Computational Psycholinguistics
Midsemester Examination, Form: A

Name: _____

Roll number: _____

Date: _____

Section 1. Short Answer Questions

1. (10 points) A monkey is trained to respond with both its hands to a certain visual stimulus, such as a flashing light. After the training is complete, the brain is surgically split. The stimulus is then shown only to the left visual field. What is the monkey's response to the stimulus? Explain your answer with reference to the concepts we learned in class.

2. (10 pts) Explain the Frequency Ordered Bin Search (FOBS) theory of morphological processing (5pts). Outline the predictions of this theory in terms of processing times for the following classes of words (5pts):

   (a) Words with real suffixes (like *speaker*) vs. words with pseudo-suffixes (like *sister*) (2.5pts)

   (b) pseudo-words that are made up of a prefix (e.g., *de*) and a real root morpheme (e.g., *juvenate*) vs a comparable pseudo-word that contains aprefix and a non-root (e.g., pertoire). (2.5pts)

3. (10 marks) A rare syntactic construction parasitic gaps occurs on average once in 100,000 sentences. Assume you have developed a complicated pattern matcher that attempts to identify sentences with parasitic gaps. Its pretty good, but its not perfect: if a sentence has a parasitic gap, it will say so with probability 0.95, if it doesnt, it will wrongly say it does with probability 0.005. Suppose the test says that a sentence contains a parasitic gap. What is the probability that this is true?

Answer Key for Exam $\boxed{\text{A}}$

Section 1. Short Answer Questions

1. When the brain is surgically split, certain information from the left side of the body is received only by the right side of the brain, and vice versa. To illustrate, suppose that a monkey is trained to respond with both its hands to a certain visual stimulus, such as a flashing light. After the training is complete, the brain is surgically split. The stimulus is then shown only to the left visual field (the right hemisphere). Because the right hemisphere controls the left side of the body (contralateriliization), the monkey will perform only with the left hand.

2. **FOBS**: FOBS proposed that word form representations were activated by bottom-up input from the auditory system. According to Taft and Forsters model, lexical access involves people using auditory (or visual) cues to search their long-term memories for a matching stimulus. The FOBS account proposes that morphemes are an important level of representation in lexical access. 2 main properties:

   (a) Frequency ordered searching: This search process is organized so that people do not need to search the entire lexicon every time they need to look up a word. Instead, lexical (word form) representations are organized into bins. The bins are organized according to word frequency. High-frequency words are at the front of the bin and are searched first; lower frequency words are stored toward the back of the bin and are searched later. When you encounter an auditory stimulus, that opens up a bin and you search through the bin looking for an entry that matches the stimulus, starting with the most frequent item in the bin, then the next most frequent, and so on until you have searched the entire bin. The search process ends when you find an item in the bin that matches the stimulus. This kind of search is called self-terminating (the process stops itself when it succeeds), so you dont keep searching the bins for an additional match after you have found one good candidate. One last important characteristic of the model is that words are organized in the bins according to shared roots.

   (b) Affix stripping: According to the FOBS model, the incoming stimulus has to be analyzed according to its root, because the root is what gets the listener access to the correct bin. Whenever a listener encounters a polymorphemic word (dogs, dogpile, dogaphobia), the first thing the listener needs to do is figure out what the root is. Therefore, the first step in lexical access is morphological decompositionthe incoming stimulus needs to be broken down into parts that correspond to individual morphemes before the root can be identified. A word like dogs is analyzed as being made up of the root morpheme dog and the plural inflectional suffix -s.

   Predictions to the 2 situations asked in the question:

   (a) Even though sister is a monomorphemic word, the lexical access process breaks it down into a pseudo-(fake) root, sist, and a pseudo-suffix, -er. After the affix stripping process has had a turn at breaking down sister into a root and a suffix, the lexical access system will try to find a bin that matches the pseudo-root sist. This process will fail, because there is no root morpheme in English that matches the input sist. In that case, the lexical access system will have to re-search the lexicon using the entire word sister. This extra process should take extra time, therefore the affix stripping hypothesis predicts that pseudo-suffixed words (like sister) should take longer to process than words that have a real suffix (like grower).

   (b) People also have more trouble rejecting pseudo-words that are made up of a prefix (e.g., de) and a real root morpheme (e.g., juvenate) than a comparable pseudo-word that contains a prefix and a non-root (e.g., pertoire). This suggests that morphological decomposition successfully accesses a bin in the dejuvenate case, and people are able to rule out dejuvenate as a real word only after the entire bin has been fully searched

3. Let G be the event of the sentence having a parasitic gap, and let T be the event of the test being positive. We want to determine:
   $P(G|T) = P(T|G)xP(G)/(P(T|G)P(G) + P(T|\bar{G})P(\bar{G})$
   = 0.95 0.00001 (0.95 0.00001 + .0005 x 0.9999) approximately 0.002