**ANSWERS ASSIGNMENT 2**

**PART 1**

1. *Why does the program generate so many long sentences ? Specifically, what grammar rule is responsible and why ? What is special about this rule ? discuss.*

The program generates so many long sentences because it’s recursive and infinite. We can’t limit it.

The rule responsible is NP NP PP. Indeed, NP is derivated to NP and PP that is also derivated to NP with probability 1/2.

1. *The grammar allows multiple adjectives, as in the fine perplexed pickle. Why do the generated sentences do this so rarely ? discuss.*



The grammar allows multiple adjectives due to the rule Noun Adj Noun.

But, Noun can be derivated to a noun or to Adj Noun again.

We have in our dictionnary 5 words. So the probability that noun is derivated again to Adj Noun is 1/6. And the probability that it gets a word is 5/6.

In other words, 5/6 of the Noun will be terminate state with only one adjective.

That is the reason why the generated sentences do this rarely.

1. *Which numbers must you modify to fix the problems in (a) and (b), making the sentences shorter and the adjectives more frequent ? Verify your answer by generating from the grammar. Discuss your solution (which rules and why).*

To fix the problem in (a), we increased the weight of NP Det Noun, so there is more chance that NP is derivated to Det Noun that to NP PP. We chose weight = 4, so we’ll have 4/5 chance that NP is derivated to Det Noun. With this, we’ll have less probability getting into a loop.

To fix the problem in (b), we increased the weight of Noun Adj Noun to 5. Indeed, like we saw on question (b), 5/6 of the choices are terminate states. So changing the weight to 5 will give us an equal probability to get another adjective. (1/2)

1. *What other numeric adjustments can you make to the grammar in order to favor more natural sets of sentences ? Experiment.*

If we want more natural set of sentences, we need to increase the weight of common words and let the weight for the less common words (rare words) according to our data. We know our dictionary and we know, as humans, what correct sentences we can get « The president kissed the chief of staff » or « the chief of state ate a pickled sandwich » etc. To do so we also have to weight our words similarly with the words we want them to be with.

**PART 2**

*Note that handling (b) and (h)/(i) can interact in a bad way, to create an ungrammatical sentence. You do not need to solve this case in this part, but you do need to discuss it and explain what the problem is with an example and a short explanation of what's happening there.*

- First of all, we made a difference between transitive and intransitive verbs. Indeed, traditional grammar distinguishes between transitive verbs like kissed, which take a direct object NP (‘Sally ate a sandwich’), and intransitive verbs like thought and worked.

We had to do that to avoid things like : a sandwich sighed a pickle .

- We added the « and » and « or » conjunctions to be used with nouns and verbs (transitive and intransitive).

- Some verbs like understood and thought can be used with the complementizer ‘that’. So, we created a new group ‘Vthat’ for those verbs. We also need to respond to the sentence ‘it perplexed the president that…’ : VP Vt NP SBAR.

- We also focused on prepositional phrases to build phrases like ‘on the desk’, ‘over the rainbow’… with NP and VP.

- We also considered the verb ‘is’ separately : ‘Be’. We did it so it can be used with adj and with Ving (ver bing gerontive) or with NP.

‘Sally is lazy’

‘Sally is eating a sandwich’

‘Sally is a sandwich’.

**PART 4**

B) Yes/No questions

« Does Sally eat a sandwich ? »

« Will Sally eat the sandwich ? »

« Can Sally understand ? »

« Is it pickled ? »

Those questions are the kind of sentences that we want to build.

We know that a yes/no question is built this way : Auxiliar (can, does, will..) + NP + Verb in present + NP

Or Is + NP + Adj

We also need to fix the transitive and intransitive verbs problem. To do so we do the same but only transitive verbs are followed by NP.

After an auxiliar, the verbs must be in present (we don’t say « Did Sally understood »).