Chapter 11. Meeting 11, Expansion, Gating, and Sidechaining

11.1. Announcements

- Quiz on Monday

- Audio materials for Processing Report 2 (due 21 March):

  audioProcReport02.zip

11.2. Processing Report 1 Review

- You must specify what DAW and processors/plug-ins you are using

- You must specify specifics for all relevant parameters

- Describe what you are trying to do

- Audition files before and after processing

- Remove leakage and noise, and find opportunities for improving timbre

11.3. Disabling Live's Warp Feature

- Live may automatically attempt to shift the duration (independent of pitch) of a track: we never want this!

- Turn off "Auto-Warp Long Samples" in Warp preferences
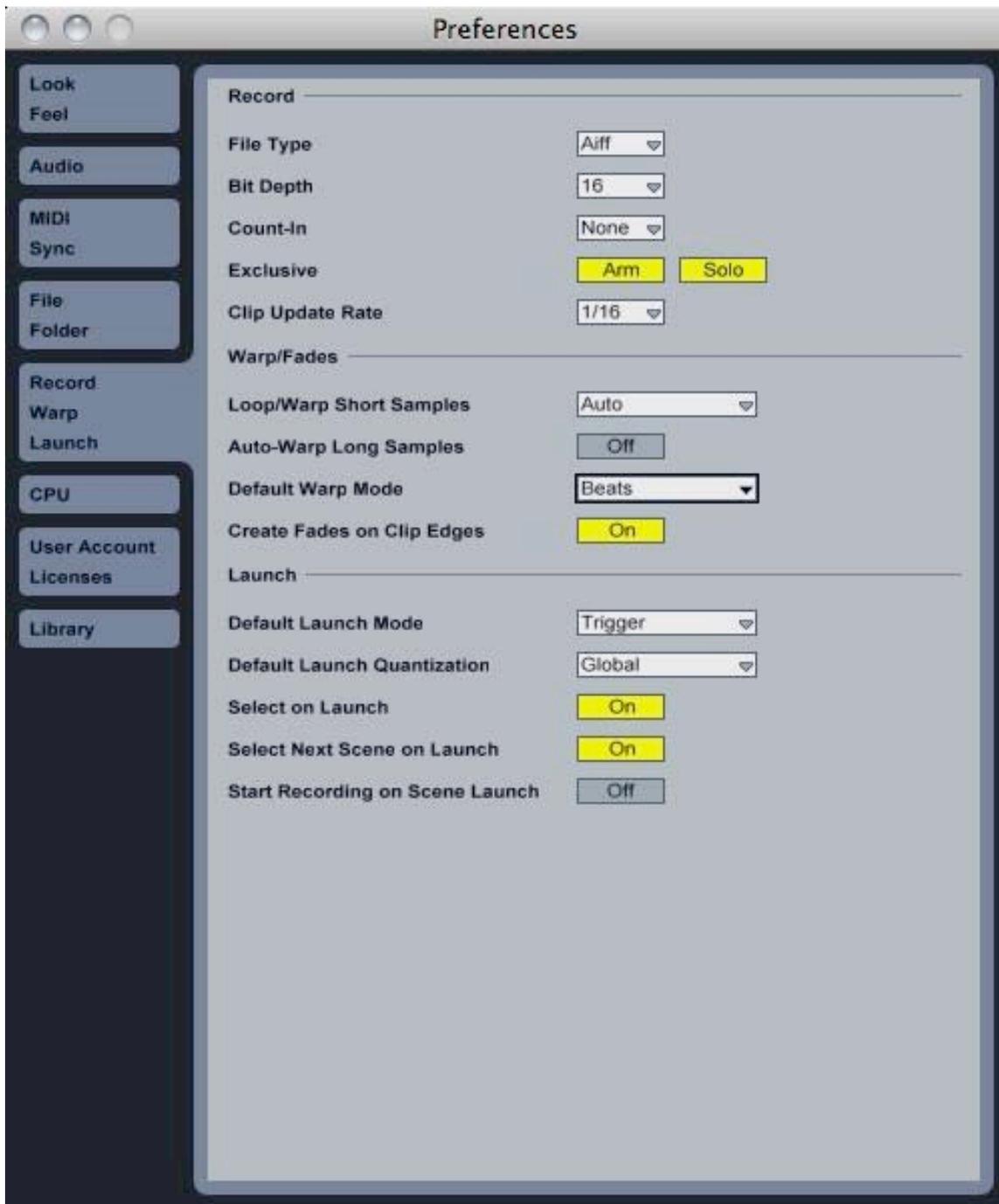
Courtesy of Ableton AG. Used with permission.

