ID# _____ Exam 2 PS 325, Spring 2009

As always, the Skidmore Honor Code is in effect. At the end of the exam, I'll have you write and sign something to attest to that fact. The exam should contain no surprises, in that it's just like the first exam (and old second exams). Thanks for the contributions you made to the class throughout the semester. I really enjoyed myself. Have a pleasant and relaxing summer.

Peace!

Essay 1. [20 pts] "Two ears are better than one." Explain how we use the information in our auditory system to localize sounds. Why do we find it difficult to localize pure tones with frequencies (1000-5000 Hz) where pitch perception is quite good? Why might complex tones be localized more readily than pure tones?

Essay 2. [20 pts] Context has been shown to play an important role in visual perception. You've also learned of several instances in which context plays an important role in auditory perception. Discuss several such examples.

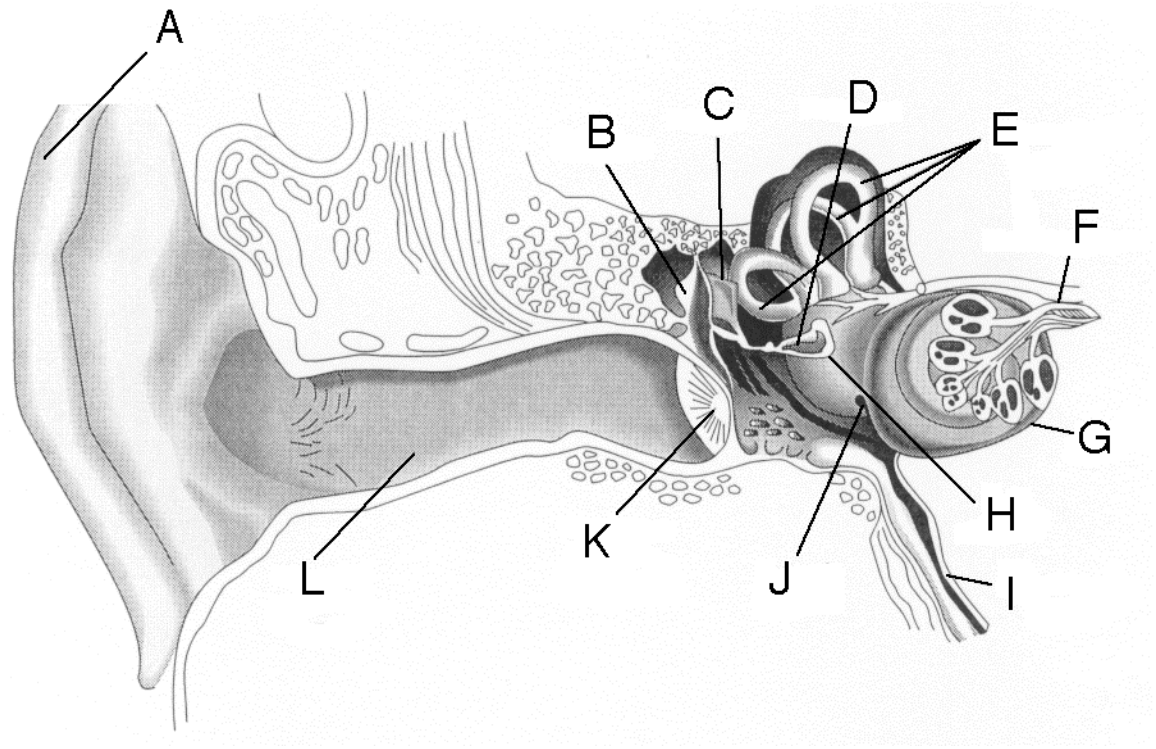
1. One of the basic principles of signal detection theory is that
   a. a clear-cut borderline exists between those stimuli that can be detected and those stimuli that cannot be detected.
   b. classical psychophysical techniques cannot accurately determine a threshold.
   c. no absolute threshold exists; observers' judgments vary according to the situation.
   d. highly motivated participants produce more accurate thresholds.

2. If you were to use the method of constant stimuli for measuring discrimination of auditory stimuli,
   a. you would present comparison tones that were substantially lower than the standard stimulus.
   b. you would have to use both ascending and descending series.
   c. you would notice the frequency of the comparison stimulus at which the judgments changed from "higher than" to "same as."
   d. you would present comparison stimuli in random order and ask observers to compare these stimuli with the standard stimulus.

3. Suppose that a study using classical psychophysics showed that women who have participated in prepared childbirth classes have lower thresholds for pain than control women. Why might a variation of that study using the signal detection theory (SDT) be valuable?
   a. SDT could give us a more accurate estimate of the just noticeable difference.
   b. SDT could tell us whether the difference was due to a difference in sensitivity or a difference in criterion.
   c. SDT would provide more accurate thresholds.
   d. SDT would provide quicker thresholds.

4. Your textbook showed a figure with one probability distribution representing "Noise" and one representing "Signal + noise." In this kind of figure, a very sensitive observer would be represented by
   a. two completely overlapping probability distributions.
   b. a criterion line at the extreme right of the figure.
   c. two probability distributions that overlap very little.
   d. a criterion line at the extreme left of the figure.

