

Working with ELAN

This tutorial accompanies the chapter “11. Annotating Multimodal Data of Singing and Speaking” by Coralie Vincent in Frank A. Russo, Beatriz Ilari and Annabel J. Cohen (Eds), *The Routledge Companion to Interdisciplinary Studies in Singing, Vol. 1: Development* (2020), pp. 149–166. Routledge. DOI: 10.4324/9781315163734

The tutorial elaborates specific steps complementing the processes described in the chapter.

Page references to relevant sections in the chapter are added in parentheses.

1. Building a Coding Scheme (p. 159)

For example, to define soprano notes, follow steps 1) to 4).

1) Create a Parent Tier and name it (e.g., “Soprano” for the vocals of a soprano singer):

Tier > Add New Tier...

In the “Add Tier” window, type in **Tier Name:** the name of your choice, e.g. **Soprano** (check that **Parent Tier:** says **none**). Click **Add** then **Close** (not clicking **Add** will not create the tier).

Add Tier

Current Tiers

Tier Name	Parent Tier	Tier Type	Participant	Annotator	Input Method	Content La...
default	-	default-It			-	-
Partition	-	default-It			-	-
Tempo	Partition	Typ-Time ...			-	-
Soprano 1	Partition	Typ-Incl In			-	-
Soprano 2	Partition	Typ-Incl In			French (Fr...	-
Metronome	Tempo	Typ-Time ...			-	-

Add **Change** **Delete** **Import**

Tier Name: default

Tier Name: Soprano

Participant:

Annotator:

Parent Tier: none

Tier Type: default-It

Input Method: None

Content Language: None - -

More Options...

Add **Close**

2) Next, define the Controlled Vocabulary for the soprano's notes. Go to

Edit > Edit Controlled Vocabularies...

In the “Edit Controlled Vocabulary” window, type in **CV Name:** the name of your choice, e.g.

notes-soprano. Click **Add** on the right.

Edit Controlled Vocabulary

Controlled Vocabulary

Current CVs
und - undetermined (und)

CV Name

Description

Entries

Entry value

Entry description

ISO Data Category

Now, type in **Entry value:** the lower limit of your choice for the vocal range, e.g. **C4** and click **Add** below. Then type in **Entry value: C4# / D5b** and click **Add**, and so on until **A5** is reached (or any other upper limit relevant for the considered vocal range).

The screenshot shows the 'Edit Controlled Vocabulary' window. The 'Controlled Vocabulary' section is at the top, with 'Current CVs' set to 'notes-soprano' and 'und - undetermined (und)'. The 'CV Name' is 'notes-soprano' and the 'Description' is 'Soprano notes'. There are buttons for 'Add', 'Change', 'Delete', 'Import', 'External CV', and 'Export .ecv'. Below this is an 'Entries' section with a table showing 'und' and 'C4'. To the right of the table are fields for 'Entry value' (containing 'C4# / D5b'), 'Entry description', and 'ISO Data Category'. There are buttons for 'Add', 'Change', 'Delete', and 'More Options...'. At the bottom are 'Sort A-Z', 'Sort Z-A', and 'Close' buttons.

To finalise this step click **Close** for this window.

3) Create the Type for soprano notes. Go to

Type > Add New Tier Type...

In the “Add Type” window, type in **Type Name**: the name of your choice, e.g. the CV Name given in the previous step, **notes-soprano**. Select **Stereotype: Included In** (as notes can be separated by pauses, they are non-contiguous; hence this choice). For “Use Controlled Vocabulary”, choose the CV Name given in the previous step, e.g. “notes-soprano”. Click **Add** then **Close** to exit the “Add Type” window (not clicking **Add** will not create the type).

