

# **Cultural Dynamics Program User Manual**

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# 1 Introduction

Cultural Dynamics is a computer program for visualising historical and cultural events, influences and interactions.

The program originated from the author's own need to visualise when people lived, who else was alive at the same time, how they were related, when they created their artifacts, how old they were, which people influenced each other and what other events influenced people or their artifacts. The program creates a diagrammatic **model** of a timespan.

The following basic requirements for a diagram were identified as follows:

- **Simplicity:** as Einstein said, models should be as simple as possible but no simpler. We would like to have as few different symbols as possible so that diagrams can be easily read. The aim is to visualise information without extraneous decoration.
- **Generality:** it should be possible to represent any desired relationship or connection.
- **Consistency:** help the user to ensure internal consistency and completeness.
- **Single Function:** it should not implement functions that other programs do better but should be open to exchange data with other programs.

## What it is not

The program is not intended as a database for storing information. Only the information needed for the diagram is stored.

It is not intended as a general-purpose drawing tool.

## What it is intended to be

It aims to use as few different diagram elements as possible to visualise historical and cultural events and connections between them as a way of converting the data into information and thus knowledge for researchers, teachers, students, authors, and anyone else interested in such things.

## Main Features

Timelines, Events related to timelines, General Events, Untimed Events.

Division of timeline into segments.

Optionally show age on timelines.

Connections between the above: direct, wave, spiral; plain, dotted, dashed; straight or curved.

Connections labelled with names.

Optional Icons for Events and start and end of timelines.

Vague Dates, e.g. 1500 rather than 1500-12-31; intelligent entry (just type the year).

User-defined colour palette.

Hash Tags and comprehensive Filters.

Explore by exposing connections over multiple level, backwards or forwards.

Find function.

Separate texts for overall Introduction and technical notes.

Import selected data from other files.

Reports to extract data, ensure consistency (cross-references), detect missing data. All in html for internal navigation and export to text processors or presentations.

Export of graphics in any resolutions and paper size, e.g. for presentations or documents.

Complete html export for websites.


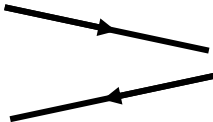


Filter and Find in separate windows to drive presentation from a second monitor.

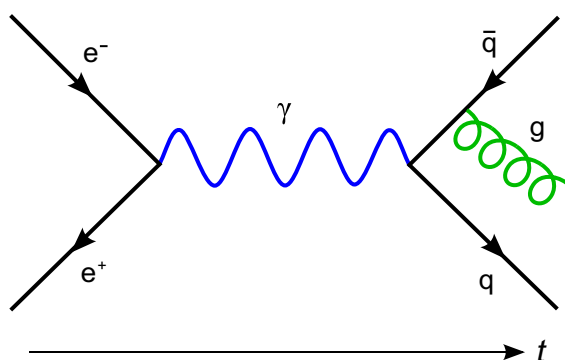
Storage in JSON text file.

## The symbols

I am a fan of simple and clear graphical representation<sup>1</sup>, and when looking for a suitable standard I remembered the physicist Richard Feynman and his Feynman Diagrams<sup>2</sup> (see example in Figure 1-1) and it seemed appropriate to adapt some of the concepts of Feynman Diagrams, namely:

Table 1-1 Feynman Diagram Symbols and their Use

Symbol	Feynman Usage	Our Usage	Comments
Vertex 	Particle created or annihilated. Photon emission or absorption.	Artifact (created or destroyed).	The dot is not always used in Feynman diagrams (see example).
Arrow 	Particle. Anti-Particle (appears to go backwards in time).	Artifact created. Artifact lost or destroyed.	The line will start from an event such as a point in a person's life and end at a artifact. Destruction shows the arrow going backwards in time.
Wave 	Boson, e.g., photon.	Relationship such as influenced, inspired, arranged, commented, translated, etc.	The wave can connect a person or artifact to another person or artifact to denote any kind of influence. The wave seems appropriate for the transmission of ideas between minds.
Helix 	Gluon (exchange particle between quarks).	Family relationship, e.g., parent, spouse.	Appropriate because reminiscent of the DNA double helix.



In this Feynman diagram, an **electron** ( $e^-$ ) and a **positron** ( $e^+$ ) **annihilate**, producing a **photon** ( $\gamma$ , represented by the blue sine wave) that becomes a **quark-antiquark** pair (quark  $q$ , antiquark  $\bar{q}$ ), after which the antiquark radiates a **gluon** ( $g$ , represented by the green helix).

Figure 1-1 Example Feynman Diagram

By Joel Holdsworth (Joelholdsworth) - Non-Derived SVG of Radiate\_gluon.png, originally the work of SilverStar at Feynmann-diagram-gluon-radiation.svg, updated by joelholdsworth., Public Domain,  
<https://commons.wikimedia.org/w/index.php?curid=1764161>

<sup>1</sup> See for example: Tufte, Edward R. The Visual Display of Quantitative Information. Graphics Press, 1983. Envisioning Information. Graphics Press, 1990.

<sup>2</sup> Feynman, Richard. P. Space-time approach to quantum electrodynamics. Physical Review 76:769–789, 1949. QED: The Strange Theory of Light and Matter. Princeton, N.J.: Princeton University Press, 1985.

(I initially named the program “Quantum Cultural Dynamics” or QCD but later dropped the “Quantum” as it is misleading and may discourage non-physicists.)

The program implements the above concepts but does not restrict the user to this level of formality. The objective is to use as few different artifacts as possible to represent the information. More freedom is also accorded by user-defined icons for events.

## 2 Install and Run

### 2.1 Prerequisites

A Java runtime environment must be installed. This is available free from Oracle at [www.java.com](http://www.java.com).

### 2.2 Download

Download the program from <https://ashepherd.eu>.

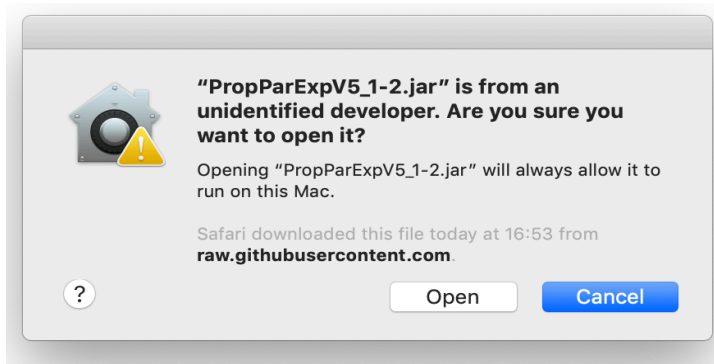
You can extract the manual and some icon files when the program is running – see chapter 9).

