Psych156A/ Ling150
Homework 6: Structure, Poverty of the Stimulus, & Learning Biases

1) Sigmund von Hacklestein was fascinated with the idea that there are ways to tell what kind of phrase a particular phrase is. Describe one way you could tell the phrase "the girl who danced with the goblin king in the crystal ballroom" is a noun phrase. [3 pts]

2) Transitional Probabilities for Structure
Sigmund was very impressed by Thompson & Newport (2007)'s study on learning phrases from transitional probability.   Still, Sigmund isn't sure if having all the properties in the training language - optional, repeated, and moving phrases all at once – would be helpful or not.
(a) Explain to Sigmund why having all these properties in the training data might make it harder to unconsciously identify the phrases of the language. [1 pt]
(b) Explain to Sigmund why having all these properties in the training data might make it easier to unconsciously identify the phrases of the language. [1 pt]
(c) Did Thompson & Newport (2007) find that it was easier or harder for subjects to identify the phrases when all these properties were present in the training language? [1 pt]


3) Poverty, What Poverty…
(a) Sigmund was a little fuzzy on exactly what it meant for the data of children to be impoverished.  Since children hear an awful lot of data as they're forming their mental grammars, how come it's still an impoverished data set?  Explain to Sigmund how children's data can be impoverished, making sure to identify what about a data set makes it impoverished.  Feel free to draw a picture to illustrate your point. [3 pts]
(b) Explain to Sigmund what prior (or innate) knowledge accomplishes in the poverty of the stimulus argument.  Be specific – make sure to describe what behavior children would need to display in order for innate knowledge to be supported. You may wish to refer to your answer in part (a) about what the poverty of the stimulus problem is. [3 pts]

4) Rules, Rules, Everywhere
Consider the following sentence:

 "The girl who will save her brother can outwit the goblin king."

a) How would a linear rule like "move the first auxiliary verb" form a yes/no question from that sentence? [1 pt]
b) How would a structure-dependent rule like "move the main clause auxiliary verb" form a yes/no question from that sentence? [1pt]
c) Which rule do young children seem to use (think about Crain & Nakayama's 1987 study)? [1 pt]
d) The data young children encounter most frequently are simple yes/no questions like "Can the girl outwit the goblin king?"  Is this question compatible with both the linear rule and the structure-dependent rule?  Be sure to explain why you think so. [2 pts]

e) If children only encounter simple yes/no questions like the one in (d), why would it be difficult to decide that the structure-dependent rule is the correct rule for English? [2 pts]

f) Why do the results from Crain & Nakayama (1987) support the idea of children having prior knowledge about yes/no question formation rules, assuming they only encounter simple yes/no questions like the one in (d)? [3 pts]
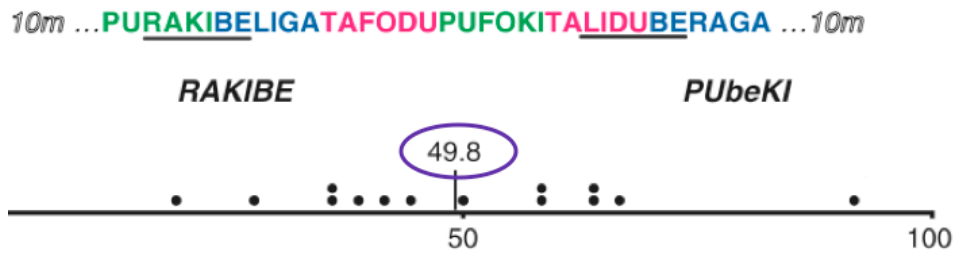
5) Generally Speaking