Add Type

Current Types

Type Name	Stereotype	Use Controlled V...	DC ID	Time-align...
default-It	-	-	-	✓
Typ-Time Sub	Time Subdivision	-	-	✓
Typ-Incl In	Time Subdivision	-	-	✓
Typ-Symb Sub	Symbolic Subdiv...	-	-	---
Typ-Symb Ass	Symbolic Associ...	-	-	---
Nuances	Included In	-	-	✓

Add **Change** **Delete** **Import**

Type Name: default-It

Type Name: notes-soprano

Stereotype: Included In

Use Controlled Vocabulary: notes-soprano

Lexicon connection: [] [] + -

ISO Data Category: [] [] + -

Time-alignable:

Add **Close**

4) Create the referring tier for soprano notes. Go to

Tier > Add New Tier...

In the “Add Tier” window, type in e.g. “Notes S” (“S” is short for “Soprano”) in the **Tier Name:** field. For **Parent Tier:**, choose “Soprano”. Check that **Tier Type:** is the type given in the previous step, e.g. “notes-soprano”. Click **Add** then **Close** to exit the "Add Tier" window (not clicking **Add** will not create the tier).

Tier Name	Parent Tier	Tier Type	Participant	Annotator	Input Method	Content La...
default	-	default-It			-	-
Partition	-	default-It			-	-
Tempo	Partition	Typ-Time ...			-	-
Soprano 1	Partition	Typ-Incl In			-	-
Soprano 2	Partition	Typ-Incl In			French (Fr...	-
Metronome	Tempo	Typ-Time ...			-	-

Add **Change** **Delete** **Import**

Tier Name: default (dropdown) | Notes S (text)

Participant: (text)

Annotator: (text)

Parent Tier: Soprano (dropdown)

Tier Type: notes-soprano (dropdown)

Input Method: None (dropdown)

Content Language: None - - (dropdown)

More Options...

Add **Close**

... Repeat steps 1) to 4) for the other categories and sub-categories in order to create the entire coding scheme.

The coding scheme can be checked in **View > Tier Dependencies...**. To display the Timeline Viewer hierarchically, right-click the left part of the window and select **Sort Tiers > Sort by Hierarchy**.

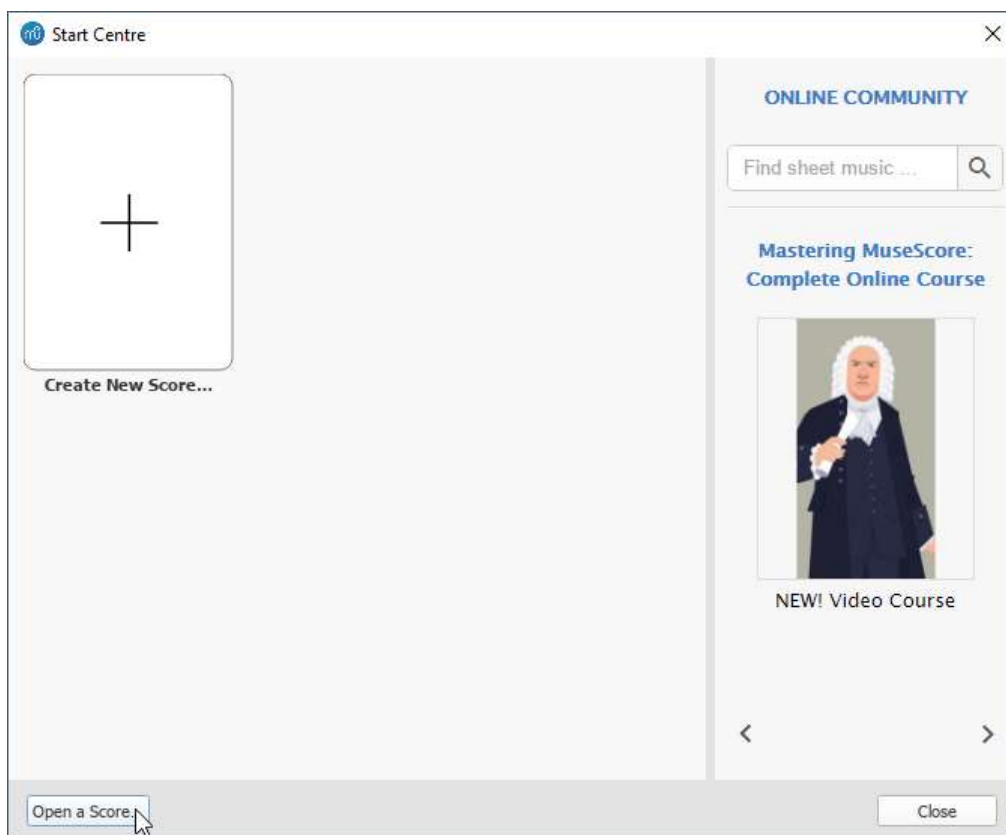
2. Preparing Multimodal Data to Annotate with ELAN (pp. 159–161)