5. In signal detection theory, one factor that influences sensitivity (d') is
   a. how much the observer is paid for the task.
   b. how much the observer is paid for correct responses.
   c. the likelihood that the signal is being presented.
   d. the intensity of the stimulus.

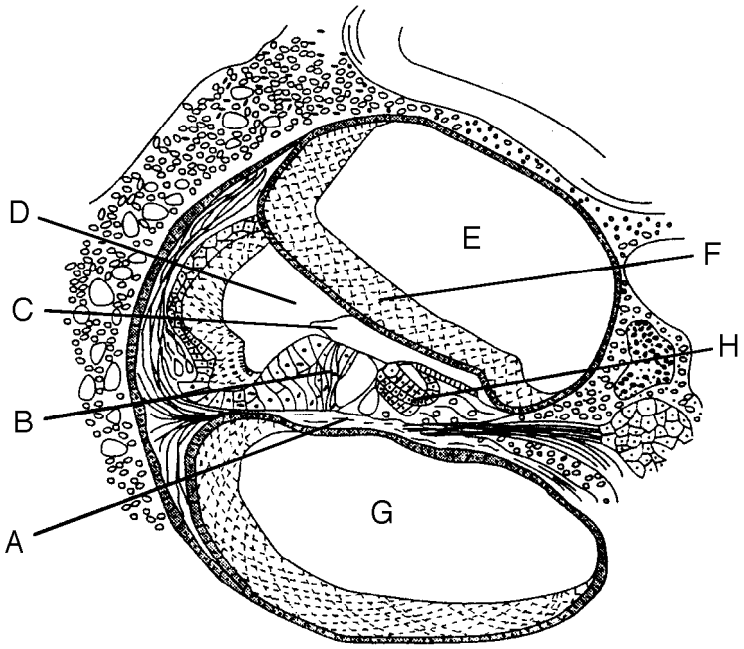


6. Match the labels from the figure above to each of the following parts of the auditory system: [10 pts]

Anatomical Part	Letter Label	Anatomical Part	Letter Label
Pinna		Eardrum	
Round Window		Stapes (Stirrup)	
Malleus (Hammer)		Eustachian Tube	
Contains Organ of Corti		Cochlea	
Incus (Anvil)		External Auditory Canal	
Auditory Nerve		Oval Window	

7. Match the labels from the figure above to each of the following descriptions: [6 pts]

Function	Letter Label
Amplifies some frequencies through resonance	
Membrane that pushes in on fluids in the vestibular canal	
Important for localization	
Important for equalizing air pressure in the auditory system	
Important for balance	
Contains perilymph and endolymph	
Site for transduction of sound stimuli	



8. Use the figure above to label the parts of the inner ear shown below [4 pts]:

Anatomical Part	Letter Label	Anatomical Part	Letter Label
Outer Hair Cells		Inner Hair Cells	
Reissner's Membrane		Cochlear Duct	
Vestibular Canal		Tectorial Membrane	
Basilar Membrane		Tympanic Canal	

9. Which of the following factors does *not* facilitate speech perception?
   a. Visual access to the speaker's lip movements.
   b. The context of a phrase or a sentence.
   c. Knowledge of the topic of conversation.
   d. Previous exposure to the voice.

10. What part of the auditory system allows for comparisons of both auditory and visual spatial information?
   a. superior colliculus
   b. inferior colliculus
   c. superior olivary nucleus
   d. medial geniculate nucleus

11. Which structure is thought to be crucial in sound localization?
   a. the superior olivary nucleus
   b. the eardrum
   c. the lateral geniculate nucleus
   d. Area 17 of the cerebral cortex

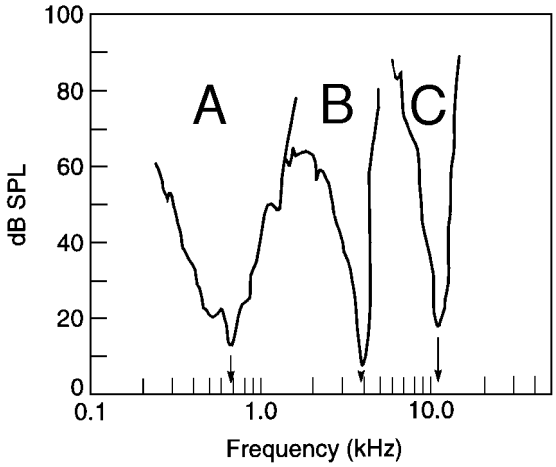
12. If you were to remove *all* the harmonics from a complex tone,
   a. you would be left with a pure tone.
   b. you would be left with a complex tone.
   c. you would create the illusion of the missing fundamental.
   d. you would hear no sound at all.

13. What happens when we combine two tones that are very similar in frequency?
    a. We hear beats or an unpleasant roughness, depending upon the difference in frequency of the two notes.
    b. We hear a note that is halfway between the two notes.
    c. We hear two distinctly different notes.
    d. We hear a note that is equivalent to the sum of the frequencies of the two component notes.

