AUDL GS08/GAV1

Auditory perception

(with a healthy dose of psychoacoustics …)

Coursework

- A written essay presenting a published psychoacoustic study in a journalistic format, appropriate for lay readers.
- You will also critique other students' papers, and rewrite from comments.
- Start thinking about the first study you will report on, reading carefully the information on the web site
    - Must be about auditory perception
    - Choose a paper you can explain to a lay audience (e.g., your grandfather!)
        - In other words, a topic that is interesting to people generally and not too technically complicated
    - *Not* in an area related to your project
    - *Not* a review paper
- Send me the pdf by next week

What is psychoacoustics?

- Psychophysics
  - Mapping the relationship between the physical/objective and perceptual/subjective world.
- Psychoacoustics — psychophysics of sounds.
- How does the loudness of a sound relates to its intensity?
  - loudness depends not only on intensity but also on frequency content
- Changing the fundamental frequency of a periodic sound from 100 to 200 Hz will not lead to the same perceived musical interval as a change from 800 Hz to 900 Hz.

100-200 Hz

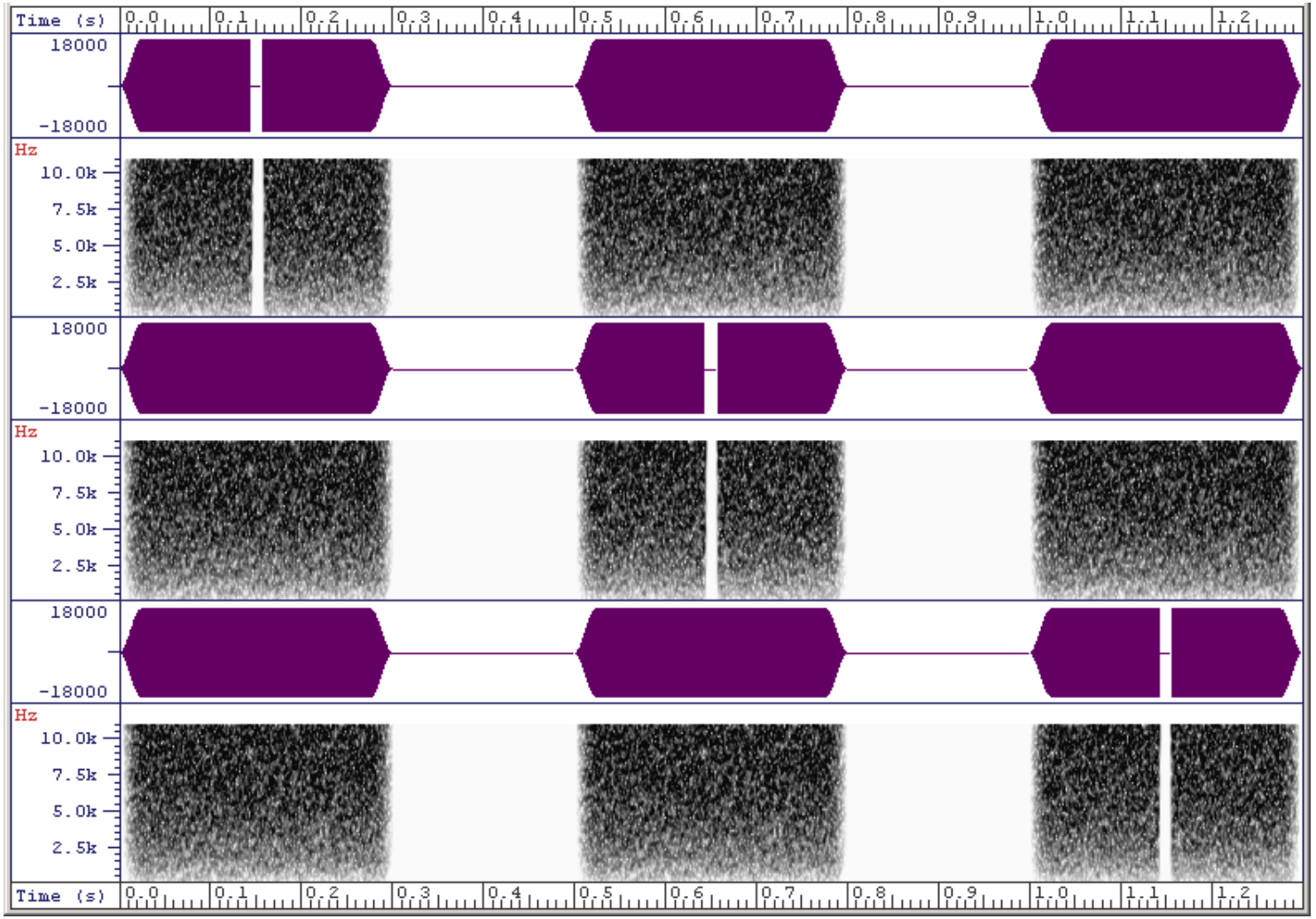
800-900 Hz

800-1600Hz

What is psychoacoustics?

