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Design report

1a)

I copied the lexica & grammar rules from the question.

1b)

First I copied all the lexica & grammar rules from the question. Then, for nouns, I also introduced a feature “number” indicating if it’s singular (sg) or plural (pl), and another feature “type” indicating if the noun is a pronoun (prp) or not a pronoun (not_prp).

2a)

The student tended to sleep

Tended:

agent = the subject (the student) [since the student is the one who tend to do something]

theme = everything else after tended (to sleep) [since everything else after the main verb is the things the agent is tended to do]

Sleep:

experiencer = the subject (the student) [since the student is the one tended to sleep]

The student appeared to sleep

appeared:

theme = the subject (the student) [since the student is the one who appeared to do something]

Sleep:

experiencer = the subject (the student) [since the student is the one appeared to sleep]

The student promised the teacher to sleep

promised:

agent = the subject (the student) [since the student is the one who promised to do something]

theme = everything else after promised (the teacher to sleep) [since everything else after the main verb is the things that were involved in the promise]

Beneficiary = the first NP to the right of promised (the teacher) [since the teacher is the one who received the promise]

Sleep:

experiencer = the subject (the student) [since the student is the one promised to sleep]

The student requested the teacher to sleep

promised:

agent = the subject (the student) [since the student is the one who requested to do something]

theme = everything else after requested (the teacher to sleep) [since everything else after the main verb is the things that were involved in the request]

Beneficiary = the subject (the student) [since the teacher is the one who received the promise]

Sleep:

experiencer = the first NP to the right of requested (the teacher) [since the teacher is the one requested to sleep]

2b)

Lexica

I added all the words that appeared in the given 4 sentences (tended, appeared, promised, requested, the, teacher, student, to, sleep).

Additionally, I also added the present tense of tended, appeared, promised, requested (tend, appear, promise, request) & the past tense of sleep (slept).

For each of the verbs, I set the roles that they don't have to none in the lexica. (for example, promised have no experiencer, so for promised i set experiencer = none)

Approach to fulfill requirement

New Types & Features:

First, I had a new type “role”. The subtypes of role are the 4 roles agent, theme, beneficiary, experiencer.

Second, I added another new type “main”. There’s 2 subtypes of main: request, not_request. Request denotes that the main verb of the clause is request, and not_request denotes otherwise. In the case the main verb is sleep, the “main” denotes the closest verb to the left of “sleep”. The purpose of this is to find the correct experiencer for sleep since the only time sleep doesn’t have experiencer = subject is when the main verb of the clause is request. For example in “The student tended to appear to sleep”. The “main” of both “to appear to sleep” and “to sleep” are “not_request”, but in “The student tended to appear to request the teacher to sleep”, the “main” of “to appear to request the teacher to sleep” is “not_request” (since the main verb is appear), and the “main” of “to request the teacher to sleep” & “to sleep” is “request”.

Finally, I added a new type “part”. The part has 4 features: subj, obj1, obj2, main. (The “main” here is the same “main” mentioned above, but I just find it easier to group all the new types I am introducing under one so “main” will be a feature of “part”).

The subj feature denotes the subject of the entire sentence, which is the first NP before the first verb (Ex: for “the student tended to sleep”, subj = “the student”).

The obj1 denotes the first left NP that’s not the subject (if exists) of the main verb of the clause, and the obj2 denotes the first right NP of the main verb of the clause (if exists). Ex: for “the student tended to promise the teacher to request the student to sleep”, the obj2 of “to promise the teacher to request the student to sleep” is “the teacher” (since “the teacher” is first NP after promise), the obj1 is unset since there’s no NP besides the subject to the left. Similarly, the obj1 of “to request the student to sleep” is “the teacher” (first NP left of request), and obj2 of “to request the student to sleep” is “the student” (first NP right of request). The obj2 is useful to get the beneficiary of to promise & to request (in “to request the student to sleep”, obj2 = “the student”, which is the beneficiary of request), and obj1 is used to get the experiencer of sleep in the case that the main verb of the clause is request (same example, “the student” is the experiencer of sleep in “to request the student to sleep”).

Under vsem, I added 5 subtypes, corresponding to the 5 verbs in present tense (tend, sleep, request, promise, appear) and 4 features: agent, experiencer, beneficiary, and theme.

For cat, I also added a subtype none to denote "doesn't exist".

For V, I added a new feature vtense to store the tense.

Grammar

S:

S: NP + VP

The general format of a sentence. The subj feature is set to be the NP. S takes the same part & vsem as VP.

S: NP + V

The only case of NP + V is when the V is slept. All other verbs need more than one word outside of the NP to fill in the roles.

The tense & vsem of S is the same as V.

NP: det + N

The only nouns in the lexica are "teacher" and "student", so we need to use "the" with both of them. That's why I only had the det + N rule.