- Always add track in the horizontal view (toggle in upper right corner)

- Double click on sample, view "Clip" and "Sample" controls, and make sure that Warp is *not* selected
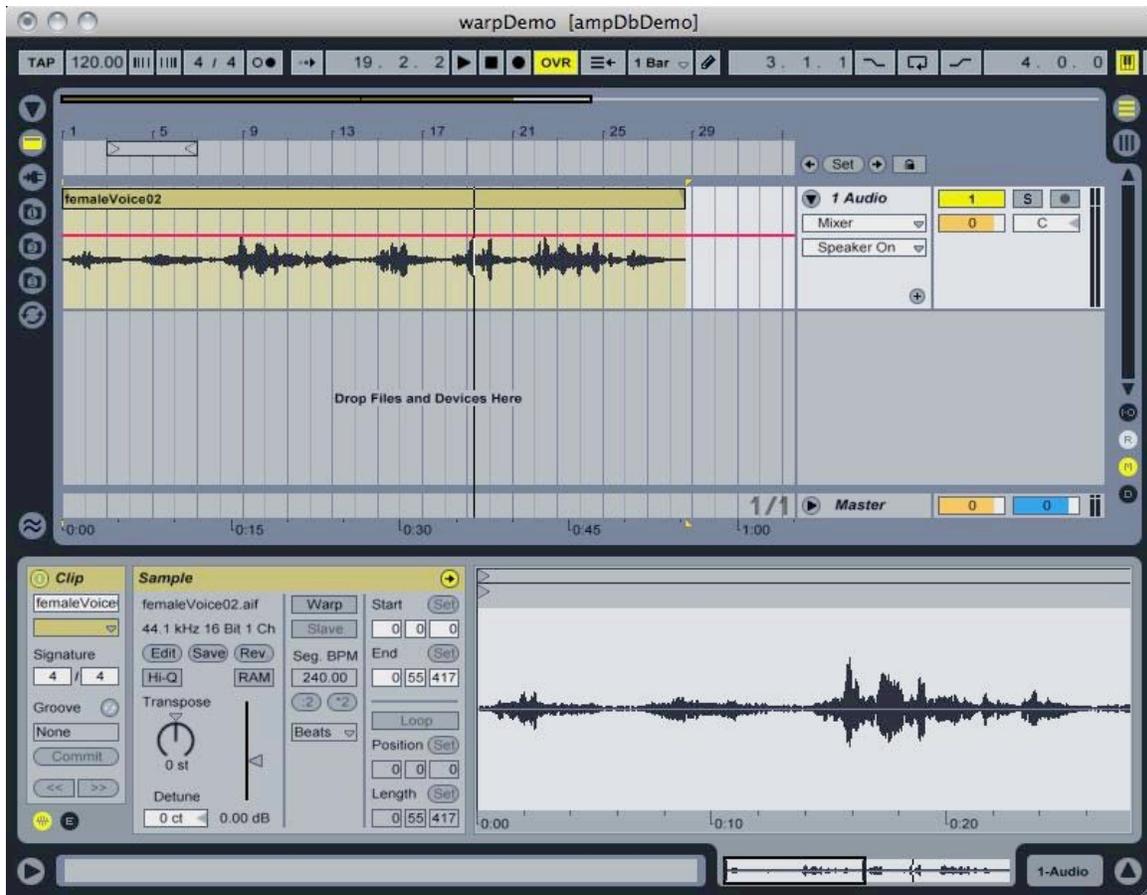
Courtesy of Ableton AG. Used with permission.

11.4. Compression and Filters

• Dyanmic effects and filters are the core of channel-strip processing

• Filters can come before and / or after compression

• If removing gain with a filter, compression best comes after

• If adding gain with a filter, compression best comes before

11.5. Compression and Limiting in Live

• Compressor

Courtesy of Ableton AG. Used with permission.