### 2.3 Run

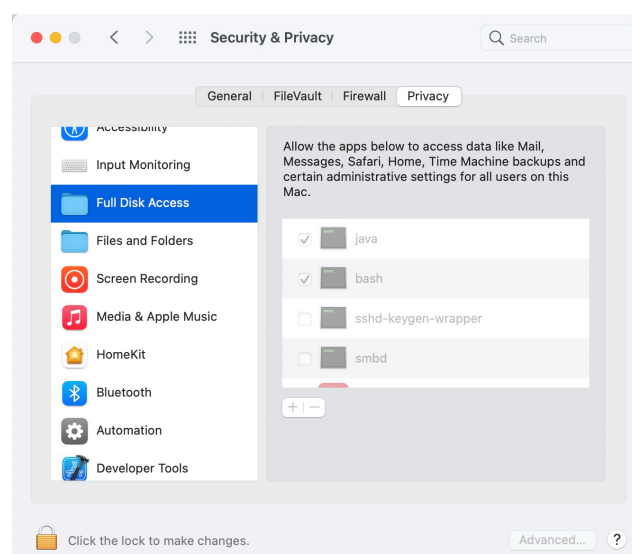
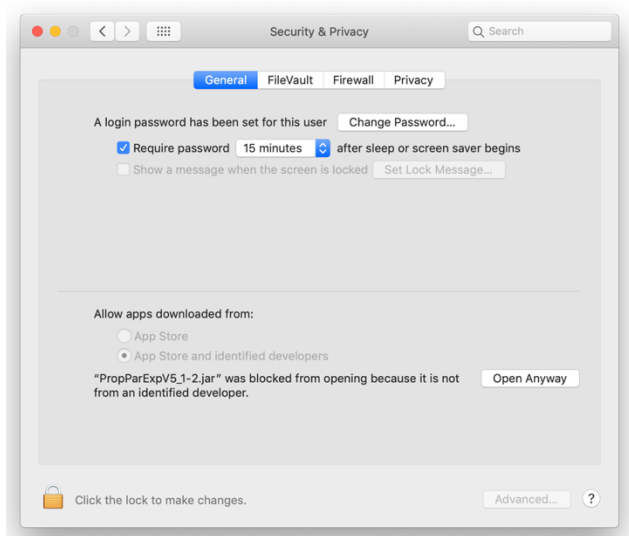
Run the program by double-clicking on the .jar file.

Notes for Apple MacOS

- Apple MacOS has tighter security restrictions on downloading and running unsigned files. The program file is not signed, so the user must confirm download and execution.



- This can be circumvented by control-clicking on the jar file and selecting "Open", which will then ask if you want to open it.
- Alternatively, you can go to System Preferences – Security and Privacy and in "Allow apps downloaded from", select "Open Anyway" as shown below:



It may also be necessary to permit access to the disc in the Apple System Preferences:

**Unix:** You may have to set the downloaded jar file to "executable" in the properties. Either double click the jar file or run from the command line (see 2.4). This depends on the Unix distribution and its user interface.

## 2.4 Running the Program from the Command Prompt

To run the program from a command prompt:

Start a Command Prompt, e.g., in the Windows start menu under Windows System, on Mac OS start a terminal window.

Change the directory to the folder<sup>3</sup> where the .jar file is saved.

Type the following command:

CulturalDynamics\_v11\_00.jar (or the file name with the current version)

## 3 Saving Your Data

The data is saved in a JSON file. This is a standard for the exchange of data over the internet – see

<https://www.json.org/json-en.html>.

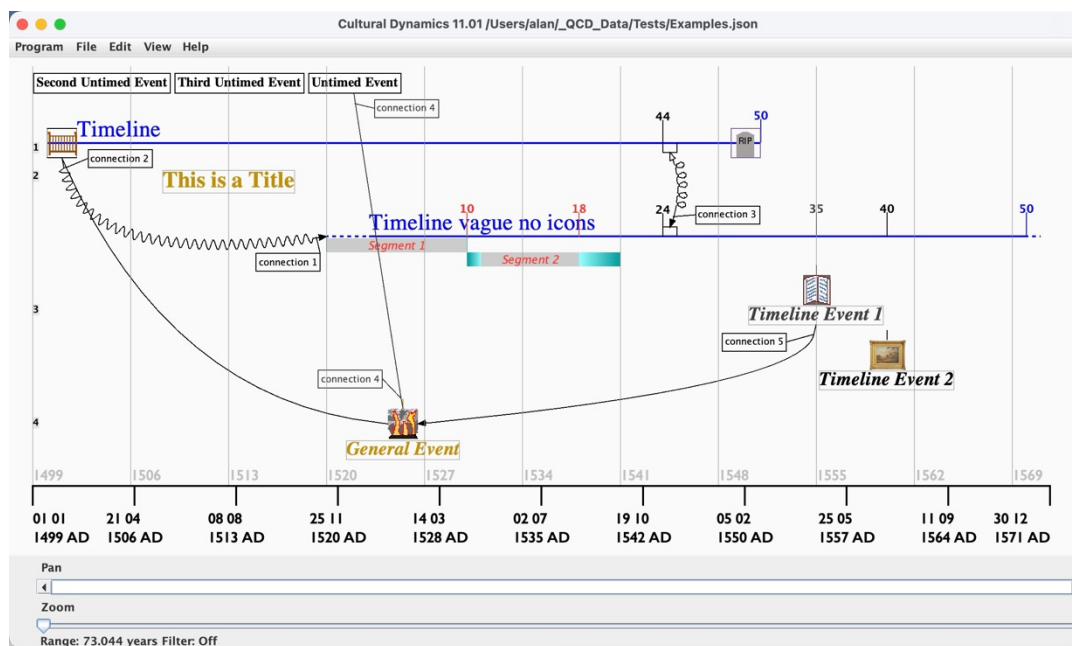
To save the data, use the File menu Save or type Ctrl/Cmd-S. To save the data to a different file, use File – Save As.

As there is currently no undo function, it is recommended to make a copy of the file before making major changes.

## 4 Overview

### 4.1 Diagram Components

The origin of the components was explained in chapter 1. The diagram below shows examples and further details are given in the subsections.