- Terminology: Objective vs. subjective
  - intensity (W/m^2, Pa, dB SPL) vs. loudness
  - periodic/aperiodic vs. buzziness/noisiness
  - fundamental frequency (Hz) vs. pitch
  - spectral envelope/shape vs. timbre/quality/colour
- Much of psychoacoustics concerns abilities to …
  - detect
    - many HI people and CI users need higher levels to detect sounds
  - discriminate
    - many HI people and CI users need greater differences between stimuli to hear a difference between them
  - but limits on detectability and discriminability can also provide crucial data for developing models of auditory perception even in normal listeners

Gap detection A fairly typical psychoacoustic task



time →

Psychoacoustic procedures vary in …

- Number of intervals (or stimuli presented) per trial
  - Typically 1, 2, 3 or 4
- What the listener is asked to do
  - detect the presence of a stimulus (absolute threshold)
  - detect a change in a stimulus (discrimination)
  - label a stimulus
  - label the direction of change in a pair of stimuli
- How the stimulus levels are controlled
  - depending on, or independent of, the listener's responses

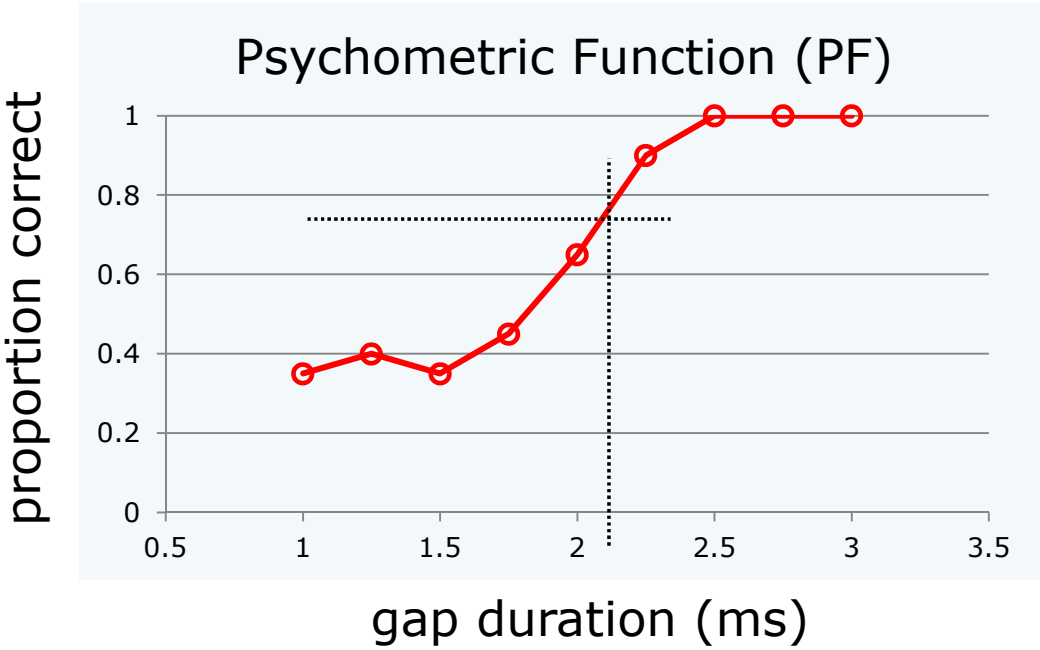
Gap detection: A simple version

- Pick the sound with the gap out of 3
- Present 20 trials at each of a number of gap durations

Why doesn't the curve go down to 0?

What's the threshold (minimal detectable gap)?