14. Suppose that you are told that you will be participating in a magnitude estimation study of loudness. It is likely that you will be asked to
    a. listen to a series of sounds decreasing in loudness and indicate when you no longer hear the sounds.
    b. say "I detect it" or "I do not detect it" for sounds that are either present or absent.
    c. adjust a sound until its estimated magnitude is substantially larger than that of a standard loudness.
    d. assign a number to indicate how loud a stimulus appears to be.

15. A person with a high sensitivity and a high criterion in a signal detection study
    a. will be less likely to have a high false alarm than a person with a high sensitivity and a low criterion.
    b. will be more likely to have a high false alarm than a person with a high sensitivity and a low criterion.
    c. will make more hits than a person with a high sensitivity and a low criterion.
    d. will make more false alarms than a person with low sensitivity and a low criterion.

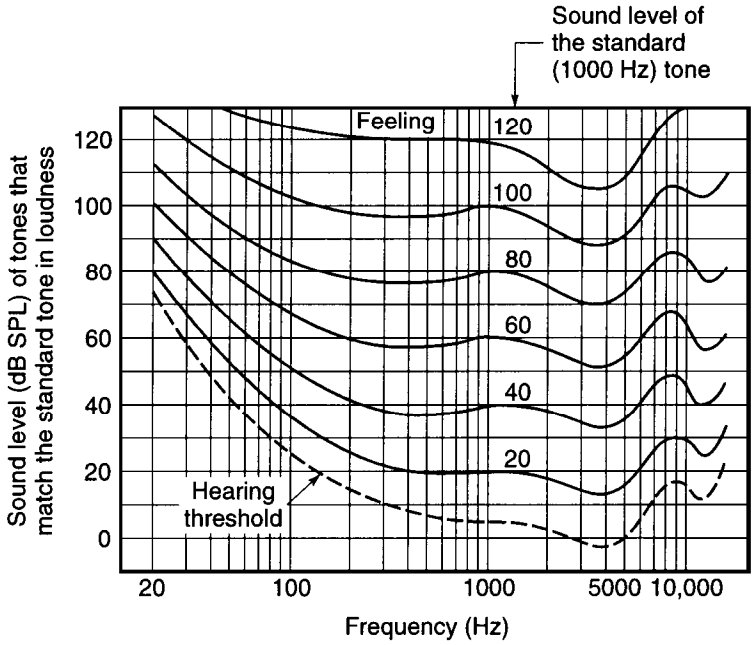
16. An important conclusion from Weber's law is that
    a. the just noticeable difference is always a constant.
    b. when we start with an intense stimulus, we must make a large change in that stimulus in order for a change to be noticed.
    c. Weber's fraction is the same for all sensory systems.
    d. a one-to-one correspondence exists between physical stimuli and psychological reactions.



17. Which of the three tuning curves shown above was obtained by recording from a neuron connected to cells nearer to the stapes?

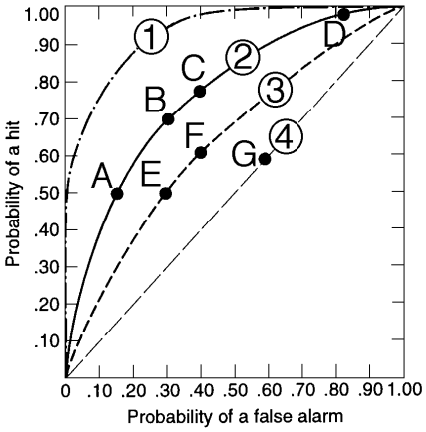
18. In the above figure, Curve C is sharper than Curve A because
    a. even at high amplitudes, low frequency tones stimulate a relatively small area on the basilar membrane.
    b. even at high amplitudes, high frequency tones stimulate a relatively small area on the basilar membrane.
    c. high-frequency neurons are more sensitive than low-frequency neurons.
    d. it is obtained from a neuron connected to cells nearer the helicotrema.

19. For such tuning curves, briefly explain why the left side of the curve (lower frequencies) has a flatter slope and the right side of the curve (higher frequencies) has a steeper slope? [3 pts]



20. Based on the Fletcher-Munson curves above, circle the tone of the pairs below that would be louder (2 pts):

Pair 1	100 Hz @ 30 dB	5000 Hz @ 20 dB
Pair 2	20 Hz @ 100 dB	100 Hz @ 80 dB



21. Use the figure above to answer the following questions. (Curves are labeled with numbers, and respondents are labeled with letters.) [5 pts]

Which curve indicates the greatest sensitivity?	
Which curve would be obtained from a complete overlapping of the Noise and Signal + noise distributions?	
Along curve 2, which respondent is the most conservative?	
Which respondent appears to be guessing?	
Along which curve would a respondent obtain the highest ratio of hits to false alarms?	

22. Now that you've reached the end of this perception course, tell me at least two principles/concepts that you learned that you did not know before taking the course, along with the evidence that supports those principles/concepts. [4 pts]

23. The Perception course (PS 325) is *way* cooler than the Cognition course (PS 324): True False