- Compressor (one plug-in)

  - Threshold and ratio, knee in units of dB

  - Output (use) and Makeup (do not use)

  - Attack and release, lookahead

  - Envelope follower (triggering) mode: peak, RMS, opto (non-linear release curve: release is faster initially, and slows as GR approaches zero)

  - Feed forward: FF1 and FF2 analyze loudness of incoming signal; FB is analyzes output

    Feed back: FB analyzes output, self-adjusts behavior, results in a smoother sound; lookahead is disabled

- Examples: acousticGuitar01, bassAmp01

11.6. Compressors, Peak Limiters, Limiting Amplifiers

- Regular compressors: variable attack, release, ratio, and threshold

- Peak limiters: fast attack, high ratio, high threshold

  May be used after compressor

- Leveling amplifiers: medium attack time, a medium to slow release time, a high ratio and a low threshold

  Holding the level down in a smooth way

  Ratio and threshold may be linked

  Early analog tube models were very popular
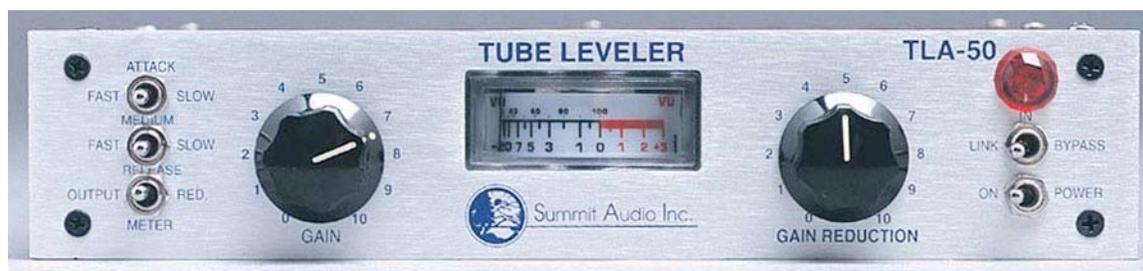
11.7. Analog Gain Reduction Technologies

- Optical isolators: light and photocell creates inherent lag time

  Example: LA-2A

- Field effect transistor (FET): used to more closely emulate tubes; extremely fast and reliable

  Example: UA 1176 LN (attack 20 microseconds to 800 microsecnonds, release 50 ms to 1.1 s)

- Voltage controlled amplifier (VCA): versatile, most control

  Example: DBX 160: the first solid state VCA compressor

11.8. Compression in MOSS

- TwinQ optical compressor

11.9. Gain Reduction Below a Threshold: Expander

- Where a compressor reduces dynamic range, an expander increases dynamic range

- Where a (downward) compressor operates above a threshold, (downward) expanders operate below a threshold

- Both reduce gain using a ratio

- Both may have attack and release controls

- Compressors take two steps: expanders take one

11.10. Expanders: Applications

- Increase dynamics in a performance

- Reduce or eliminate leakage, reverb, or noise floor

11.11. Gain Reduction Below a Threshold: Gate

- An expander taken to an extreme gain-reduction ratio

- Ratios are in the range of 10:1 to infinity:1

- Ratios can be thought of in negative values (below the threshold): -1:-2

- Often used for noise reduction and noise silencing

- Gates

Image removed due to copyright restrictions.
"The Gate/Expander" from Gibson, B.
Microphones & Mixers. Hal Leonard Corp., 2007.