2.1. Music-Score Video (p. 159)

Here is an example of creating a movie from a MIDI file of the score. This requires three software programmes: MuseScore, a text editor, and FFmpeg.

1) Converting a MIDI score to images with MuseScore

In MuseScore's "Start Centre" window, click **Open a score...** to open the MIDI file.



Change the page layout to define the ratio of the final video file (ideally 4:3 or 16:9):

Format > Page Settings...

In the "Page Settings" window define the parameters according to the desired output e.g.:

Page Size: Custom

Unit: * inch

Width: 8.00in

Height: 6.00in or 4.50in (respectively for a 4:3 or 16:9 video file)

The radio button right below should automatically switch to: Landscape

Uncheck:

Two sided

Odd Page Margins should all be set to the same positive value (for example 0.39in).

To save changes and exit the “Page Settings” window, click: **OK**

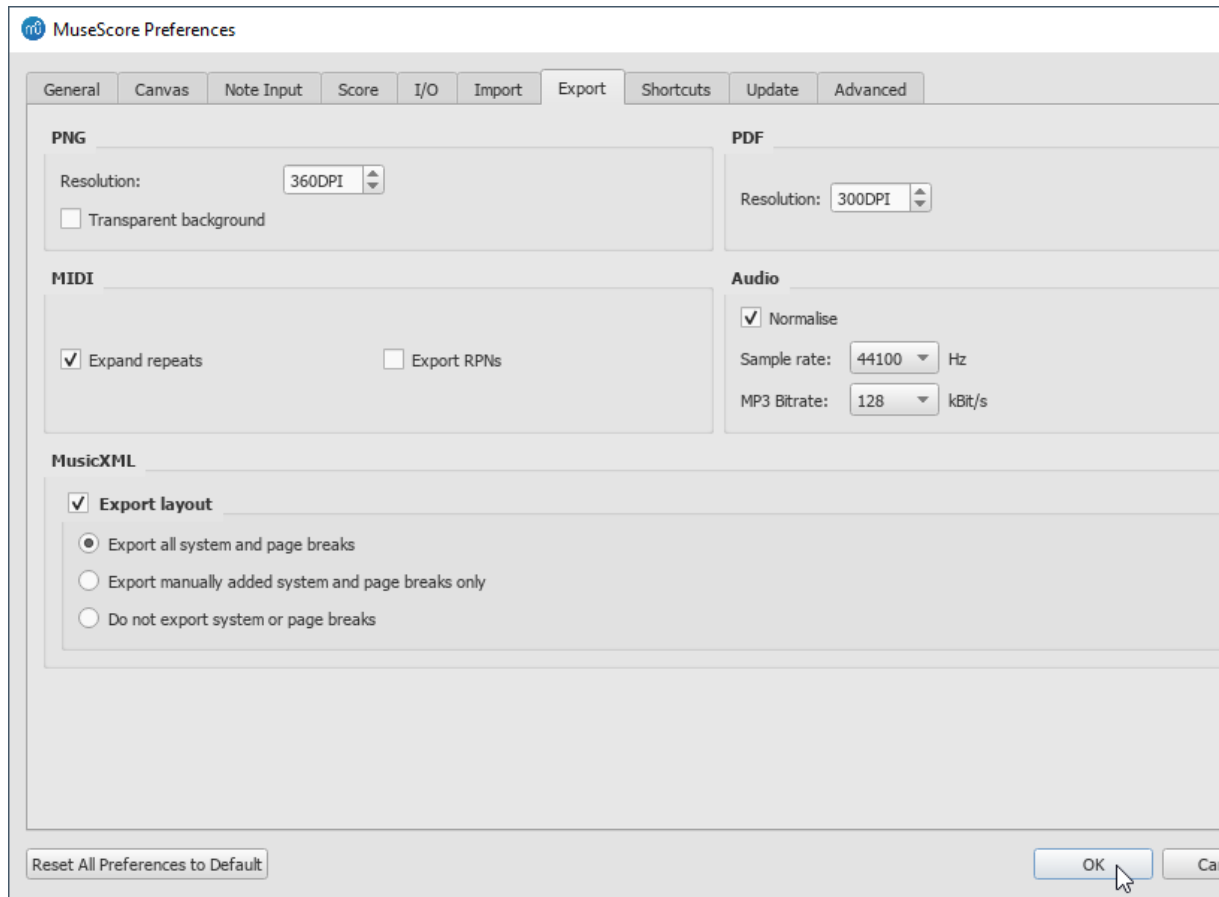


To adjust the background parameter for the images (white or transparent), go to

Edit > Preferences...

In the Export tab, uncheck: **Transparent background**

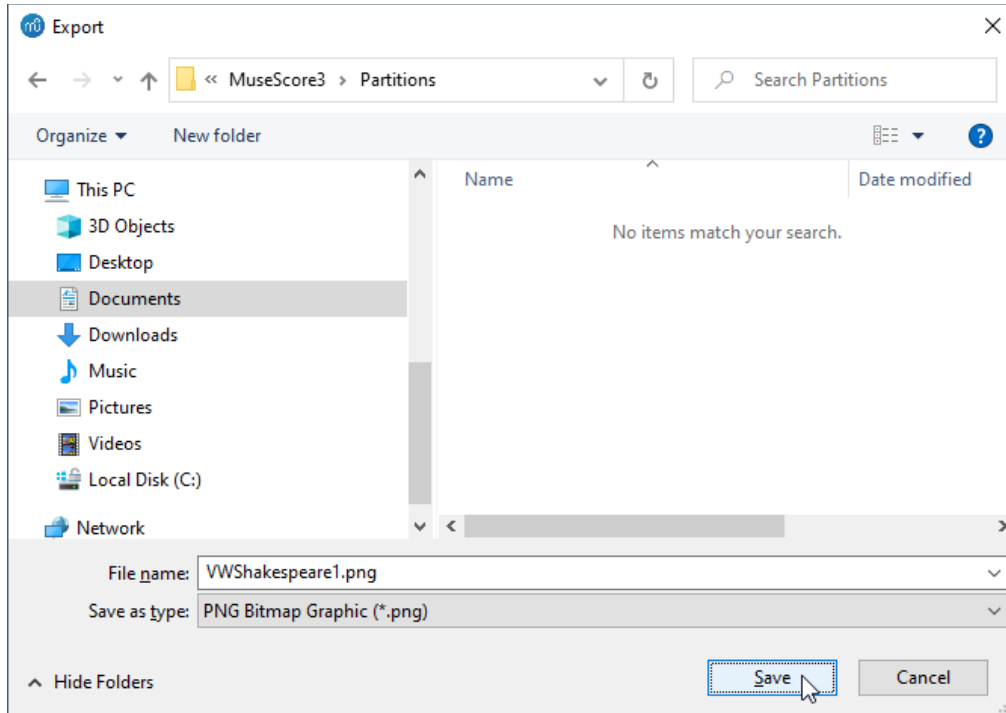
To save changes and exit the “MuseScore Preferences” window, click: **OK**



Finally, in MuseScore main window, go to

File > Export...

