Homework #1 **Ling/Psych 371N, SP '03**

Bring Graphs to Class on Monday, 4/14
Complete assignment due on Wednesday, 4/16

This homework examines the perception of "voice onset time" (VOT), an acoustic cue that is relevant for the perception of voiced and voiceless stop consonants (e.g., /g/ vs. /k/, /b/ vs. /p/, /d/ vs. /t/) in English and many other languages.

During the first part of the homework, which was an **identification task**, you listened to a sequence of 80 sounds. Each of those 80 sounds was really just 1 of 8 different sounds presented in random order. These 8 sounds were synthesized using a series formant synthesizer and three formants. The formant values were held constant over the 8 sounds and were designed to cue a velar stop (/k/ vs. /g/) followed by a low back vowel (/a/). The only way in which the 8 sounds differ from one another is in the VOT value, which ranges from 0 ms (milliseconds) to 70 ms in 10 ms steps (i.e., 0ms, 10ms, 20ms, 30ms, 40ms, 50ms, 60ms 70ms).

In class, you heard each of the 8 sounds 10 times for a total of 80 tokens. These 80 tokens were presented in 5 randomized blocks of 16. The VOT corresponding to the 8 tokens in each block is shown below:

Block **1**.	0 - 30 - 60 - 20 - 50 - 10 - 40 - 70 - 60 - 20 - 0 - 40 - 10 - 50 - 70 - 30
Block **2**.	20 - 50 - 70 - 30 - 60 - 0 - 40 - 10 - 10 - 30 - 60 - 40 - 70 - 0 - 50 - 20
Block **3**.	30 - 0 - 50 - 10 - 40 - 70 - 20 - 60 - 60 - 10 - 70 - 20 - 40 - 0 - 30 - 50
Block **4**.	10 - 70 - 30 - 0 - 60 - 40 - 20 - 50 - 30 - 60 - 10 - 70 - 20 - 50 - 0 - 40
Block **5**.	70 - 0 - 30 - 60 - 40 - 10 - 50 - 20 - 70 - 60 - 0 - 40 - 10 - 30 - 50 - 20

Calculate the number (or percentage) of times you chose the category /ga/ as the response for each of the 8 sounds and plot the results on a graph that you will turn in.

- The VOT value should be plotted on the x-axis, and the number or percentage of /ga/ responses should be plotted on the y-axis.

- Remember to label the axes and to title the graph with the name of the task.

- You may draw the graph by hand or by computer (NB: Excel has a handy chart wizard). If you choose to graph by hand, please write clearly and legibly.

- It is sometimes easier to answer the questions at the end of you also plot the number (or percentage) of times you chose the /ka/ category. To do this, make a second y-axis at the right-hand edge of the graph.)

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The second part of the homework used the same stimuli as the first part, but this time the sounds were presented as a sequence of 48 triplets (A B X). The third sound was identical to either the first or second sound, and the difference in VOT between the first two sounds was always 20 milliseconds. The following key identifies the VOT of the sounds in each triplet:

1.	10 - 30 - 10	25.	60 - 40 - 60
2.	70 - 50 - 50	26.	10 - 30 - 30
3.	30 - 10 - 30	27.	70 - 50 - 70
4.	0 - 20 - 0	28.	40 - 20 - 40
5.	60 - 40 - 40	29.	30 - 50 - 30
6.	50 - 70 - 50	30.	0 - 20 - 20
7.	20 - 40 - 20	31.	50 - 70 - 50
8.	50 - 30 - 30	32.	30 - 10 - 30
9.	20 - 0 - 0	33.	50 - 30 - 50
10.	40 - 20 - 40	34.	40 - 60 - 40
11.	30 - 50 - 50	35.	20 - 40 - 40
12.	40 - 60 - 60	36.	20 - 0 - 0
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13.	40 - 20 - 20	37.	50 - 30 - 30
14.	0 - 20 - 20	38.	60 - 40 - 60
15.	30 - 50 - 50	39.	0 - 20 - 0
16.	60 - 40 - 40	40.	20 - 40 - 40
17.	70 - 50 - 50	41.	40 - 20 - 20
18.	10 - 30 - 30	42.	30 - 50 - 30
19.	50 - 30 - 50	43.	40 - 60 - 60
20.	20 - 0 - 20	44.	70 - 50 - 70
21.	50 - 70 - 70	45.	10 - 30 - 10
22.	20 - 40 - 20	46.	20 - 0 - 20
23.	40 - 60 - 40	47.	30 - 10 - 10
24.	30 - 10 - 10	48.	50 - 70 - 70

This type of experimental task is known as a **discrimination task**. Your task is to calculate and graph the percentage of times that you correctly matched the third sound to the preceding sound for each A B pair of VOTs (e.g., 0 and 20, 10 and 30, 20 and 40, 30 and 50, 40 and 60, 50 and 70). You will turn in this graph also.

- Notice that 0 and 20 (e.g., number 4) also occurred as 20 and 0 (e.g., number 46). Group these responses together.
- The identity of the VOT pairs should be plotted on the x-axis, and the percentage of correct responses should be plotted on the y-axis.
- Remember to label the axes and to title the graph with the name of the task.
- You may draw the graph by hand or by computer. If you choose to graph by hand, please write clearly and legibly.

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Using your two graphs, please answer the following questions in a typed, mini-essay - that is, connect your answers in a coherent set of concise paragraphs.

1. Is there a distinct boundary between the category for /g/ and the category for /k/ in your identification graph?

2. What do the two graphs show when you consider them together?

   To answer Q2, consider the following sub-questions:

   - What is the relationship between the pairs you discriminated most accurately and how you responded to those VOTs during the identification task?

   - How did you identity the VOTs of a pair that you could not discriminate accurately?

   - Are there any pairs that probably should have been discriminated more accurately than they actually were?

Please remember:

- Graphs must be legible and on separate pieces of paper when you turn them in with this assignment.

- Always support your answers by referring to the data in the graphs.

- Please proofread your assignment. Sometimes simple errors (spelling, leaving out a word, or leaving in a word unintentionally, using the wrong word) can change the meaning of what you intended to say.