

Psych156A/ Ling150

Spring 2012

Homework 1: Introduction to Language Acquisition & Sounds

Or “The Language Adventures of Sigmund von Hacklestein, part 1”

Remember to write your full name and University ID number on your assignment. If you collaborate with other students in the class (which is highly encouraged), please make sure to indicate who you worked with.

(48 points total)

(1) Sigmund von Hacklestein has been trying to understand some of the complexities that are involved in his knowledge of language, and how that relates to prescriptive and descriptive rules of language use. Sigmund received an essay back from his English teacher with the following comment: “Don’t end a sentence with a preposition (like *with*).” Sigmund was baffled, and spoke to his teacher after class:

Sigmund: “I don’t understand why I can’t end a sentence with a preposition. I do it all the time when I speak.”

Teacher: “I don’t care how you speak. I care how you write. Don’t end a sentence with a preposition.”

Is Sigmund’s teacher enforcing a prescriptive rule of English grammar or a descriptive rule of English grammar? [1 pt]

Briefly explain why you think so. [2 pts]

(2) Sigmund remembers that we talked in class about a cash register carrying out the process of addition as an example that demonstrates Marr’s hierarchy of explanation. However, he wants to make sure he really understands the different levels in Marr’s hierarchy.

In the cash register example in the lecture notes, the computation of addition was carried out by placing numbers in a column and following the rules of addition to add up the columns until a final answer was reached. Electronic and mechanical components implemented the rules of addition.

Help Sigmund figure out the following problem:

Suppose a cash register was created that carried out the process of division between two numbers. For example, if given 20 and 5, it would produce 4. This computation is accomplished by a very small man inside the cash register who derives the correct answer by tossing a set of dice in the air.

(a) Does this change the computational level? Briefly explain why or why not. [2 pts]

- (b) Does this change the algorithmic level? Briefly explain why or why not. [2 pts]
- (c) Does this change the implementational level? Briefly explain why or why not. [2 pts]

In the sandwich example in the lecture notes, the creation of a peanutbutter and jelly sandwich was carried out by following a series of instructions and using the appropriate ingredients and tools, such as a knife and spoon. Someone's younger sibling was directed to follow those instructions and make the sandwich.

Help Sigmund figure out the following problem:

Suppose a peanutbutter and jelly sandwich was the goal, but the instructions were carried out by a robotic arm. In addition, the robotic arm was unable to grasp utensils, and so used different tools to carry out the process than were specified in the original instructions (for instance, the robotic arm used specially designed peanutbutter and jelly squeezy containers).

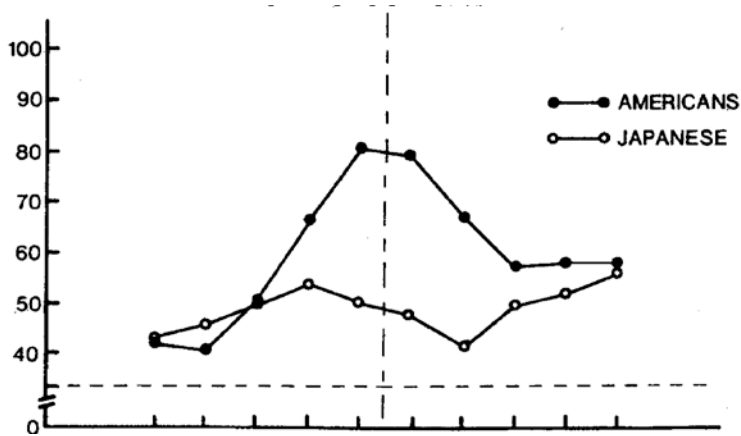
- (a) Does this change the computational level? Briefly explain why or why not. [2 pts]
- (b) Does this change the algorithmic level? Briefly explain why or why not. [2 pts]
- (c) Does this change the implementational level? Briefly explain why or why not. [2 pts]

(3) Below are some data from the language of Guin, which Sigmund has encountered by spending time with the Guin people. Sigmund hopes to use them to figure out which sounds are contrastive in Guin.

- (i) "shoosh" = to knit someone a scarf
- (ii) "chooch" = to knit someone a scarf

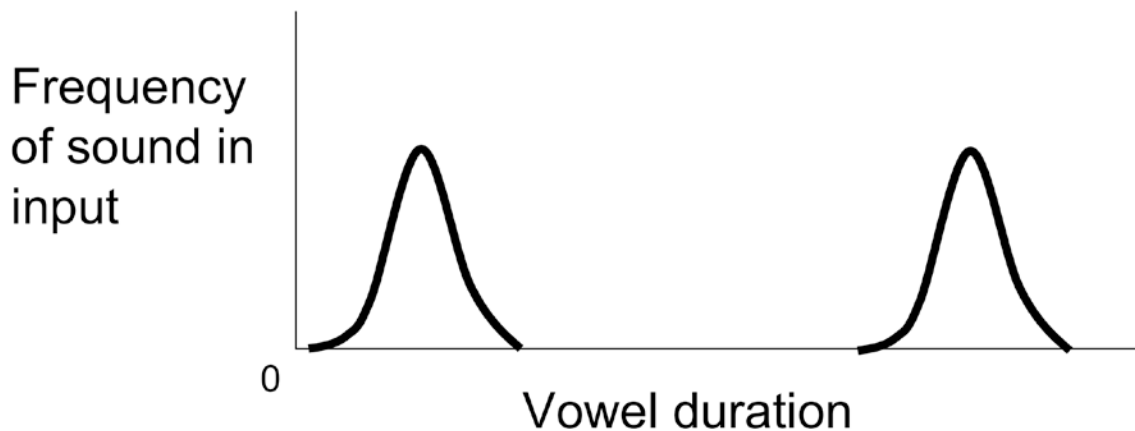
- (a) Are "ch" and "sh" contrastive sounds in Guin? Briefly explain why you think so. [3 pts]
- (b) Sigmund later encountered some Guin speakers using the word "shooch". Should he know exactly what "shooch" means, given the data he has already? If so, what should it mean and why? If not, why can't Sigmund predict exactly what it means from the words he already knows? [3 pts]

