BSc Audiology

Year 4

AUDL4007 – Auditory Perception

2007
FINAL EXAMINATION

Time allowed: 2 hours

Time Allowed: 2 Hours

Answer Booklets

All candidates will require an **answer booklet** AND **graph paper** for this examination.
All answers **must** be written in the answer booklets or graph paper provided. Candidates requiring additional answer booklets should contact an invigilator. Any answers written on the Examination Paper will **not** be marked.

Do **NOT** write your name on your answer booklets, only your assessment number.

This examination has ONE section:

Candidates should answer **FIVE** out of the following EIGHT questions.
In all cases, simple diagrams should be used to illustrate answers as much as possible.
All questions are weighed equally.

---

1) Describe a simple yes/no detection experiment from the point of view of signal detection theory. Include the definitions of the following concepts (with appropriate graphs):

    i. hit
    ii. false alarm
    iii. miss
    iv. correct rejection
    v. d´
    vi. bias
    vii. criterion
    viii. ROC curve

2) Discuss the three main ways in which outer hair cell damage is reflected in human psychoacoustic measurements. What changes in physiological functioning are supposed to underlie these changes? How do current ordinary compression hearing aids attempt to ameliorate each of these deficits?

3) Describe a system for making an auditory spectrogram that would reflect the transformations occuring in the outer, middle and inner ears, and would result in an output that reflected the place and time cues present in the firing of the auditory nerve.

4) Outline the contributions of auditory place and time coding in determining the perceived pitch of a 200 Hz train of very narrow pulses that is passed through the following four systems before presentation to the listener. Assume all the filters have extremely steep slopes outside the passband.

i. 300 Hz low-pass filter
ii. 1900 Hz high-pass filter
iii. 700 to 1300 Hz band pass filter
iv. 50 to 10000 Hz band-pass filter

5) Two of the most commonly used measures of temporal resolution are the modulation transfer function and gap detection. Describe what you would need to do to measure these in a listener using white noise (including the form of the stimuli), and the typical results obtained. Why is white noise the best signal to use in such studies? Explain the temporal window model and how it can be used to account for the results obtained.

6) Suppose a person had, in the absence of a hearing loss, unusually broad auditory filters. Of the following perceptual attributes/abilities, which do you think would be affected by this broad filtering, and which would not? Explain your reasoning for each case.

i. threshold for a tone masked by a broadband noise
ii. pitch perception for pure and complex tones
iii. detection of slow amplitude modulations in white noise
iv. loudness of complex signals, both periodic and aperiodic
v. intensity discrimination for broadband noise

7) What interaural differences do we use to localize sounds? How do these interaural differences arise? What are the limitations on our ability to use interaural differences to localize sounds? Name instances where interaural differences are insufficient for localisation. What cues are important in these instances?

8) Sketch the audible area of a normal human listener. Define the notions of MAF, MAP, threshold and dynamic range. Describe the phon scale and sketch a few equal-loudness contours on your graph. Explain the notion of Weber's Law, and evaluate its accuracy for the discrimination of intensity. Explain, giving at least two examples, why the loudness of a sound is not simply proportional to its intensity.