Suppose there are multiple generalizations children might make, given the data they've encountered: generalization A, generalization B, generalization C, and generalization D. The sets of data these generalizations are compatible with are schematized in the picture below, including sample data points x1 and x2.
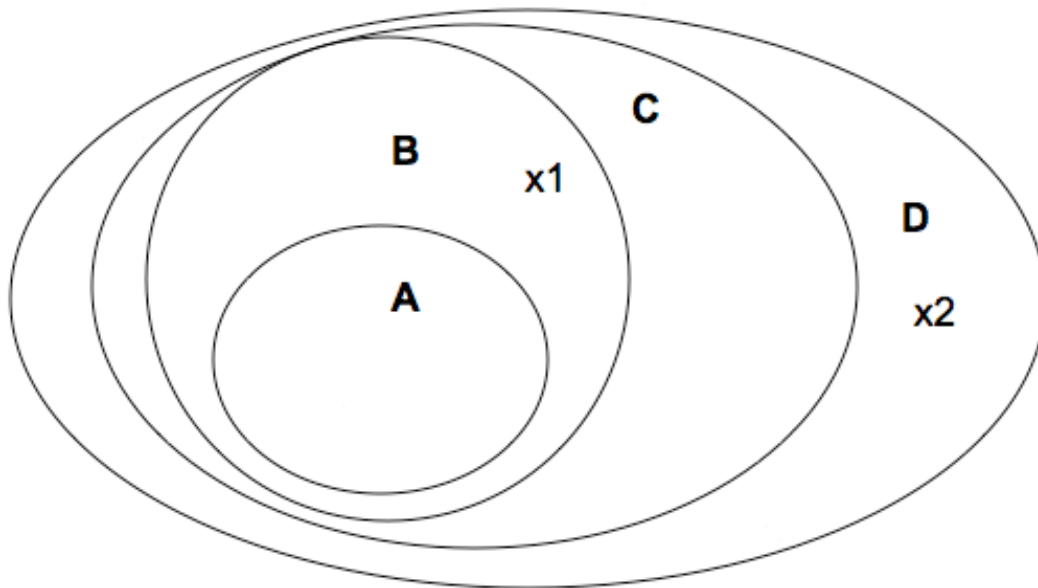


(a) Will a child who makes generalization C think that data point x1 is in the language? Why or why not? [2 pts]

(b) Will a child who makes generalization B think that data point x2 is in the language? Why or why not? [2 pts]

(c) Briefly describe what the Subset Problem is with respect to language learning. (You may wish to refer explicitly to the picture above to help your explanation.) Be sure to explain *why* it is a problem. [4 pts]

(d) Would choosing generalization A when generalization D is actually correct be an example of the subset problem? Why or why not? [2 pts]
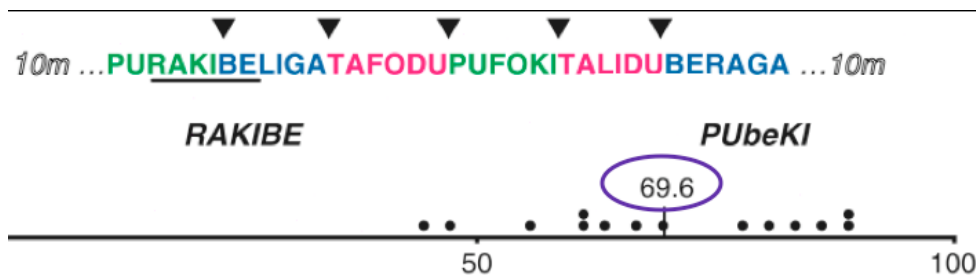
6) Computational Nature
(a) Consider the result from the second experiment in the Peña et al. (2002) study, schematized below.

10m …PURAKIBELIGATAFODUPUFOKITALIDUBERAGA …10m

RAKIBE                                    PUbeKI

49.8

50                                        100

Briefly describe what this result shows about adults' ability to notice the structural generalization about the words in the artificial language. Note: Do not describe all the details of the experiment – simply describe the implication of the results. [1 pt]

(b) Consider the result from the third experiment in that study, schematized below.

10m …PURAKIBELIGATAFODUPUFOKITALIDUBERAGA …10m

RAKIBE                                    PUbeKI

69.6

50                                        100

Briefly describe what this result shows about adults' ability to notice the structural generalization about the words in the artificial language. Note: Do not describe all the details of the experiment – simply describe the implication of the results. [1 pt]

(c) What was the change in experimental design between experiments 2 and 3? [1 pt]
(d) What was the motivation for making this change? That is, why did the experimenters think that this particular change would lead to different results? [4 pts]
(e) Newport & Aslin (2004) conducted a very similar study to the Peña et al. (2002) study, but used different novel data items. What was the key difference between the Peña et al. (2002) stimuli and the Newport & Aslin (2004) stimuli? [2 pts]
(f) Why might Newport & Aslin's stimuli have produced different results from the stimuli Peña et al. (2002) used? Note that Newport & Aslin (2004) actually did find similar results to Peña et al. (2002) – but it is a reasonable concern to have had before the experiment was conducted. (You may find it useful to think about the Saffran, Aslin, & Newport (1996) study, and what the Gambell & Yang (2006) study showed about the transitional probability strategy.) [2 pts]