In the “Export” window, select **Type: PNG Bitmap Graphic (*.png)** and **Save**.



2) Creating a text file of the timecode of the images in a text editor

Based on the main video or audio recording to be annotated, manually determine the time when each page image is to be displayed (automatic audio-to-score alignment will hopefully be available in the near future; see Gong, Cuvillier, Obin, & Cont, 2015). To set the timecodes, indicate the location of each image and the timecode for the intended display duration in seconds and milliseconds, as follows:

```
file 'path\to\image01.png'
```

```
duration n.nnn # to display the first frame during n.nnn s (format is [s.ms])
```

```
file 'path\to\image02.png'
```

```
duration p.ppp
```

Repeat for all images. The code must end with the path and a repeat of the name of the last image:¹

```
file 'path\to\imageNB.png'
```

For example:

```
file 'C:\Users\cvincent\Documents\ELAN-Chapter\Tutorial\VWShakespeare1-01.png'  
duration 33.640 # to display the first frame during [s.ms]  
file 'C:\Users\cvincent\Documents\ELAN-Chapter\Tutorial\VWShakespeare1-02.png'  
duration 20.640  
file 'C:\Users\cvincent\Documents\ELAN-Chapter\Tutorial\VWShakespeare1-03.png'  
duration 20.480  
file 'C:\Users\cvincent\Documents\ELAN-Chapter\Tutorial\VWShakespeare1-04.png'  
duration 18.280  
file 'C:\Users\cvincent\Documents\ELAN-Chapter\Tutorial\VWShakespeare1-05.png'  
duration 10.760  
file 'C:\Users\cvincent\Documents\ELAN-Chapter\Tutorial\VWShakespeare1-06.png'  
duration 12.440  
file 'C:\Users\cvincent\Documents\ELAN-Chapter\Tutorial\VWShakespeare1-07.png'  
duration 27.680  
file 'C:\Users\cvincent\Documents\ELAN-Chapter\Tutorial\VWShakespeare1-08.png'  
duration 16.400  
file 'C:\Users\cvincent\Documents\ELAN-Chapter\Tutorial\VWShakespeare1-09.png'  
duration 11.200  
file 'C:\Users\cvincent\Documents\ELAN-Chapter\Tutorial\VWShakespeare1-10.png'  
duration 12.580 # Last duration divided by 2 (FFmpeg bug)  
file 'C:\Users\cvincent\Documents\ELAN-Chapter\Tutorial\VWShakespeare1-10.png'
```

¹ Due to a bug in FFmpeg, the last duration should be divided by two (see screenshot above for an example).

3) Open a command window (terminal on Mac and Linux) to run FFmpeg.

Execute the following command to create a movie containing the images:

```
> ffmpeg -f concat -safe 0 -i "path\to\timestamp_file.txt" -vf "scale=640:480,format=yuv420p"
```

```
"path\to\movie.mp4" (scale=640:480 for 4:3; scale=640:360 for 16:9).
```

2.2. Motion Capture Video (p. 160)

Mokka can be used to export data as an image series and create a video sequence of images with FFmpeg. This video will allow to preview motion capture data in ELAN. In this specific case, as all images have the same duration (the reciprocal of the motion capture sampling rate), a video can also be created through Avidemux.

