

9.35 Spring 2024 – practice questions for Midterm 2

Most of these questions are shorter than what we will feature on the midterm, but cover the topics that will be on the midterm. The questions on the midterm will similar in style to those on Midterm 1.

Note that we might repeat some questions from Midterm 1.

Given the traveling wave that occurs on the basilar membrane, what frequencies might you be quickest to detect, high or low?

What is beating, and how is its perception constrained by the frequency selectivity of the ear?

Draw a graph showing the response of the cochlea at the place with a CF of 12 kHz to a 12 kHz tone, as a function of the level of the tone. On the same axes, draw a graph of the response if all outer hair cells were dead.

How is loudness perception affected by the loss of compression that occurs when people lose outer hair cell function?

Name one difference in frequency selectivity between humans and non-human animals.

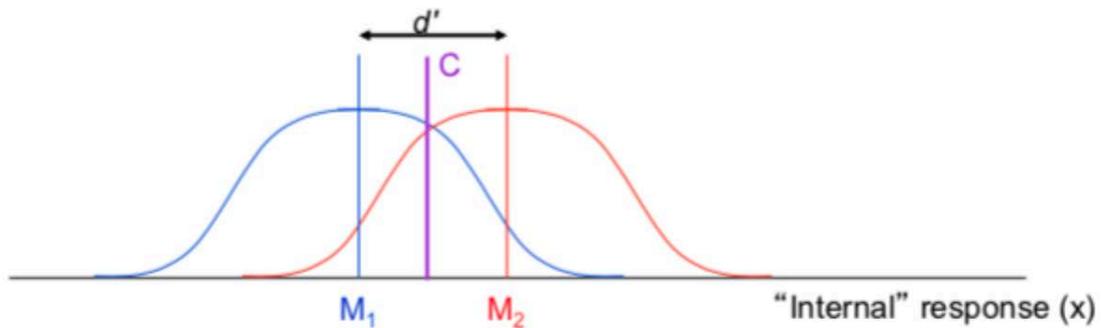
What is presbycusis? What is one piece of evidence for what might cause it?

Name one piece of evidence that traumatic noise exposure causes hearing loss.

Name one piece of evidence that hearing loss can in some cases be “hidden”, with apparently normal detection thresholds.

Describe the basic idea behind a cochlear implant in two sentences.

In the diagram below, label the y axis and shade the region whose area corresponds to the probability of a false alarm.



Describe a 2AFC task and one of its advantages for psychophysics.

Describe one method for measuring a threshold, and its advantages and disadvantages compared to other methods.

What are the two main binaural cues to a sound's location? What is the main monaural cue?

Approximately how big are interaural time differences?

What limits the use of interaural time differences at high frequencies?

What limits the use of interaural intensity differences at low frequencies?

What is one piece of evidence for the duplex theory of sound localization?

What is the Jeffress model a model of? Draw a diagram explaining the model.

In what part of the auditory system are ITDs and ILDs believed to be detected?

What is the cone of confusion?

What happens to your auditory abilities if plastic molds are inserted into your pinna, and left there for a few months? What happens when the molds are subsequently removed?

What is one piece of evidence that people learn the location-specific transfer functions of their ears?

Name one cue to a sound source's distance from the listener.

What is the fundamental frequency of a sound containing the frequencies 300, 400, and 500 Hz?

What is the acoustic correlate of a sound's pitch, according to a traditional psychoacoustician?

What is the tonotopic map, and where is it found?

Where is the presumptive locus of human pitch perception, relative to the tonotopic map? What is one aspect of its response that implicates it in pitch perception?

Name two stimulus attributes that contribute to timbre.

If a sound increases in level by 20 dB, how much does it increase in loudness (for someone with normal hearing)?

What is the JND for intensity in a human with normal hearing (roughly)?

What is the dynamic range problem in hearing?

What are the three levels of analysis as articulated by Marr? Describe each in one sentence/phrase.

Describe an illusion that demonstrates the role of common onset in auditory grouping.

Describe an illusion that demonstrates the role of harmonicity in auditory grouping.

Describe the conditions in which the precedence effect occurs. What is its presumptive function in everyday hearing?

A high and a low tone are presented in alternation. Describe two stimulus manipulations that would decrease the change that they would be heard as a single stream.

Describe one example of "filling in" in audition.

What are the conditions necessary to experience the continuity illusion when a tone is interrupted by noise?

Describe the sense in which the retina is set up "backwards", the physiological adaptations that enable high-resolution vision despite the backward arrangement, and the relationship to the blind spot. Why do we not normally notice our blind spot?

Discuss the differences between rods and cones, the conditions in which we are dependent on each of them for vision, the properties of “rod vision” and “cone vision”, and the link between these properties and the physiology of the retina.

Name two differences between midget and parasol ganglion cells? Where do they reside in the visual system? To where does each type of cell project?

Give one explanation for why our visual system might have evolved a fovea (i.e., dense sampling at the center of gaze, and coarser sampling in the periphery).

Explain how one computes a spike-triggered average, and describe what it is typically used to measure.

What are the consequences of lesions to the parvocellular and magnocellular layers of the LGN?

What does convolution typically represent in models of early vision (retina through V1), and how is it used to explain some illusions?

Describe how the left and right hemifields (the parts of the visual field to the left and right of fixation, respectively) are represented in the retina, LGN, and visual cortex.

What effect does the dense sampling at the fovea have on the cortical representation of visual space?

Explain how a population code for orientation could enable the estimation of orientation independent of the contrast of an edge.

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