NLP - Assignment 2 -- Grammar Writing

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Part 1:

a)
There are rules that cause recursive generation, such as:
NP NP PP
PP Prep NP
Those rules, always have heir own LHS symbols on their RHS. We should have an preterminals/terminals transfers to those symbols for not getting in the recursy. The more like that we'll have, the less chance we'll stack in that recurse, the less sentences will be long.

b)
The rule that allows that kind of sentences is 'Noun Adj Noun' and this can happen recursivley (in other words allow multiple adjectives).
But that LHS (Noun) has more 5 terminal state rules with weight 1 each, thus the prob to pick that is rule is just 1/6. For raising the adjectives number we just need to increse that rule weight.

c)
Those are the rules for NP:
1 NP Det Noun
1 NP NP PP
The first rule results in 2 preterminals, which will be replaced with terminals, therefore incrementing its weight will result in shorter sentences.

To increment the usage of adjectives, we will increment the weight for the below rule:
1 Noun Adj Noun
Thus incrementing the chances of a Noun being prefixed with an adjective instead of being replaced with a terminate state.

d)
All not-terminals States except 'NP' and 'Noun' have exactly one state to be replaced with,
hence there is no meaning for their weight, because the propability to choose them is 100%.
Changing weights for the other rules from described in (c) just make the sentence sense more semantically.
For example: we decreased weights of some Verbs and Adj, since they can refer to less nouns (just a little semantic issue).

Part 2:

We precced each sentence, got insights of it and adjusted it to the others.

a) We made Noun a non-terminal state (NOUN), and introduced Nnp (proper noun, Sally) and Nn (singular noun, president). NP can now transition into Det Nn or Nnp ot NP PP

b) We introduced Cc an pre-terminal state (and,or) along with rules that utilize it on NP and VP and Verb

c) We replaced Verb with Vi and Vt

d) We introduced V5 a pre-terminal verb, VP can now be replaced by V5 SBAR
   We introduced SBAR as Comp S, where Comp is a preterminal (that)

e) We introduced V6, verbs that follow by NP SBAR
We introduced Prp (personal pronoun) and It can only be placed to the left of a VP

f) We added Rb (adverb, 'very') and a rule to replace somtimes an adjective with a 'adverb and adjective', the adjective can be replaced again many times (very very pickled)
g) We added 2 things to deal with similar sentences
  1- a trsition VP -> VP PP. any verb can happen 'on the floor'
  2- Vprep -> special verbs that must be followed by a PP. worked the desk is wron while worked on the desk is correct

h) We added the lazy adjective, and introduces Vbzl, a preterminal present 3rd person linking verb ('is' being the 3rd person present form of 'be'. be is a linking verb that needs to be followed an adjective for now).

i) We introduced Vbg, a pre-terminal present particle (thinking) and now Vbzl can also be followed by Vbg (eating) or Vbg NP (eating the sandwich).

j) Vbzl is now also followed by a PP or a NP

The problem of handling (b) and (h)/(i):
Issue 1 example: `Sally wanted and is eating a sandwich`
We solved that by not introducing the combination VP NP, but rather adding NP after only specific form verbs therefore we would generate.
Issue 2 example: `Sally wanted a sandwich and is eating a pickle` which is good.
issue 3 example: `Sally sighed and is eating a sandwich` is un natural because of the time mixtures (and is now eating... will be more natural) though gramaticly that is ok.

(a) "a" vs. "an" problem:
adding nouns:
   Nnv = Nn with prefix of vowels
   Nnv can be Adj Nnv
   case1: 'it is eating an very perplexed perplexed apple':
   Splited Det to: Deta={'a'}, Detan={'an'} and the rest in Det.
adding adjectives:
   the 'a'/'an' should be depended only by the right following adjective.
   Adjv = Adj with prefix of vowels
adding advers:
   Rb splited to Rb and Rbv.
   The 'a' , 'an' could be followd by it too.
   There were created NNAPRE (Nn that has 'a' prefix) and NNANPRE (Nn that has 'an' prefix)
   Det works with both of them without any limitations.
   About the Deta and Detan, we had to insure that the following symbol must has a matching symbol.
   Thus, we created those 2 nonterminals NNAPRE and NNANPRE that their prefix are the follow:
   NNAPRE stars with Nn or Adj
   NNANPRE stars with Nnv or Adjv
   Then we just did all the possible combinations of the adjectives, adverbs and nouns.
output:
'it is eating an extremely fine sandwich !'
'is it true that Sally wanted a very perplexed eagle ?'

(c) Relative clauses:
A noun phrase can be replaced by a noun phrase 'that' something.
Detailed expliantion:
NP can transition to NP REL.
REL is a non terminate state that is replaced by Comp RSV (Relative Statement verb) or Comp RSNV (Relative Statment noun verb).
RSV is a non terminate state that is replaced by a Verb phase, therefore refering to the inital noun as the subject.
RSNV is replaced by a noun phrase (the subject) and a verb that is either Transitive or Ditransitive, where the initial noun is the direct or indirect object respectivley.