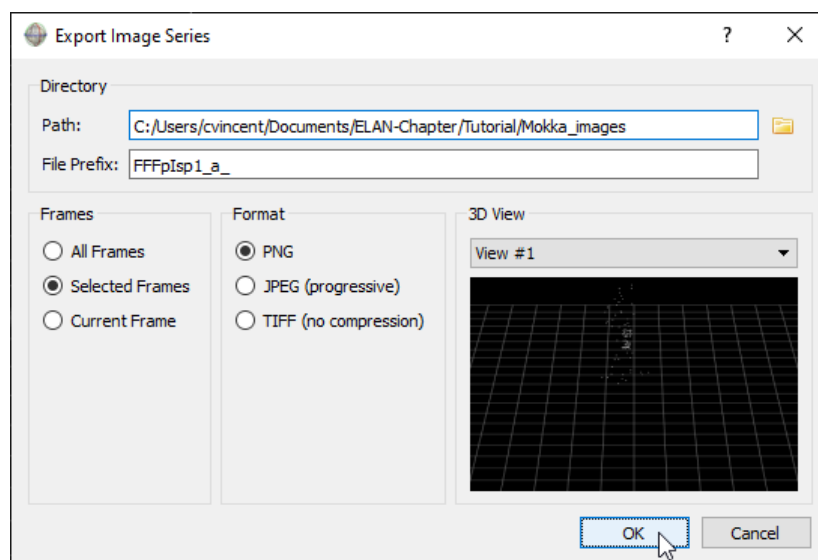
1) Launch Mokka

File > Open...

Select the .trc motion capture (MoCap) file in the “Open” window.

Then go to

File > Export > Image Series...



2) Open a command window (terminal on Mac and Linux) to run FFmpeg.

Execute the following command to create a movie containing the images:

```
> ffmpeg -framerate 120 -i "path\to\images\FFFpIsp1_a_%03d.png" -vf format=yuv420p  
"path\to\movie.mp4" (with MoCap recorded at 120 Hz and images sequentially named  
FFFpIsp1_a_001.png, FFFpIsp1_a_002.png, FFFpIsp1_a_003.png, etc.).
```

2.3.Audio (p. 160)