11.12. The Family of Dynamic Effects

- Four (downward) processors
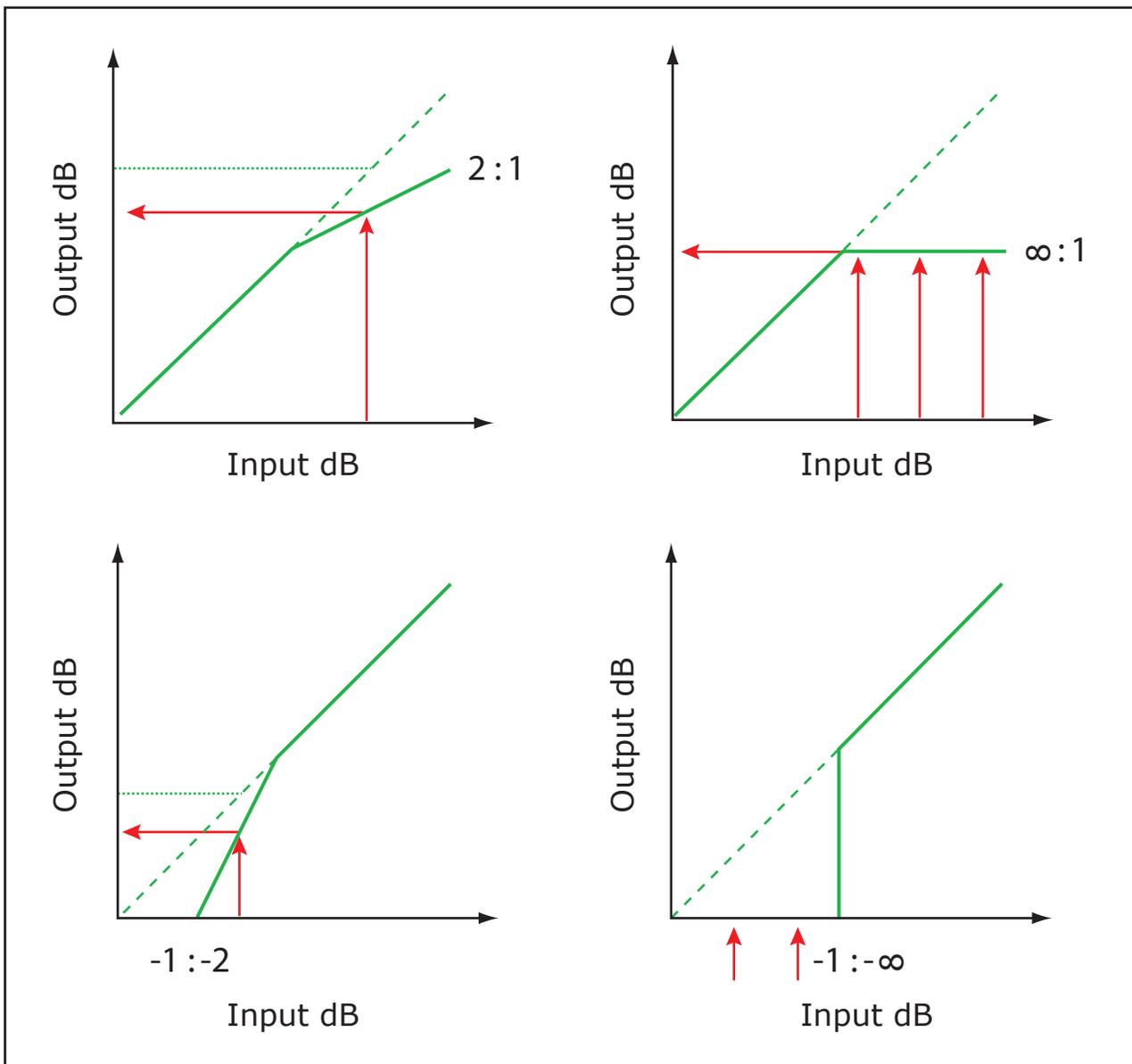
11.13. I/O Map Exercise

- Diagram a compressor with a threshold at -10 dB and a ratio of 2:1

- Diagram a limiter with a threshold at -8 dB and a ratio of 10 to 1

- Diagram an expander with a threshold at -10 dB and a ratio of 2 to 1

- Diagram a gate with a threshold at -16 dB and a ratio of infinity to 1

- Diagram a compressor with a threshold at -6 dB and a ratio of 3:1

- Diagram an expander with a threshold at -20 dB and a ratio of 6 to 1

- Diagram a compressor with a threshold at -8 dB and a ratio of 4:1

11.14. Compression and Limiting in Live

- Gate

Courtesy of Ableton AG. Used with permission.

- Gate (one plug-in)

    - Threshold and attenuation (how much gain is reduced)

    - Attack (time to open) and release (time to close, after hold)

    - Hold (time gate remains opened after cross threshold)

