21M.380 · Music and Technology
Recording Techniques & Audio Production

Sound editing exercise 3 (ED3)
Dynamic range processing

Due: Wednesday, October 19, 2016, 9:30am
Submit to: MIT Learning Modules ▸ Assignments
5% of total grade

1 Instructions

Using only dynamics processors (compressor, limiter, gate) and parametric EQs, process the provided sound files such as to complete the tasks described below. In an accompanying write-up, describe separately for each audio file which problems you faced and how you have addressed them.

1.1 Source materials

The audio files required for this assignment are available at `http://www.mtkdata.cambridgemusictechnology.co.uk/MTK001/BigStoneCulture_FragileThoughts.zip` (14 MB). They are provided for educational purposes[1] through Mike Senior's Multitrack Download Library.

[1] `http://www.cambridge-mt.com/ms-mtk-UsageFAQs.htm`

1.2 Tasks to be completed

Restrict yourself to the processors specified in the following instructions. Do not use any processors that are not listed for the respective instruments. No EQs where they are not specified, no reverb on anything!

- `01_Kick.wav`: On the kick drum mic, use any combination of compressor, gate, and EQ to reduce leakage from other instruments on the one hand, and add punch and impact to the kick on the other. This will likely require a compromise of some sort, and you should argue in favor of the balance that you have found in your write-up.
- `02_Snare.wav`: On the snare drum mic, reduce leakage from other instruments by using a gate.
- `03_Overheads.wav`: You should be able to confirm through the signal meters of your DAW's mixer that the source file for the

overheads peaks at 0 dBFS. Use a peak limiter to reduce these peaks to −3 dBFS. Don't just trust the settings on your limiter plugin, but confirm that your bounced output file never exceeds the desired peak level throughout the entire duration of the track.[2] Can you observe an audible effect of this operation? Address this question in your write-up.

- `05_Bass.wav`: Clean up the background buzz with the help of an EQ and use a compressor to make the level of the bass more stable and give it more impact.
- `07_LeadVox.wav`: Stabilize the level of the vocals through the use of compression.

You are *not* required to edit or submit the files `04_Percussion.wav` and `06_Gtr.wav` from the `.zip` archive.

[2] For example, you could re-import the bounced file into a new DAW project and play through it while watching the meters on the DAW mixer.

2 Guidelines

2.1 Where can I learn more about dynamics processing?

Izhaki (2011, chs. 15–20) provides perhaps the most complete introduction to dynamic range processing, including many online sound examples as well as practical recipes. Senior (2011b) also serves as a useful starting point for learning about compression, including an accompanying website with many sound examples and freeware compressor plugin recommendations. Shepherd (2010) might be a good resource for practical tips relating to this assignment. Senior (2011a) and Katz (2007a,b,c) discuss the subject in more depth.

2.2 Which software to use?

Use *Reaper*, or whichever other DAW package you might have agreed on with the instructor, for this asssignment. The following plugins are recommended for this assignment, and they can be inserted into your DAW channels in the same manner as the EQ plugins for the ED2 assignment. If your DAW offers suitable plugin presets, you can use these as a starting point, but do not apply them 'blindly' – you are expected to fine-tune the parameters by ear (or even better, overthrow them entirely)!

2.2.1 Reaper plugins

- Compressor: FX » VST: ReaComp (Cockos)
- Limiter: Either use *ReaComp* as a limiter or use dedicated plugins:

  - FX » VST: ReaComp (Cockos) (adjust parameters to behave as limiter)
  - FX » JS: Master Limiter
  - FX » JS: MGA JS Limiter
- Gate: FX » VST: ReGate (Cockos)
- Equalizer: FX » VST: ReaEQ (Cockos)

2.2.2 Ardour plugins

Install the `calf-plugins` package (for the Calf plugins) and the `swh-plugins` package (for Steve Harris' *Fast Lookahead Limiter*) in the Ubuntu Software Center or via the terminal (`sudo apt-get install calf-plugins swh-plugins`). It's a good idea to insert all plugins *pre-fader*, as for the ED2 assignment.