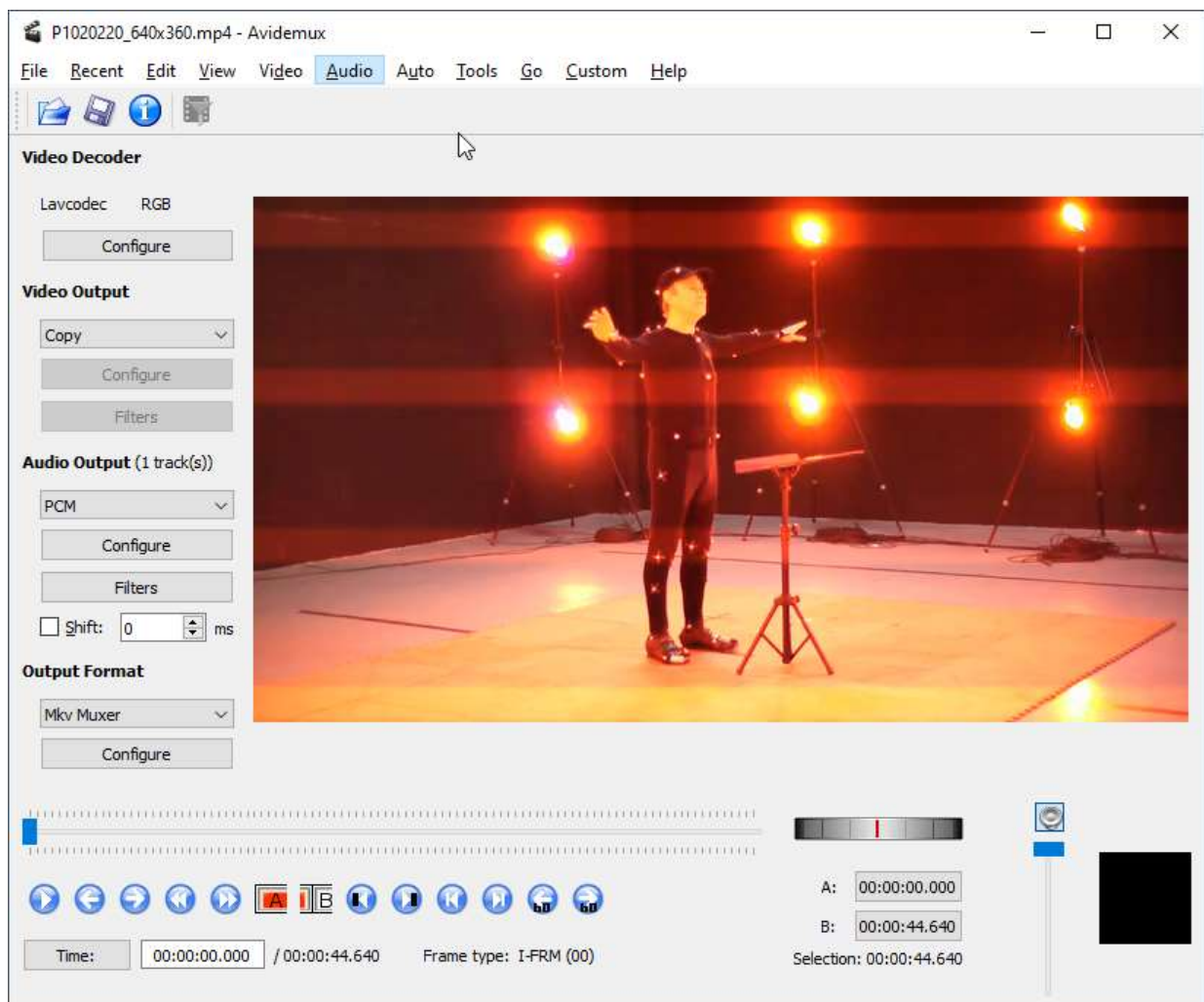
Launch Avidemux

File > Open

Select the video file in the “Select Video File...” window.

Next, on the left side of the main window, choose **Audio Output: PCM** and in the main menu:

Audio > Save audio. Type the audio filename (including .wav).



2.4.Time Series (p. 160, p. 161)

Line graphs can be displayed from .csv files or .txt files containing a pair of time-values (values can be in any range) separated by a comma on every line. Each line has to be written in the following format

Time (floating point value [s.ms]),Value (floating point value [q.qqq])

Example:

0,137.771316681753

0.00833333,137.671734122537

Importing time series

After the time series has been created, it is possible to import and view it (Edit > Linked Files...).

Previously imported media files are listed in the “Linked Files” window, under the **Linked Media Files** tab. In order to link the time series, select the **Linked Secondary Files** tab. Click **Add...**, navigate to the relevant tier file (.csv, .tsv, .txt, .IntensityTier or .PitchTier file). Click **Select** in the “Select” window. In the “Linked Files” window, click **Apply** (otherwise, the file will not be linked). A .xml file containing information about the Linked Secondary Files is automatically created and stored at the same level as the .eaf file (using the same name followed by “_tsconf.xml”, for TimeSeries CONFIguration). The Timeseries Viewer will then open (see Figure 11.1 (3) in the chapter, p. 151).

If this is a direct import without configuration (for example a .IntensityTier or a .PitchTier file), the graph is shown right away. If this is an import with configuration (for example a .csv files or a .txt file with time-value pairs separated with a comma), no graph is shown. Right-click in the Timeseries Viewer, then click **Configure Tracks...**. This opens a window showing the parameters for the graph, including the Derivative of the data: none (0), first (1: velocity), second (2: acceleration), and third (3: jerk). When linking two or more time series files, they can be superimposed in the same TrackPanel, or displayed in different TrackPanels by right-clicking in the Timeseries Viewer.

3. Importing Pre-existing Annotations or Making New ones (p. 161)

3.1. Importing annotations (p. 161)

3.1.1. An Optional preliminary step (p. 161)

To the annotation layer previously exported from Sonic Visualiser, add a column containing the end time (which equals the next start time), as Sonic Visualiser only exports tab-separated time-value pairs (start time and value). For example, a text file with chord estimation:

```
0.000000000 N
```

```
8.618666666 F
```

```
10.325333333 C#maj7
```

```
11.477333333 Bbm
```

should be changed to:

```
0,8.618666666,N
```

```
8.618666666,10.325333333,F
```

```
10.325333333,11.477333333,C#maj7
```

```
11.477333333,12.757333333,Bbm
```

This can be easily done in a text editor or in a spreadsheet program like LibreOffice Calc, and saved as a .csv file.