VP:

VP: V(past) + inf_clause

The possible V's are tended, appeared, promised, requested. (slept is already covered in S => NP + V). The vsem for the V is the same vsem as the VP.

For tended, promised, requested the inf_clause is also the theme. (For appeared, since the theme is the subject (by 2a)) so we don't assign theme here). Since VP got its "subj" feature from S, and by 2a), the subject is the agent for tend, promise, request & theme for appear, here I assign agent to be subj for tended, promised, requested & theme to be subj for appeared..

VP's tense and vsem is the same as V's vtense and vsem. For tend, appear, promise, set main = not_request, for request set main = "request"

Inf_Clause:

Inf_clause: to + sleep

This is the base case of inf_clause, since all inf_clause have to end in “to sleep” as mentioned on discussion board, all other 4 verbs cannot be the last verb in sentence. Set experiencer to be subj when main = not_request, and set experiencer to be obj1 (this should be passed from inf_clause) when main = request. Since there’s 2 cases of main, in my code I had 2 grammar rules for this.

Below are the recursive cases:

Inf_clause(A): to + tend/appear (intransitive verb) + inf_clause(B)

The vsem of the A is the same as the vsem of the intransitive verb, since that is the main verb here. For tend, set the theme to be B, since by 2a) everything after tend is the theme. For appear, don’t set the theme here.

Inf_clause(A): to + promise/request (transitive verb) + inf_clause(B)

The vsem of the A is the same as the vsem of the intransitive verb, since that is the main verb here. For either case of verb, set the theme to be B (since by 2a) everything after the verb is the theme) & set obj2 (got it from B) to be the beneficiary (as explained in the purpose of obj2, it’s the closest NP right of the main verb, which is the beneficiary of a transitive verb by 2a)) & set subj (got it from S) to be the agent (by 2a) the subject is the agent).

Inf_clause(A): NP + inf_clause(B)

This is where the obj1, obj2 features are set. Set A’s obj2 to be NP (since it’s the first right NP of A), and set B’s obj1 to be NP (since it’s the first left NP of B). The vsem of A, B are the same.

Testing report

Question 1:

Since for both part a) & b), the lexicas were the same, I used the same strategy. I started with the base case NP + V + NP for both singular & plural. Then the next case is NP + V + NP + P + NP. I made sure that the NP number is agreeing with the V number (both singular or both plural). Also I made sure that fred is the only N that doesn't need "the" to be NP.

Question 2:

First I tested NP + slept, since it is trivial.

Next, I tested the recursive case for each of the 4 remaining verbs.

I started with tend, since it is the most straightforward (subject is agent, everything after the first verb is theme). The most basic sentence is the one on the handout NP + tended + to sleep

While I am on tended, I test the recursive case of NP + tended + to tend + to tend ... + to sleep. This lets me check not only the tended recursive case but also "to tend".

Next, since "to tend" is really similar to "to appear" as they both don't need an obj1/obj2, I went on testing "to appear" next: NP + tended + to tend/ to appear + to tend/ to appear + ... + to sleep

After "to appear", I tested the main verb of the sentence "appeared". I tested the basic case of NP + appeared + to sleep, and then NP + appeared + to appear / to tend + to appear/to tend ... + to sleep.

Now that I finished all the main verbs without obj1/obj2, I moved on to "to promise". Again, I started with the basic form NP + appeared/tended + to promise + NP + to sleep. Then, I moved on to: NP + appeared/tended + (to promise + NP)/to tend/to appear + (to promise + NP)/to tend/to appear + ... + to sleep.

After that, I moved on to the main verb promised, and tested the basic NP + promised + NP + to sleep, and then NP + promised + NP + (to promise + NP)/to tend/to appear + ... + (to promise + NP)/to tend/to appear + ... + to sleep.

Then, I tested “to request” because it is really similar to “to promise” since the only difference in role is the experiencer. I tested NP + tended/appeared/(promised + NP) + to request + NP + to sleep. Then, I tested more cases of NP + tended/appeared/(promised + NP) + (to request + NP)/(to promise + NP)/to tend/to appear + (to request + NP)/(to promise + NP)/to tend/to appear + ... + to sleep.

Lastly, I have “requested” left. I started with the basic NP + requested + NP + to sleep, and then did NP + tended/appeared/(promised + NP)/(requested + NP) + (to request + NP)/(to promise + NP)/to tend/to appear + (to request + NP)/(to promise + NP)/to tend/to appear + ... + to sleep.

CSC 485, Summer 2020: Assignment 2

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I declare that this assignment, both my paper and electronic submissions, is my own work, and is in accordance with the University of Toronto Code of Behaviour on Academic Matters and the Code of Student Conduct.

Signature: Heng Liu