- Compressor: New Plugin » By Category » Compressor » Calf Mono Compressor
- Gate: New Plugin » By Category » Expander » Calf Gate
- Limiter: New Plugin » By Category » Limiter » Fast Lookahead Limiter
- Equalizer: New Plugin » By Category » Equaliser » Calf Equaliser 5 Band

2.2.3 Logic plugins

The following are untested suggestions. You are on your own.

- Compressor: Audio FX » Dynamics » Compressor » Mono
- Limiter: Audio FX » Dynamics » Limiter
- Gate: Audio FX » Dynamics » Noise Gate
- Equalizer: Audio FX » EQ » Channel EQ » Mono

2.3 Should I process dynamics before or after the EQ?

The only correct answer to this question – as usual – is: "It depends!". Senior (2011c, p. 180) deducts that you should first process dynamics and then EQ, unless you EQ primarily to change the way in which your dynamics processor responds to its input. Izhaki (2011, p. 328) argues that even in the latter case, EQing the side chain will often lead to better results than pre-compressor EQing, since the former allows you to shape the dynamics processor's behavior without also coloring the sound itself.[3]

[3] It should be noted that for music *mastering*, on the other hand, Katz (2014, p. 131) argues that "[…] equalizing before the compressor is usually not a problem unless some emphasized frequency range causes the compressor to overreact".

If you want to keep things simple, I recommend that you start by patching your dynamics processor *before* the EQ in your DAW channels' FX chains (which are read from top to bottom in Reaper, Ardour, and Logic alike).

2.4 Rendering the results

Method 1 You can either set up a dedicated DAW session for each source file and, when you are done, render the master output:

- Reaper: File › Render › Master mix
- Ardour: Session › Export › Export To Audio File(s) …
- Logic: File › Bounce › Project or Section…

A challenge that you will face is that you will be required to render the source files, which are mono (single-channel), back to mono audio files, whereas the master output of your DAW is stereo by default. The following options will be useful for a workaround:

- Reaper: File › Render › Options › Channels
- Ardour: Session › Export › Export To Audio File(s) … › Channels › Channels

Method 2 Or you can set up all source files in a single DAW session,[4] mute channels as needed[5] while you work, and then render all tracks individually to separate target files:

- Reaper: File › Render › Stems (selected tracks)
- Ardour: Session › Export › Stem export …

Again, note that you are required to render the (mono) source files to mono audio files. The following options will be useful in this respect:

- Reaper: File › Render › Options › Tracks with only mono media to mono files
- Ardour: Session › Export › Export To Audio File(s) … › Channels › Channels

[4] This approach works particularly well here because all source files share the same sample rate, so no resampling will be required.

[5] I recommend to *mute* the tracks *not* needed rather than to *solo* those that are, since the solo bus often introduces additional signal processing that we want to avoid.

2.5 Accompanying write-up

The purpose of the write-up is for me to have something to refer to whenever questions arise regarding the editing decisions you have made. Keep this document very concise and informative, and do not make it too verbose. This should really be an editing, not a writing assignment.

Your write-up should include the resulting settings of all dynamics processors and EQs in either tabular form (make sure you include all relevant units) or – preferably – as legible screenshots. Rationalize your choice of these parameters in the text. Try to verbalize the audible effects of your editing processes. Include a screenshot of the mixer that shows all channels with their respective list (and order) of plugins.

3 Submission format

Submit your assignment as a single archive `submission.zip`, which should be structured as follows:[6]

[6] Please make sure you stick closely to the requested submission format. Detailed guidelines can be found in the syllabus.

```
submission.zip
├─ writeup.pdf (1–3 pages)
├─ 01_Kick.wav (mono, 44.1 kHz, 24 bit)
├─ 02_Snare.wav (mono, 44.1 kHz, 24 bit)
├─ 03_Overheads.wav (mono, 44.1 kHz, 24 bit)
├─ 05_Bass.wav (mono, 44.1 kHz, 24 bit)
└─ 07_LeadVox.wav (mono, 44.1 kHz, 24 bit)
```

- Do *not* submit the files `04_Percussion.wav` and `06_Gtr.wav` from the original `.zip` archive; you are not expected to edit these files.
- Please do really use the original source files' base names for the five audio files that you submit.
- Make sure you render all files in mono, not stereo! See section 2.4 for details on how to accomplish this.
- Double-check all rendered files to ensure that they comply with the requested format (mono, `.wav`, 44.1 kHz, 24 bit). There are

many ways in which this information can be retrieved from an audio file. Find a method that you are comfortable with and that works for your specific software environment.