From top left to bottom right:

- The title bar with the program version and the currently open file.
- The menus Program, File, Edit, View, Help.
- Untimed events.
- A Timeline with start and end icons.
- An event used as a title.
- A Timeline with vague start and end dates and two segments. Segment 2 has vague start and end dates.
- Two Timeline Events on the timeline with different icons.
- A General Event

<sup>3</sup> The terms “directory” and “folder” are synonymous - the usage depends on the operating system.

- Connections – connection 1 as a curved wave, connection 2 as direct curve, connection 3 as a curved helix with forward and back arrows, connection 4 as a straight line, connection 5 as a curved line with forward arrow.
- The time axis.
- The pan and zoom controls.
- The status bar with the currently shown timespan and the active filter.
- The row numbers are shown down the left-hand side.

The left, right, top and bottom margins can be set in the preferences.

#### 4.1.1 Rows

Events are placed in horizontal rows. Row numbers are displayed down the left side if the corresponding preference is set or if the row editor is open (see section 7.8).

Rows can be moved up or down. Empty rows can be added or deleted. To save vertical space, multiple timelines and general events can be placed in the same row, but only if they do not overlap.

Rows can be left empty for spacing the layout. The minimum space between rows can be set in the preferences.

Multiple events can be placed in the same row to save vertical space. Timelines and General Events cannot overlap in a row, and the minimums space between them can be set in the preferences.

#### 4.1.2 Events

Events represent a point in time or a duration, e.g., a person's life, a war, an epoch, an artifact created by a person, a letter written, a battle, a natural disaster. An event has a start date, and optionally an end date. These can also be given with an earliest and a latest date if the exact dates are not known.

There are four types of events:

- Untimed Event
- Timeline
- Timeline-Event
- General-Event.

An **Untimed Event** appears at the top of the graphic, above the first row. Untimed events have no time information and are used for summaries or similar; they can be connected to other timelines and events. If there are too many to fit in the width of the window, they are divided into multiple lines.

A **Timeline** is intended to represent an extension in time, e.g., a person's life, a war, an epoch. A timeline has start and end dates which may be vague, i.e. given with an earliest and latest date. A timeline can have segments – see 4.1.5.

**Timeline-Events** are points in time associated with a timeline, e.g., a work created at a point in an artist's life and are drawn below the timeline in the same row. Their dates can be vague. There is a preference to "Stack Timeline Events" which places timeline-events so that they do not overlap each other.

**General-Events** are points in time independent of a timeline and can be placed in any row where they will fit. Their dates can be vague. General-Events can also be used as titles within the diagram.

An event must have a unique name. The names of Untimed Events, Timeline-Events and General-Events can have more than one line of text.

An event will fit in a row if its dates do not overlap with any event already in the row, including the minimum number of days between entries – the "Minimum X Gap" in Preferences (see 5.1.3). This does not prevent the event icons from overlapping at low magnifications.

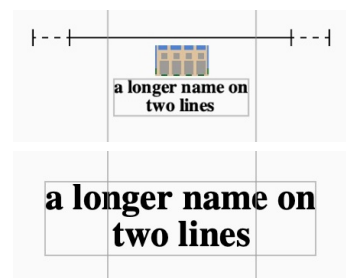
#### 4.1.3 Icons and Names

Icons for a timeline overlap the ends of the timeline – the left edge of the start icon is at the earliest start date and the right edge of the end icon is at the latest end date. Names of timelines appear on the right of the start icon and are moved along the timeline if the start is panned off screen.



Timeline-event names are centred below the icon.

Icons for general-events are centred at the middle of the earliest and latest dates.



If the general-event is used as a title, the icon is not shown, and a different font is used. The title is kept visible as long as the earliest or latest dates given for the event are visible. This allows control over when the title will be shown in conjunction with other events.

#### 4.1.4 Ages

Points that affect a timeline can additionally show the time elapsed from the beginning of the timeline until that point (years from the start of the timeline), e.g., the age of the person when a timeline-event occurred, or when a segment started or ended, or when a connection starts or ends. The age is measured from the earliest start date of the timeline.

The age is shown in the colour of the corresponding event, segment or connection.

#### 4.1.5 Segments

Segments show divisions of a timeline, e.g., where a person lived or what position they had, phases of a war, etc.

These are shown below the timeline. There can be up to 10 lines of segments below each timeline.

Segment boundaries are shown with a vertical line, or, if the dates are vague, i.e. a late date is given, as a gradient-shaded rectangle.

Segments can extend beyond the start or end of the timeline.

#### 4.1.6 Connections

Connections are lines between events to represent relationships such as spouse, parent - child, teacher - student, influence on a person or artifact, copying, arranging, destruction, etc.

Connection lines can be plain or can be a wave or helix in reminiscence of Feynman diagrams as shown above.

They may be straight or curved, dotted or dashed and may have arrowheads.

Connections have a label which can be displayed at the source, destination, both or neither. The label is surrounded by a rectangle and has a linkage to the connection line. The label can be dragged to the desired position relative to the connection end. The dragging is limited to the visible screen area so that the connection cannot inadvertently be moved to a point where it is no longer visible or moveable.

Connections are identified by the source event name, destination event name, and an index to differentiate between multiple connections between the same two events in the same direction, so the label does not have to be unique.

Connections will enter the destination icon or leave the source icon or name of an event at the appropriate edge or corner depending on the direction. This may change depending on zoom magnification and filtering.

Likewise, the linkage between the label box and the connection will join to the label box at the appropriate point. The linkage joins the label box to the connection line at the tail of the arrow, or if there is no arrow, on a straight line of the same length. The arrow lengths are set in preferences.

The position of the label box relative to the source or destination end is saved in the data. When a label is clicked it is highlighted together with the associated connection line and can be dragged. A label can also be double clicked to open the connection editor.

#### 4.1.7 Zoom and Pan

As a typical timeframe will contain a lot of data, items will overlap and may be unclear at this high-level view, so there is a zoom control to magnify the time axis. A pan control enables the magnified timeframe to be traversed.

The initial magnification displays the entire period covered. The maximum zoom magnifies such that the diagram width displays one year. The current range of time in decimal years is shown in the status line.

The zoom control is logarithmic so that there is finer control at lower magnifications.

### 4.1.8 Time Axis

This is shown along the bottom of the diagram dividing the width into 10 equal periods, labelled with the dates. The first and last dates are indented to stay within the margins.

Since months and years are of different lengths, these will not necessarily be neat month or year boundaries.

To compensate for this, the year boundaries are shown as vertical lines labelled at the top of the window. These will not necessarily be equally spaced.

The range is always extended backwards to the beginning of the previous year and forwards to the end of the following year to allow the zoom to function in extreme cases.

## 4.2 Editors

There are editors for events, connections, preferences and rows. The editors provided for creating and changing data all work on the same principle. They open showing the current values of the data or the default values for new data.

Multiple editors can be open at the same time.

The OK button updates the data according to the inputs and closes the editor window.

The Apply button does the same but leaves the window open so that further changes can be made on seeing the effect.

The Cancel button closes the window without changing anything. When the editor is next opened, the old values will be shown.

If necessary, data shown is refreshed when the editor gains focus, as the data may have been changed by other editors.

The Delete button deletes the item.

Any other buttons are described below.

## 4.3 Window Positioning

The windows are initially distributed on the screen as follows:

The main screen is at the top left. The Filter window is at the top right and the Find window at the bottom right.

Reports cascade from the top left. All other windows cascade from the top right.

All the windows can be moved and resized.

With multiple monitors, the positioning is on the same monitor as the main window.

The Filter and Find windows are only positioned as above when initially opened. After that they will always re-open at the position where they were closed. This is to facilitate presentations using a projector or second screen: the main window can be on the projector and the Filter and Find windows on the controlling laptop invisible to the audience.

## 4.4 Dates

Times are given by calendar dates to the precision of one day, but since historical times are not always known exactly, they can be given as an earliest and latest possible date, and these are represented on the diagrams by a corresponding bracket over the time for general- and timeline-events and by dotted lines at the beginning and end of timelines.

All dates are in the format YYYY-MM-DD EE where:

YYYY is the four-digit year

MM is the one or two-digit month

DD is the one or two-digit day of the month

EE is the epoch AD or BC – this can be omitted when typing and will default to AD.

Data entry is further facilitated as follows:

If you type only a year in the earliest date and go to the latest date (tab or click on it), the dates will be preset to span that year.

If you only type a year and month, the dates will be preset to span that month.



Exact dates must be given as the earliest date when the latest date is blank.

### Handling living people or unfinished events

Set the earliest end time to the current date, no latest end time, and a suitable end icon, e.g., a green right arrow. The date then indicates when the file was created and thus how up to date the information is.

## 4.5 Icons

Icons are small graphics used to represent events and the start and end of timelines. Most standard graphics file formats can be used, e.g., .PNG, .JPG, .GIF.

The program expects to find the icons in the directory set in the preferences (see 5.1.2), and if this is not set it will expect a folder named “icons” in the user’s home directory.

Some basic icons are provided with the program, and these can be extracted to the desired folder (see 9).

Users can make their own icons with any pixel graphics program, e.g. [Pixen](#).

When drawing your own icons, it is recommended to ensure that they go to all the edges so that they will connect with lines (see 4.1.6 and 10.3). This can be achieved by giving them a background or a frame.

They should also have some transparency because they overlap the start and end of timelines.

The icon directory for each icon is NOT saved in output files, otherwise this would overrule the preference, and when receiving files from others the directory is likely to be different. The Output/Input file therefore only contains icon file names, and when exchanging files with others, the icon files need to be provided as well.

If icons are missing, a default icon of a small grey square is used.

## 4.6 Colours

Events, segments and connections have colours. These are selected from a palette to ensure that colours can be used consistently. A default palette is created when a new diagram is started. Users can define their own colours and delete the default colours – see 5.1.4.

The colours can be named for their purpose to ensure consistency, e.g., green for philosophers, red for artists, green for writers or to differentiate types of connections, etc.

The transparency or alpha value should be used to allow overlapping items to be visible, e.g. make connections slightly transparent so that they do not obscure other items.

The cross-reference report (see 8.4.2) shows where each colour is used and unused colours.

## 4.7 Metadata

### 4.7.1 Tags

Tags are attributes of events and connections used for filtering. They are similar to hash tags used in social networks on the internet. They consist of a # followed by any number of lower-case letters and numbers and underline. (Upper case letters are not allowed because this is usual in other applications, and it avoids having to take care to get the case right when filtering.)

### 4.7.2 Tags and Connections

Two possible strategies for handling connections are as follows.

- Add the tags of the source and destination events. The Missing Metadata Report can then be used to find connections that have less than two tags. Disadvantage: if other filter criteria are used you must ensure that all connections have the appropriate additional tags.
- Do not put any tags on connections and set the filter option “Show items with no tags”. In the Preferences for the Missing Metadata Report, set the Connection Tags to “< 0” so that no missing tags are reported for connections (see 5.1.7). This ensures that all connections will be shown in a filtered view.

### 4.7.3 Description

Events and connections have a description field for a plain text giving any details that the user desires, e.g., source references, details of the item, etc. They can contain any characters, including the separator.

### 4.7.4 Links

Events and connections can have any number of links to Internet sources. These consist of a text, which is displayed in the metadata, and the link itself which is opened in the system browser when the text is clicked.

Note: there is a known bug in Java Mac OS that may cause an error with URLs that contain special characters (e.g., accents)<sup>4</sup>. This can sometimes be solved by substituting the unaccented character in the URL.

#### Location from Google Maps

To make a link to show a location on Google Maps, go to Google maps in your browser, search for the location, click “Share” and “Copy link”. Paste this into the URL in the editor. Pasting directly from the browser address line does not work.

#### Location from Apple Maps

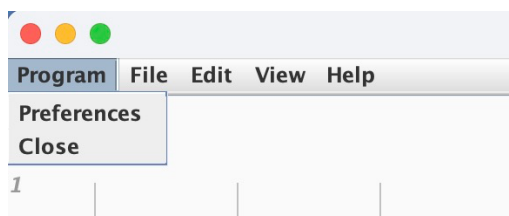
To make a link to show a location with the Apple Maps app on Mac, search for the location in the Maps app and use the right mouse and Share and Copy. Paste this into the URL in the editor.

### 4.7.5 Introduction

The Introduction text is intended for an overall description of the diagram, list of references etc. This can be included in the summary report.

There is a separate text to document technical details such as how the tags are designed and any other conventions. This is not shown anywhere other than in the editor (see 7.9).

## 5 Program Menu



### 5.1 Preferences

#### 5.1.1 Overview

The preferences are basic settings that apply generally, i.e. not to any specific item.

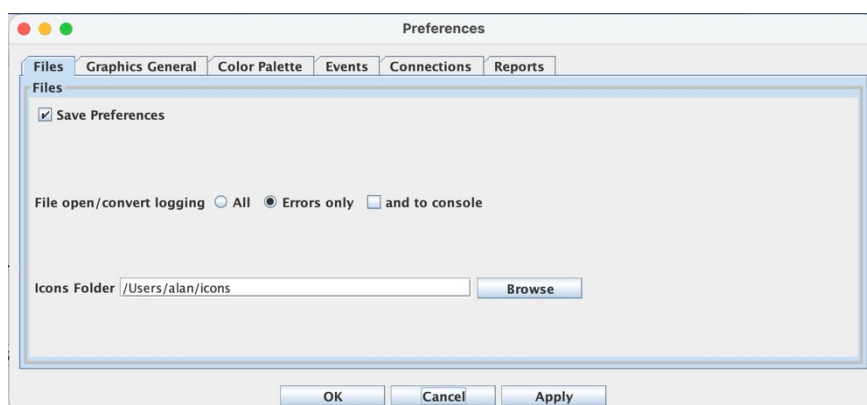
They can optionally be saved with the data. If no settings are in a file when it is opened, the default values are used.

Preference settings can be saved by setting them up in a new file and saving the empty file. A copy of this can be opened to start a new project with those preferences.

---

<sup>4</sup> <https://bugs.openjdk.java.net/browse/JDK-8255754?attachmentOrder=asc>

### 5.1.2 Files Tab



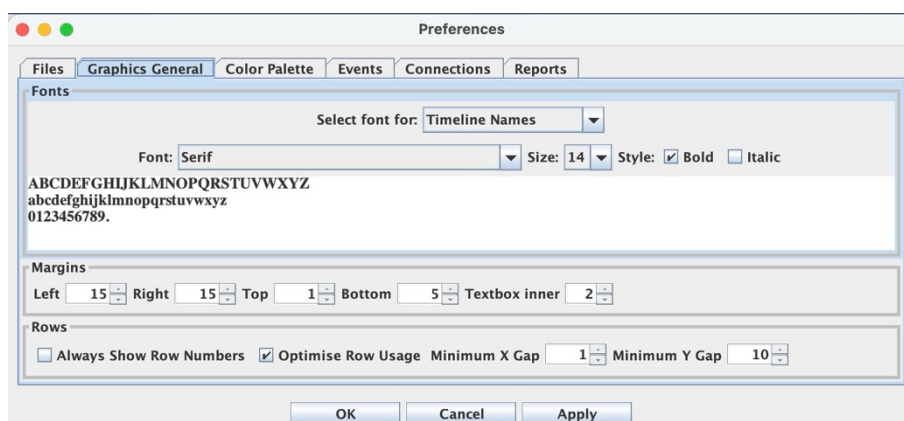
**Save Preferences** – check this box to save the preferences to the output file so that the preferences will be the same when the file is next read. It is preset to on and is de-selected if a file with no preferences is read.

**File open/convert logging** – **All** will log all lines read from the input file, **Errors only** will only log errors, **and to console** will additionally output the log entries to the java console (may be useful if the logging window fails).

Note: this setting is not saved to the file – you don’t want the setting you chose for reading a file to be changed by the file itself.

**Icons Folder** – select the folder from which the icons will be read, and where the program will start browsing for icons (the default icon folder). This will be set if icons are extracted from the program .jar file – see 9.

### 5.1.3 Graphics General Tab



**Fonts** – first select the type of text in the upper field “**Select font for:**” and then select the font, size and style. The result is shown in the sample text. The following fonts can be changed:

- Timeline names
- Timeline segments
- Timeline ages
- General- or Timeline-Event names
- Untimed Events
- Time axis
- Row numbers
- Titles (General Events used as titles)

The colour of the font is determined by the colour of the item. The time axis is always black and the row number grey.

**Margins Left, Right, Top, Bottom** – set the size of the area around the graphic in pixels.

**Textbox inner** – set the size of the inside margin for text boxes, i.e. untimed events and connection labels.

**Rows:**

**Always Show Row Numbers** – if checked the row numbers are shown in the margin down the left side of the graphic and can be double-clicked to start the row editor on that row. If it is not checked, row numbers will only be shown when the row editor is open (see 7.8).

**Optimise Row Usage** – if checked, the First Fit option will be preset for new events.

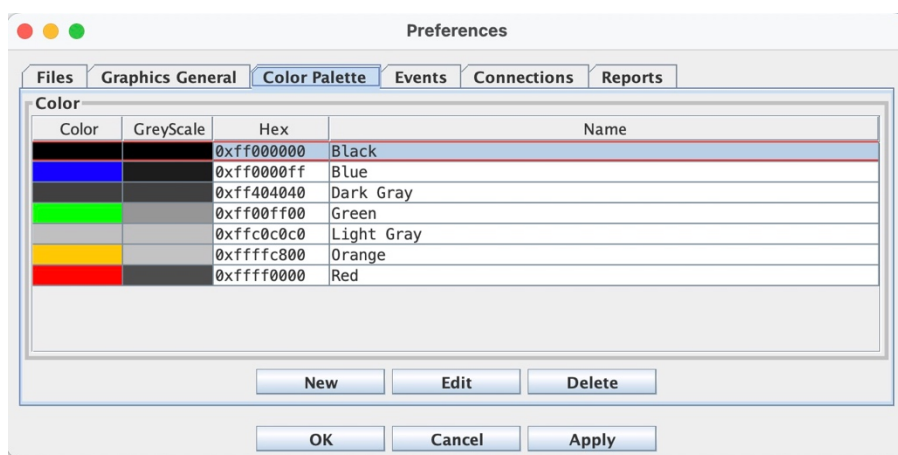
**Minimum X Gap** – the minimum number of days to be left between events for them to fit in the same row.

Note: this only applies to the times; the icons and names may still overlap at low magnifications. Any rows that do not adhere to the set value will be listed in a message and the editors of the events that are too close together will be opened.

**Minimum Y Gap** – the minimum number of pixels to be left between rows and the height of an empty row.

Note: if this is set to 0, the row numbers of empty rows will overlap.

### 5.1.4 Color Palette Tab

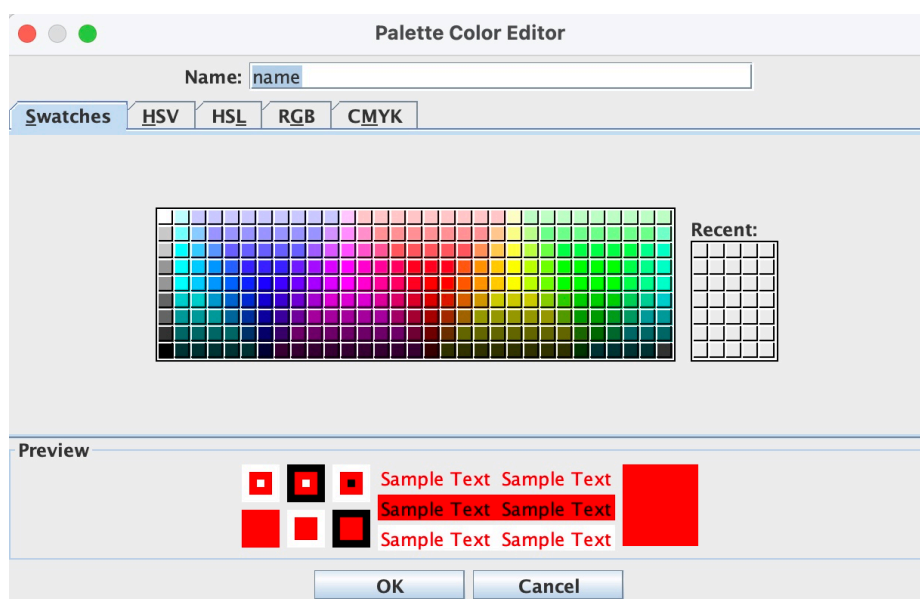


The current palette is shown in the table. The **GreyScale** column shows approximately how the colour will appear on a black and white printer – use this to make sure the colours can be differentiated if so desired.

The **Hex** column shows the hexadecimal value of the colour. “0x” indicates that it is a hexadecimal number. The following digit pairs are the Opacity, Red, Green and Blue values. This is the same format as saved to the data file.

**New** brings up a Palette Color Editor window where a new colour can be defined.

When a colour is selected by clicking in the table, the selected colour is indicated with a red rectangle and can be changed with the **Edit** button. This brings up the colour editor. The name can also be changed here to rename the colour.



**Delete** removes the selected colour from the palette.

The Palette Color Editor has tabs with different methods of defining the colour:

**Swatches** – a set of predefined colours.

**HSV** – Hue, Saturation, Value colour model

**HSL** – Hue, Saturation, Lightness colour model.

**RGB** – Red, Green, Blue colour model

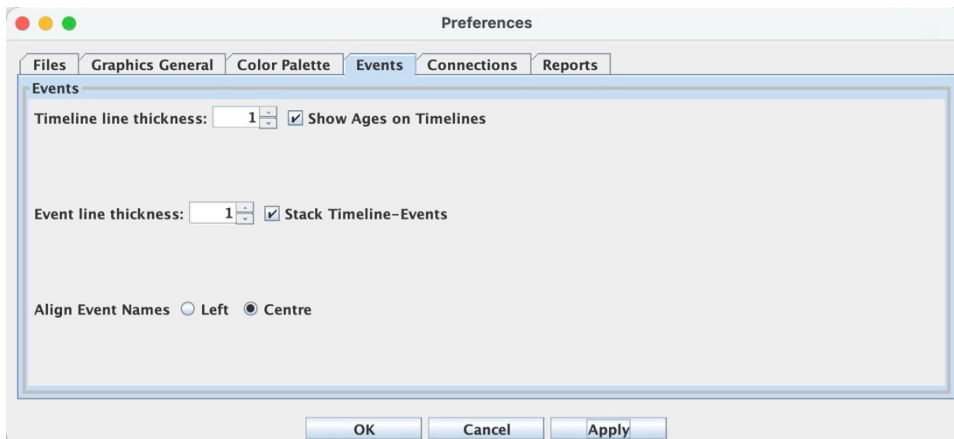
**CMYK** – Cyan, Magenta, Yellow, Key (black) complementary colour model.

The Preview panel shows the colour against white and black backgrounds.

The colour model tabs have a slider for Opacity or Alpha. Reducing this lightens the colour and allows other items that might otherwise be obscured to shine through them.

Note: the new, changed or deleted colour is not saved until OK or Apply is clicked on the main Preferences window and is not written to the data file until File - Save or Ctrl/Cmd-S is used.

### 5.1.5 Events Tab



**Timeline line thickness** – the height of timeline lines in pixels.

**Show Ages on Timelines** – if checked, the ages are shown above the timelines.

**Event line thickness** – the width of the lines between timeline-events and their timelines and for the time bracket of vague general- or timeline-events.

**Stack Timeline-Events** – if checked, timeline-events will be “stacked” or staggered so that they do not overlap. As the magnification of the display is increased, the events will move to minimise the vertical space required.

**Align Event Names** – select whether the names of Untimed-Events, Timeline-Events and General Events will be aligned left or centred. This is applied to names with more than one line. It does not apply to connection labels.

### 5.1.6 Connections Tab

#### Wave Parameters:

Amplitude – the height in pixels of waves for wavy lines.

Wavelength – the length of one cycle of the wave in pixels.

#### Helix Parameters:

Amplitude – the width of a helix loop in pixels.

Helix Pitch – the distance between loops in pixels.

#### Dot-Dash Parameters:

Mark – the length of the mark of a dot or dash.

Gap – the length of the gap between dots or dashes.

Dot – the lengths of the marks and gaps for dotted lines.

Dash – the lengths of the marks and gaps for dashed lines.

Dot-Dash – the lengths of the marks and gaps for the dots and for the dashes.

Note: To use dotted and or dashed connections with wavy or helix lines, the wave and helix parameters will need to be adjusted in conjunction with the dot and dash settings to give the desired effect. Flexibility has been given priority over usability in this case.

#### Arrow Parameters:

Arrow Length: the length in pixels of the arrow heads.

Arrow Tail Length: the length in pixels of the straight tails of the arrows.

Half Arrow Width: the width in pixels of one side of the arrows.

#### Bézier Curve Presets for New Connections:

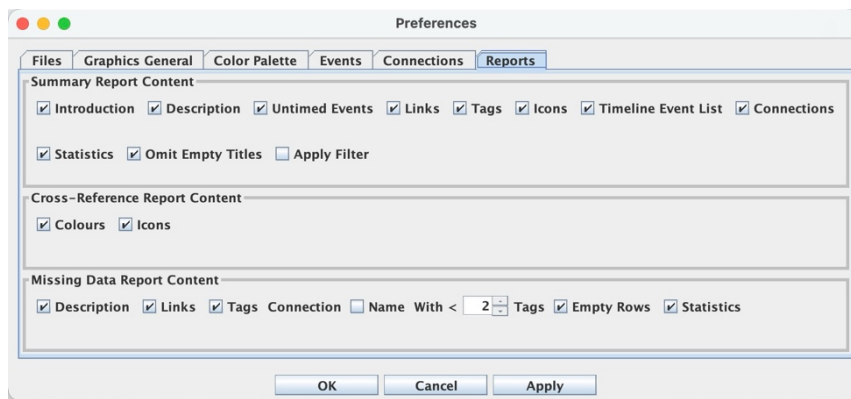
Curved Lines: check to preset new connections to be curved.

Bézier Control Point X and Y: the default values of these for new connections.

### 5.1.7 Reports Tab

This tab is used to configure the contents of the summary, cross-reference and missing metadata reports.

Ticked sections are included in the report. Other specific fields are described below.



### Summary Report

**Statistics** gives a summary of the numbers of timelines, events and connections at the end of the summary report.

**Omit Empty Titles** if checked will leave out the titles of sections that have no data. This is useful if an item of data or metadata is not wanted in the file.

**Apply Filter** if checked will only list those timelines, events and connections that are selected by the currently active filter (see 8.1).

### Cross-Reference Report

(No specific fields)

### Missing Data Report

**Connection Tags** reports connections that have less than the set number of tags. It can be set to 0 to avoid reporting connections that have no tags or set to 2 to ensure that all connections have tags for both source and destination (see 4.7.2).

**Statistics** gives a summary of the numbers of timelines, events and connections at the end of the summary report.

**Empty Rows** when checked will list all empty rows. They are coloured green if they are to be kept empty and red if not (see section 4.1.1 and 7.8).

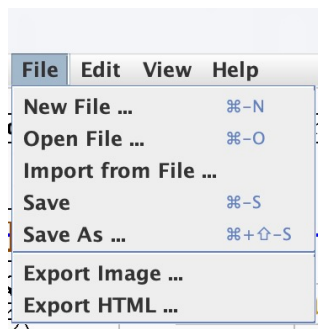
The settings are saved in the data file.

The settings are included in the headings of the reports so that it is clear what metadata was included when reading them later.

## 5.2 Close

This closes the program having checked with the user whether any unsaved changes should be discarded.

## 6 File Menu



## 6.1 New File

This deletes all the data ready to start a new session. The preferences are set to default values. These can be modified in Preferences – see 5.1.4.

## 6.2 Open File

Deletes all the data and opens a new JSON data file.

If preferences were not saved to the file, the default values are used.

Errors are logged in red in an error log window. If “File read logging” is set to “All” in the preferences (see 5.1.2), all lines read from the file (except empty lines and comment lines) will be logged in a new window. If this is set to “Errors only”, only errors will be logged (if any).

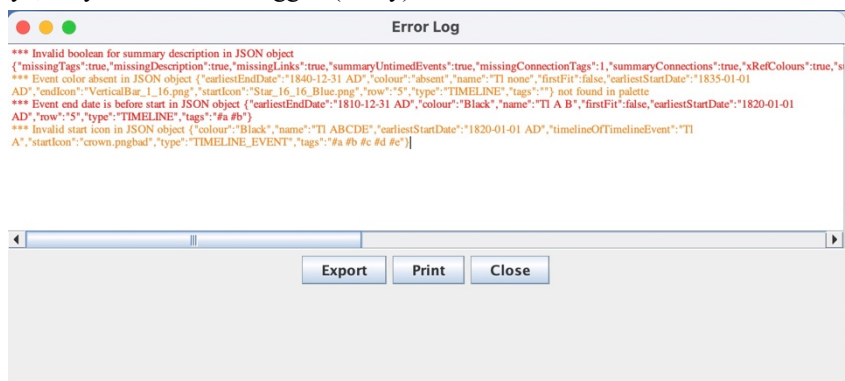


Figure 6-1 Error log showing errors only

If colours are encountered which are not in the palette, a warning is logged and the first colour in the palette is used.

The window includes buttons:

**Export** – to export the log to an html file that can be read later in a browser.

**Print** – to print the log.

**Close** – to close the window.

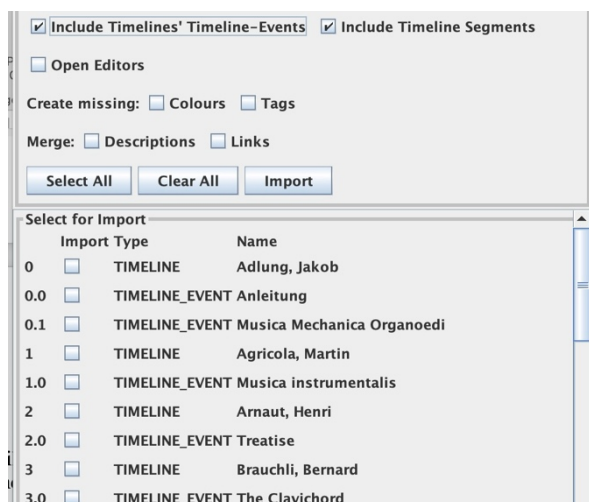
## 6.3 Import from File ...

Import selected data from another file.

First, the file from which to import is chosen. This must be a JSON file as written by the program.

Then a window is opened showing the contents of the file to be imported and the various options.





The lower part, Select for Import, lists the contents of the file, with each item numbered hierarchically for convenience and to relate to the log (see below). The order is fixed:

- Timelines
- Timeline-Event of the timeline
- Untimed Events
- General Events
- Connections

Figure 6-2 Import Selection Window

Each row has a checkbox – only those entries whose box is checked will be imported.

The options in the Import section are:

#### **Include Timelines' Timeline-Events**

Check this to automatically check or uncheck the timeline-events of a timeline when the timeline is checked or unchecked.

#### **Include Timeline Segments**

Check this to include the segments of a timeline.

#### **Open Editors**

If this is checked, an editor will be opened for each item imported. This is to make it easier to validate or modify the imported items. The menu View – Close Editor Windows can be used to close them all.