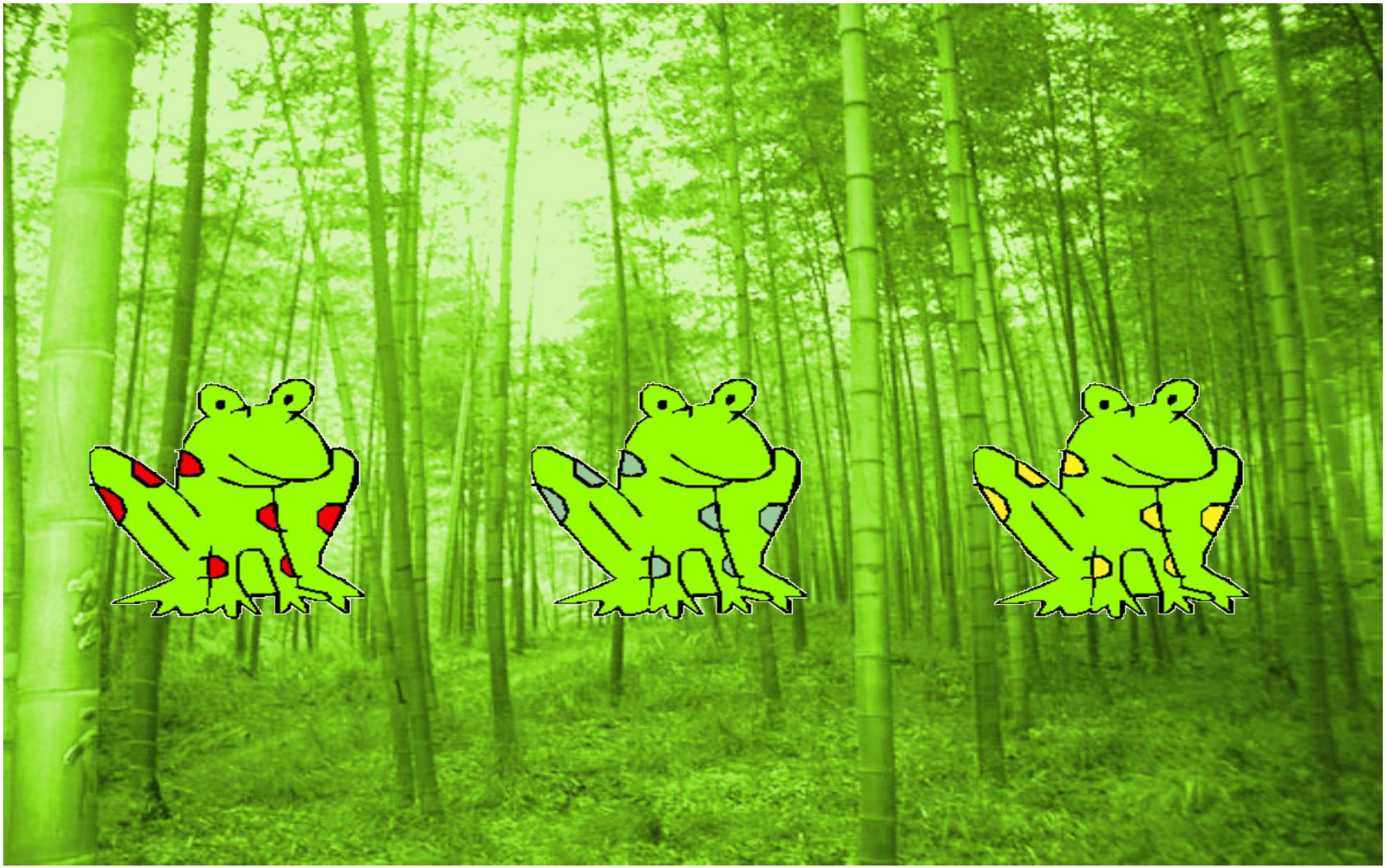
gap (ms)	r	n	p
1	7	20	0.35
1.25	8	20	0.4
1.5	7	20	0.35
1.75	9	20	0.45
2	13	20	0.65
2.25	18	20	0.9
2.5	20	20	1
2.75	20	20	1
3	20	20	1



Gap detection adaptively

- Pick the sound with the gap – vary the gap duration to find threshold
  - when a listener is ‘doing well’, make it harder
  - when a listener is ‘doing poorly’, make it easier
- What does this remind you of?

SHaPS software



An adaptive track

- starts easy
- moves quickly in the beginning
- 3-down 1-up tracking rule
- reversals