Acoustics of Speech and Hearing  
Massachusetts Institute of Technology: 6.551J / HST.714J  
Harvard Medical School, Division of Medical Sciences: SHBT 200  
Reading Assignment for October 21, 2014

Paper 1:  

Paper 2:  

Study questions for Paper 1:  
1. In Zwislocki figure 2, one of the rules we have suggested for acoustic circuits is broken. What is the broken rule?
2. Describe in words the function of each of the boxes of figure 2.
3. Assuming that the primary function of the middle ear is to conduct sound energy to the cochlea, what is the primary distinction between the uncoupled ear drum (box 2) and the incudo-stapedial joint (box 4) and boxes 1 and 3 in Figure 2.
4. How does Zwislocki simplify the circuit in Figure 2 for various pathological conditions? Specifically: What is the effect of removing the incus? What is the effect of otosclerosis which immobilizes the stapes?
5. Figure 3 describes several zeros in impedance. What happens at these zeros?
6. What determines the frequency limits of Zwislocki’s measurement procedures? and What determines the frequency limits of his analytic procedures?

Study questions for Paper 2:  
1. Figure 2: The model used in this paper is more complicated. One example is the use of transformers. How many transformers are there and what are they used for?
2. Figures 4&5: What is a stapedotomy? and What is the effect of varying stapes prosthesis area on the volume velocity of the stapes?
3. How is this effect manifest? Specifically, does a reduction in prosthetic area produce an equal reduction in prosthetic volume velocity? What is the area of the normal footplate?
4. Would you expect a larger than normal footplate to produce larger than normal volume velocities of the stapes?
5. Figure 6: Is the function of the human middle ear sensitive to the mass of the ossicles? Why or Why not?
6. Figure 6: Is the function of the human middle ear sensitive to the volume of middle ear air? Why or Why not?
7. What is a tympanoplasty?
8. Why does a type IV tympanoplasty work?