiners.