Challenge 4: Grammars

1

Extend the simple English grammar G_3 given in class to account also for adjectives and prepositional phrase. Your grammar must recognize (and assign plausible structures to) sentences such as:

The Englishman lives in the red house.

The Spaniard owns the dog.

Coffee is drunk in the green house.

The Ukrainian drinks tea.

The man in the yellow house smokes Chesterfields.

The Japanese smoke Parliaments.

2

Extend the grammar of the previous section to account also for simple questions. Your grammar must recognize (and assign plausible structures to) interrogative sentences such as:

Who owns the zebra?

Who drinks water?

What does The Norwegian smoke?

What does the French own?

Where is juice drunk?

Note that questions can refer to the subject or the object of the sentences.

3

Design a unification grammar for the language $\{a^{n^2} \mid n > 0\}$.

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Submission

Implement the first two grammars with PATR. You may not be able to implement the third one due to problems with processing of unit rules by PATR. Submit:

- The full code of each of the grammars, including the lexicons;

- Printouts of the trees assigned by the first two grammars to the example sentences above;

- A list of sentences you used to check the first two grammars, for which the grammars produce plausible trees (no need to submit printouts);

- Any additional documentation recording the considerations you applied when designing the grammars (optional for the first two, mandatory for the third).