3.1.2. First step: transforming a .csv file into a .eaf file (p. 161)

```
File > Import > CSV / Tab-delimited Text File...
```

In the “Open” window, navigate to the .csv file and click **Open**.

Next, in the **Import Options** and **Select columns and specify their data type**, select **Begin Time** for column 1, **End Time** for column 2, and **Annotation** for column 3, then click **OK**. A new ELAN window will open, containing the annotations. Save the file in the appropriate folder. It is now possible to **close the file** and go back to the first ELAN file to which these annotations

should be added.

3.1.3. Second step: merging the resulting .eaf file with the original annotation file

(p. 161)

File > Merge Transcriptions...

In **Second source**, find and select the .eaf annotation file that has just been created from the .csv file. In **Destination**, create and save a new .eaf file. In the “Merge Transcriptions” window, click **Next** and then **Finish**. Finally, click **Yes** to open the new transcription in ELAN and close the .eaf file which was used before the merging (it is possible to switch between open ELAN files with the **Window** menu).

3.2. Getting coordinates / positions (p. 161)

Select the tier into which this annotation should be added: double-click its name in the left part of the Timeline Viewer. Pause the video at the appropriate time. Click in the Media Player to copy the location of the mouse pointer into the clipboard. In the Control buttons (see Figure 11.1 (6) in the chapter, p. 151), check “Selection Mode” and click “Go to next frame” for frame-by-frame tracking. Create the annotation: **Annotation > New Annotation Here**. Now, paste the content of the clipboard into the annotation: press the keys “ctrl” (“command” on a Mac) and “v” at the same time. The results should look something like “377,97 [640,360]”; the first two numbers give the x and y positions of the point of interest in the video, and the numbers in square brackets indicate the picture size.

4. Query of Annotations, Generation of Statistics and Saving Results (p. 161)

4.1. Searching in an Annotation File (p. 161)

Once the file is annotated, assessing consecutiveness (for example in *pianissimo* and *mezzo piano* in the Soprano I voice nuances) can be done this way:

Search > Find (and Replace)...

In the “Search Dialog” window, select **An annotation on tier: Nuance S1 that matches: mezzo piano** and click **Add constraint**. Check that **WITH structural constraint** is selected. Right below, select **An annotation on tier: Nuance S1 matches: pianissimo in distance of: -1 to: 1 Nuance S1 annotations**. Then click **Search** at the bottom of the “Search Dialog” window. While this window is open, it is possible to navigate through the search history by clicking **<** or **>** at the top of it. A constraint can also be deleted by clicking **Delete** right below this constraint.

Be aware that regular expressions can be included in the searches by checking the **regular expression** box on the right of the same window. More information about regular expressions can be found in ELAN’s help appendix.

Still in the “Search Dialog” window, the matched substring can be replaced in the results of a search:

Edit > Replace

This operation can be done on a set of files. In the ELAN main window, go to **Search > Find and Replace in Multiple Files...** and click **Define search domain**.

Similarly, a search can be done on multiple annotation files:

Search > Search Multiple eaf...

Software

Used software (version when it matters):

- Avidemux 2.7.3
- ELAN version 5.9
- FFmpeg
- LibreOffice
- Mokka 0.6.2
- MuseScore 3.4.2

Dedication and acknowledgment

The author would like to dedicate this tutorial to the memory of Dominique Boutet, an ELAN enthusiast who had been training colleagues and students to use this software for countless years.

The author deeply acknowledges Dana Cohen for her extremely valuable comments.

Reference

Gong, R., Cuvillier, P., Obin, N., & Cont, A. (2015). Real-time audio-to-score alignment of singing voice based on melody and lyric information. In *Proceedings of Interspeech 2015* (pp. 3312–3316). Dresde, Germany: ISCA.