- Each submitted audio file should have the same duration as the original source file. Avoid mysterious silence at the end of a file, for which Reaper's File » Render… » Render bounds option will be useful.
- No accidental submission of the original (unprocessed) source files, please. This is *your* responsibility!

4 Assessment criteria

The submitted audio files should demonstrate your ability to handle the following tasks by means of a digital audio workstation (DAW).

- Using dynamic range processors in combination with filters and EQs to increase the quality and mixing potential of recorded sound
- Rendering audio files in a specified format

References & useful resources

Izhaki, Roey (2011). *Mixing Audio. Concepts, Practices and Tools*. 2nd ed. Focal Press. 600 pp. ISBN: 978-0240522227. MIT LIBRARY: 002302617. Hardcopy and electronic resource. On course reserve at the Lewis Music Library. Accompanying sound examples: http://www.taylorandfrancis.com/cw/izhaki-9780240522227/p/resources/.

Katz, Bob (2007a). "How to manipulate dynamic range for fun and profit: Part one: Macrodynamics." In: *Mastering Audio. The Art and the Science*. 2nd ed. Focal Press. Chap. 9, pp. 113–8. MIT LIBRARY: 002015727. On course reserve at the Lewis Music Library.

— (2007b). "How to manipulate dynamic range for fun and profit: Part three: The lost processes." In: *Mastering Audio. The Art and the Science*. 2nd ed. Focal Press. Chap. 11, pp. 133–8. MIT LIBRARY: 002015727. On course reserve at the Lewis Music Library.

Katz, Bob (2007c). "How to manipulate dynamic range for fun and profit: Part two: Downward processors." In: *Mastering Audio. The Art and the Science*. 2nd ed. Focal Press. Chap. 10, pp. 119–32. MIT LIBRARY: 002015727. URL: https://stellar.mit.edu/S/course/21M/fa14/21M.380/courseMaterial/topics/topic1/readings/katz2007_pp119-132/katz2007_pp119-132.pdf. On course reserve at the Lewis Music Library.

— (2014). "Additional mastering techniques." In: *Mastering Audio. The Art and the Science*. 3rd ed. Burlington, MA: Focal Press. Chap. 9, pp. 125–39. ISBN: 978-0240818962. MIT LIBRARY: 002307049. On course reserve at the Lewis Music Library.

Senior, Mike (2011a). "Beyond compression." In: *Mixing Secrets for the Small Studio*. 1st ed. Focal Press. Chap. 10, pp. 163–70. ISBN: 978-0240815800. MIT LIBRARY: 002092991. Electronic resource. Accompanying information and sound examples: http://www.cambridge-mt.com/ms-ch10.htm.

— (2011b). "Compressing for a reason." In: *Mixing Secrets for the Small Studio*. 1st ed. Focal Press. Chap. 9, pp. 143–62. ISBN: 978-0240815800. MIT LIBRARY: 002092991. Electronic resource. Accompanying information and sound examples: http://www.cambridge-mt.com/ms-ch9.htm.

— (2011c). *Mixing Secrets for the Small Studio*. 1st ed. Focal Press. 352 pp. ISBN: 978-0240815800. MIT LIBRARY: 002092991. Electronic resource. Hardcopy version at MIT LIBRARY: 002178705. On course reserve at the Lewis Music Library.

Shepherd, Ian (2010). *Using compression to add punch, warmth and power to your mix*. URL: http://productionadvice.co.uk/using-compression/ (visited on 10/13/2015).

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