Audio 1

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Who are we?

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Course overview

• Session 1: The basics
• Session 2: Recording
• Session 3: Workflow and basic editing
• Session 4: Metadata, setup recommendation, wrap up
Why do we need to care about audio recording?

- Typical goals and uses of audio recordings in language documentation
- What are criteria for "good enough" in relation to different types of projects
- How poor recordings affect our work in language documentation?
Big questions

• What are we actually recording?
• What / Who is it for?
• What is the role of audio in language documentation?
Elements of good recordings

• Signal quality
  – Accuracy / Intelligibility
• Signal/Noise ratio
• Experience quality
  – Listenability / Localization of source / Separation of noise
• Content
• Fit for purpose
Signal and noise

• The level of a desired signal to the level of background noise
• What are part of what we want to capture, i.e., signal?
• Noise
  – typical noises and their sources, and how to deal with them
Signal

• Content
  – Identity of the speakers
  – Performance

• Context and spatial information
Noise  (unwanted sound)

• Noise from environment
  – near: people, animals, activities, TV, radio
  – far: traffic, generators, planes
  – machines: clocks, refrigerators, fans, computers, cell phones
  – not hearable: electrical interference
  – acoustic: reflections/resonance
Noise (unwanted sound)

• Noise generated by (unwanted parts of) event:
  – shuffling papers, clothes
  – table banging
  – backchannel from interviewer
  – equipment handling, especially microphones and cables (and recorders with built-in mics)
Noise (unwanted sound)

• Noise generated by equipment:
  – wrong input levels
  – circuitry noise (cheap or incompatible)
  – compression loss or distortion
  – automatic gain control effects
  – video camera motors
Dealing with noise:

– be prepared and aware
– seek collaboration
– monitor
– use or modify room acoustics
– location
– direction
– surfaces
– reflection
– Isolation
How humans hear

- a human listener has:
  - location, orientation in a physical setting
  - two ears - incredibly sensitive
  - a brain/mind
- the mind selects from various sources of sound and other sensory information, using long- and short-term memory
- listening is actually a “hallucination”
Range of human hearing

- **Frequency sensitivity**
  - Lowest: 20 Hz
  - Highest: 20,000 Hz

- **Dynamic range**
  - Threshold of hearing: 0 dB
  - Threshold of pain: 130 dB
How machines ‘hear’

- microphones can’t distinguish wanted from unwanted sound
- microphones don’t have “edges” like camera lenses
- the recording process removes acoustic information
How sound travels

- The inverse square law
How sound travels

- The inverse square law
Using the inverse square law

• If you have noise sources, maximise the signal to noise ratio by:
  – placing the microphone as close as possible to the signal source
  – placing the microphone as far as possible from the noise source
Analogue vs. digital recording

- **Analogue**
  - physical recording medium is made to vary in a manner analogous to the variations in air pressure of the original sound

- **Digital**
  - converting the physical properties of the original sound into a sequence of numbers
Digital recording

• Sampling rate
  – the number of samples per unit of time

• Bit depth (word-size)
  – the number of bits used to represent a single audio wave
Survey of equipment

- Examine the pros and cons of each
- Examine budget considerations
- Equipment
  - Microphones, stands, and other accessories
  - Recorders
  - Cables and connectors
  - Power supplies
  - Media (SD cards, DATs, CDs, etc.)
  - Recording and audio editing software
Microphones

• Microphones
  – electrical property
    • dynamic
    • electret
  – design type
    • handheld
    • shotgun
    • lapel, lavalier
  – patterns
    • omnidirectional
    • cardioid
    • supercardiod
Stands and accessories

- Stand
- Holder
- Windscreen
  - foam
  - fur (‘dead cat’ and ‘dead kitten’)
Recorders

• Analogue
  – Cassette recorder
• Digital
  – Digital audio tape (DAT)
  – Compact disc (CD)
  – Minidisc
  – Flash or SD
  – Computer
Cables and connectors

• Types
  – phono (RCA) cable
  – mini (TRS)
  – XLR

• Unbalanced vs. balanced
  – single core, shielded cables
  – paired core, shielded cables
Recording media

- Analogue
  - Cassette tape

- Digital
  - Digital audio tape (DAT)
  - Compact disc (CD)
  - Minidisc (MD)
  - Secure digital (SD) card
  - Hard drive (direct-to-computer)
Recording and audio editing software

• Expensive
  – Adobe Audition CS6: $350
  – Sony Sound Forge Pro 10: $350
  – Sony Sound Forge Audio Studio: $65

• Affordable, yet powerful
  – Audacity 2.0: $0