- Examples: epiano01

- More robust expanders can be used to shape internal dynamics
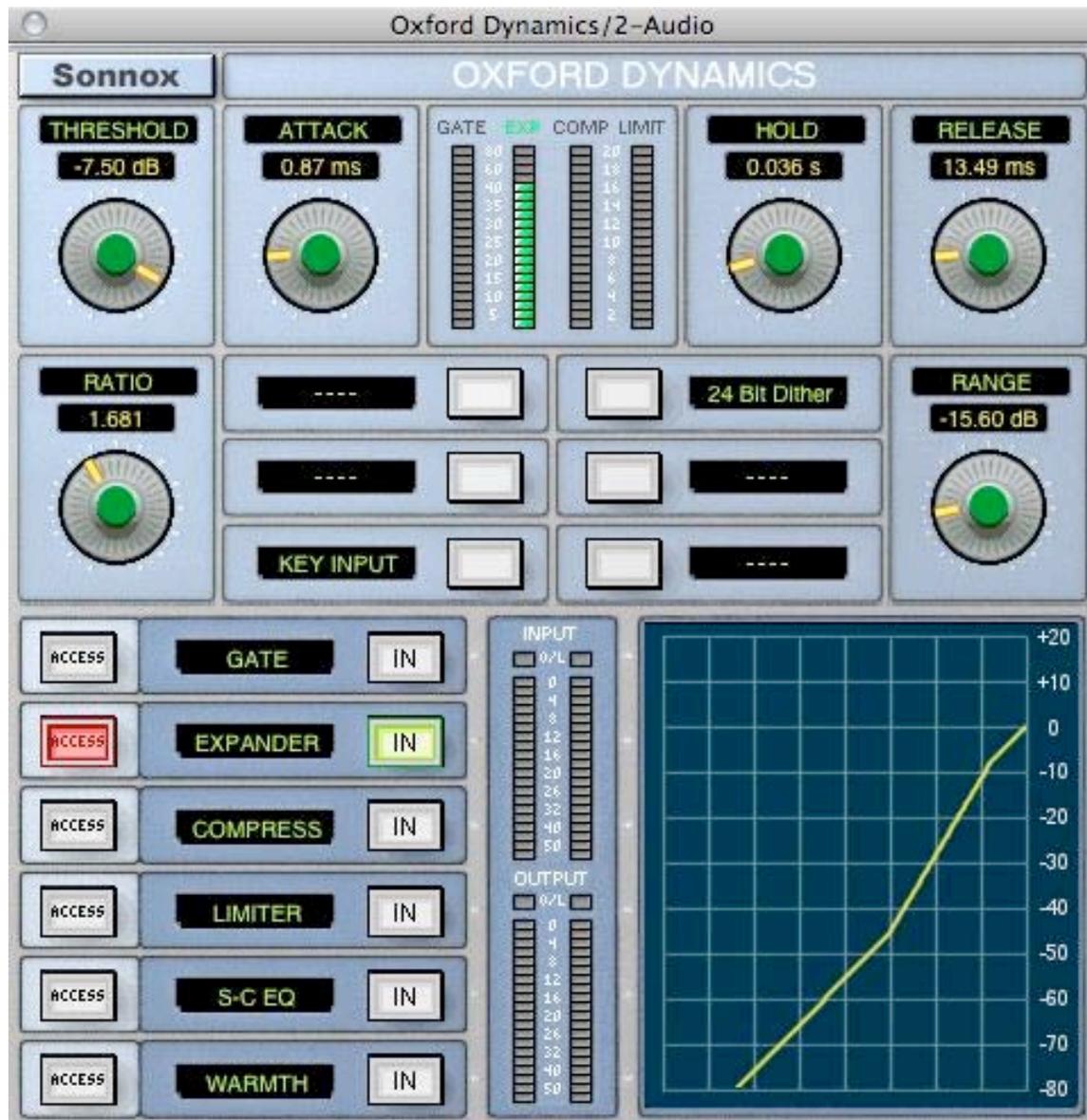
- Examples: sanshin01

11.15. Sidechaining

- The sidechain is the signal used to trigger the compressor

- Amplitude characteristics of one signal can be used to process the amplitude of a different signal

- Compresser in this case is used without makup gain

11.16. Sidechaining: Ducking

- Problem: lower the level of a music track when a spoken voice or musical part enters

- Sidechain is spoken voice or track that needs to be on top of mix (e.g., kick)

- Compresser is used without makup gain

- Ducking in Live

Courtesy of Ableton AG. Used with permission.

11.17. Sidechaining: Deessing

- Problem: vocals s and th sounds (4 to 6 kHz) produce peaks and create extreme presence

- Sidechain signal is filtered version of the source, boosting the problematic frquencies

- Forces the compressor to react more strongly to amplitude activity in that frequency region

- Deessing in Live

Courtesy of Ableton AG. Used with permission.