(4) Sigmund was impressed by the difference in categorical perception across language speakers, and is trying to remember how to interpret some of the graphs from the studies discussed during lecture. Consider the graph below:



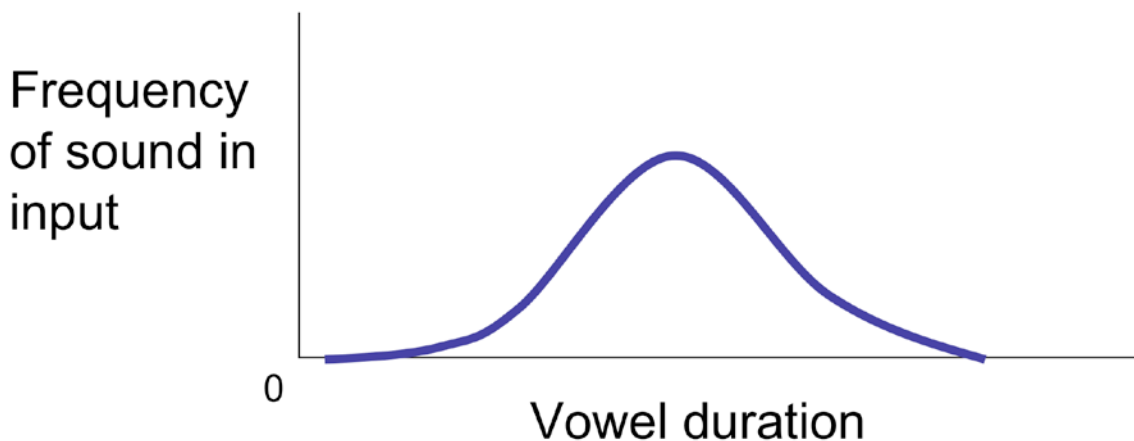
- What does the x axis represent? [1 pt]
- What does the y axis represent? [1 pt]
- What does the dotted line down the center represent? [1 pt]
- Is this a discrimination or an identification task? [1 pt]
- Is the reaction time for the decisions occurring near the dotted line for the American subjects likely to be short, long, or about the same, as compared to the reaction time for the decisions occurring away from the dotted line? [1 pt]
- Is the reaction time for the decisions occurring near the dotted line for the Japanese subjects likely to be short, long, or about the same, as compared to the reaction time for the decisions occurring away from the dotted line? [1 pt]
- Which group, the Americans or the Japanese, is treating these stimuli as if they belong to two separate phonemes (that is, the range of stimuli include examples of two different phonemes, instead of all being examples of the same phoneme)? Briefly explain how you know. (Hint: You'll likely want to include parts of your answers from (a)-(f)). [3 pts]

(5) Sigmund was very impressed by the idea that children may be sensitive to distributional information in the data, and could use it to learn what the relevant contrastive dimensions are in their language. After spending some time among the Gwanks, he determined that the distribution of Gwank sounds looked like the following with respect to vowel duration.



- (a) Is this a unimodal or bimodal distribution? [1 pt]
- (b) Is vowel duration likely to be contrastive in the language of the Gwanks? (yes or no) [1 pt]
- (c) If children are sensitive to distributional information, should Gwank children learn that vowel duration is contrastive or not contrastive? [1 pt]

Sigmund later spent some time among the Guin, recording the frequency of the different vowel durations present in their language. He determined that the distribution looked something like the following:



- (d) Is this a unimodal or bimodal distribution? [1 pt]
- (e) Is vowel duration likely to be contrastive in the language of the Guin? (yes or no) [1 pt]
- (f) If children are sensitive to distributional information, should Guin children learn that vowel duration is contrastive or not contrastive? [1 pt]

(6) Sigmund has been monitoring the vocabulary of his little brother Aethelric. Aethelric knows only the following words:

mommy, daddy, Sigmund, more, new, big, ball, kitty, go, pig, doggie, call, mine, cup, bit, drink, tall, little, no, do, come, poor, row, boat

(a) List which words Aethelric knows that are neighbors, making sure to indicate which words are neighbors to which other words.

Example answers using words that Aethelric does not know yet (your answers should use the vocabulary items Aethelric knows):

rib and *rig* are neighbors

ray, say, and bay are neighbors

[9 pts]

(b) If it is true that children who know neighboring words are able to distinguish those sounds in novel words (that is, the neighborhood structure idea), should Aethelric be able to learn that a new label *mev* is different from a new label *pev*? Briefly explain, using part of your answer from (a). [3 pts]