11.18. Sidechaining: Gating

- Can use a control track (filtered and processed as necessary) to open and close (gate) on another track

- Sidechain Gating in Live
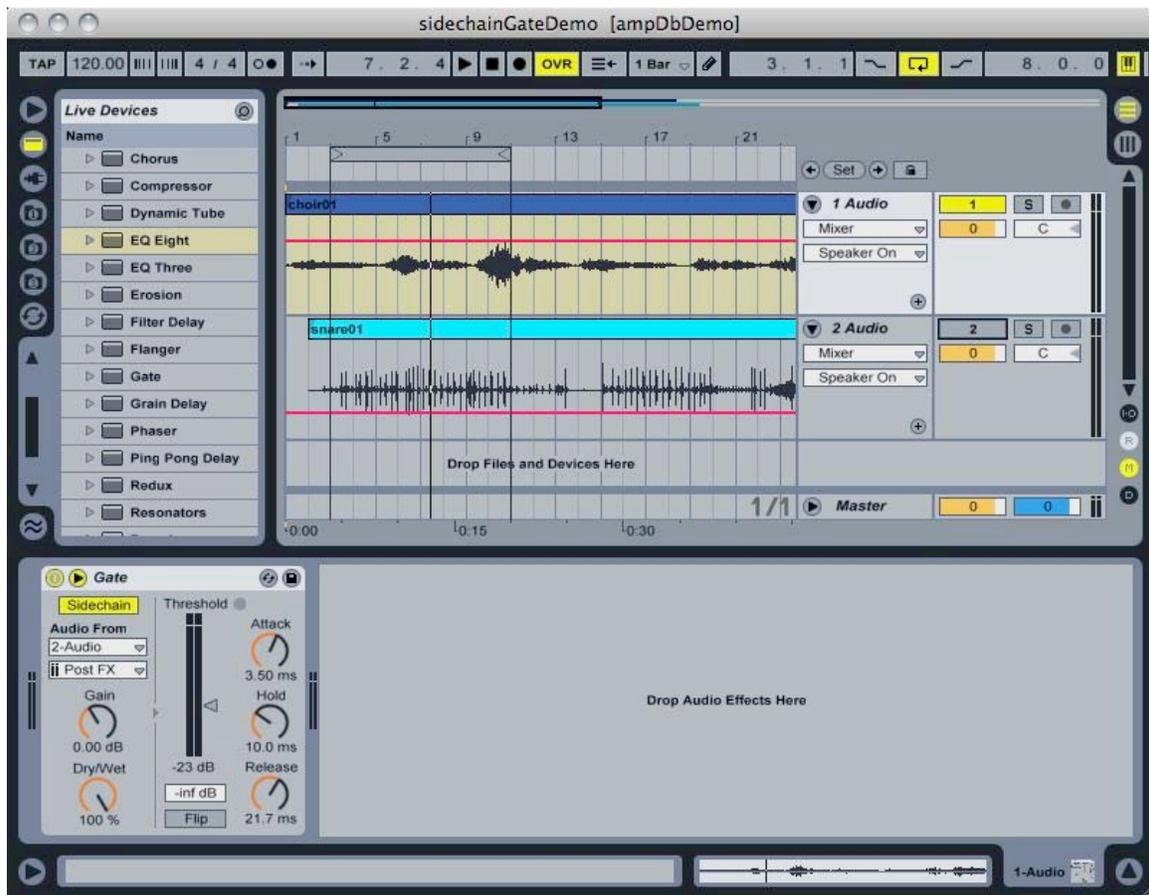
Courtesy of Ableton AG. Used with permission.

11.19. Processing Report 2

- Process each of the four audio tracks to remove noise, remove leakage, increase isolation, balance timbre, balance dynamics, and optimize mixing potential. Only filter/equalization and dynamic processors can be used.

- For each file, in prose, describe the problems with the audio file and what you are trying to do. Then, describe the specific processors you are using, as well as the specific filter settings used. Be sure to include units for all parameters.

- Send back to me the processed audio files (export or bounce out of the DAW) as well as the written report.

11.20. Reading: Eargle: The Pressure Gradient Microphone

- What polar pattern is found in pressure gradient microphones?

- Why is the polarity of signal entering the back of the ribbon reversed?

- Which has more LF response, figure-8 ribbon or a figure-8 capacitor? Why?

- What is the proximity effect?

21M.380 Music and Technology: Recording Techniques and Audio Production
Spring 2012