#### **Create Missing:**

##### **Colours**

If this is checked colours from the imported data which are not already defined in the open file will be created. If it is not checked, missing colours will be omitted, and the default colour will be used in the result.

##### **Tags**

If this is checked, tags from the imported data which are not defined in the open file will be created. If it is not checked, missing tags will be omitted.

#### **Merge:**

##### **Descriptions**

If this is checked, imported events and connections that already exist will have their descriptions added to those of the corresponding existing events.

##### **Links**

If this is checked, imported events and connections that already exist will have their links added to those of the corresponding existing events.

#### **Select All**

This button checks all the checkboxes in the list so that the entire import file will be processed.

#### **Clear All**

This button unchecks all the checkboxes.

## Import

This button starts the import.

The import runs in several passes:

1. The timelines.
2. The timeline-events. These can be imported without their parent timeline if that already exists in the target data.
3. Untimed events and general events.
4. Connections.

This sequence ensures that the data on which an item depends would have been imported previously, e.g. the parent timeline of a timeline-event or the source and destination events of a connection. The import can be done in batches by checking and unchecking the items.

If an item already exists and no merge checkboxes are selected, an error is logged, but the import continues.

A log of the results is created in a new window. This shows warnings for missing colours and tags and error messages, e.g. for data that could not be imported because it already exists in the open file. This is similar to the error log in Open File, section 6.2.

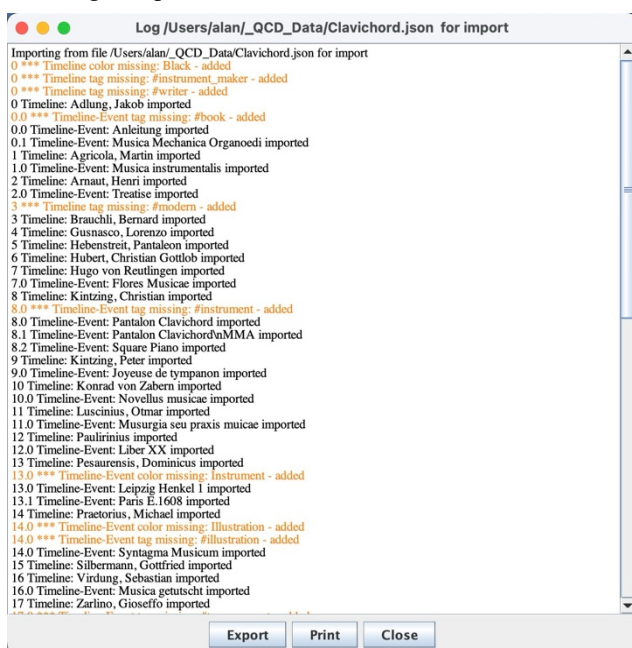


Figure 6-3 Results Log of Import

The Export, Print and Close buttons work as described in section 6.2.

The imported data is added to new rows at the bottom of the timeline being displayed. No first fitting is applied.

The log file can be used to review the import results and make any necessary changes to the imported data by using the normal editors (which could have been automatically opened – see above).

Note: it is advisable to save the open file before importing so that the import can be abandoned and the original file restored and re-opened if the results are not as expected.

If a lot of editor windows have been opened, these can be closed from the View menu.

## 6.4 Save

Saves the diagram to the currently open file, overwriting it.

Note: if Filtered Extract has been checked in Save As, only items selected by the currently active filter will be saved.

## 6.5 Save As ...

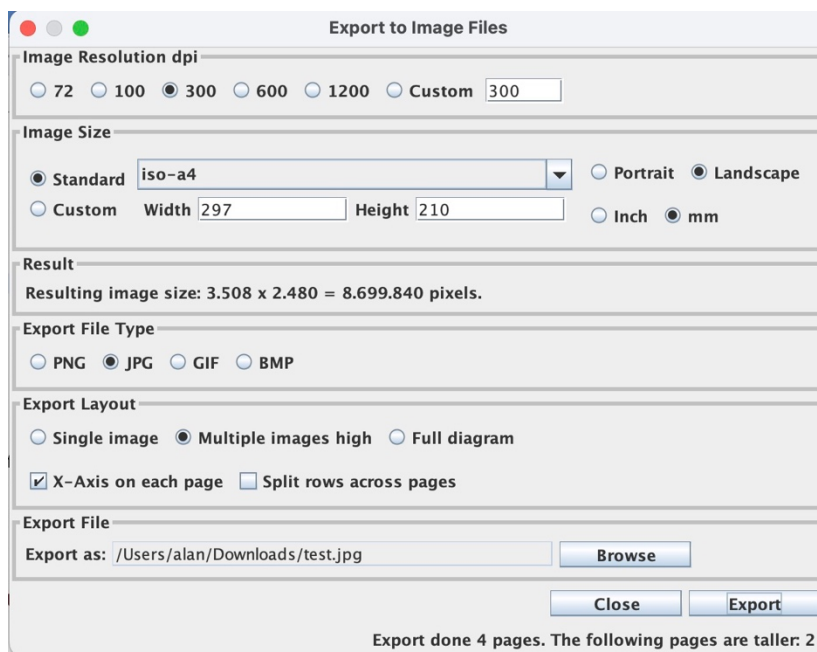
Saves the diagram to a new JSON file. If the file already exists, the user will be asked for confirmation before overwriting it.

If the Filtered Extract checkbox is checked, an extract of the events and connections as selected by the filter will be saved. Preferences, Introduction texts, Filters and Row data will not be saved. Be sure to give a different file than the original complete file when saving an extract!

The box is unchecked on New File and Open File.

## 6.6 Export Image ...

The export image function outputs the displayed diagram as one or more graphics files which can be used for printing



or for inclusion in other documents or presentations.

The export is based on the chosen resolution and width of the image. The image width in pixels will be the width in inches multiplied by the dots per inch (dpi). The height of the resulting image depends on the diagram and the layout chosen.

### Image Resolution dpi

Select the desired standard resolution or select “Custom” and enter your own.

### Image Size

Standard – select a standard paper size from the drop-down list

Portrait/Landscape – select the orientation

Custom – enter your own width and height and select the unit inches or millimetres.

### Result

This shows the resulting image size in pixels and the total. The file size will normally be less, especially if a compressed format such as JPG is used.

### Export File Type

Select the desired file type for the export.

### Export Layout

**Single Image** – The diagram will be output as a single image. The width in pixels is determined as above, and the height will be as required to accommodate the diagram.

**Multiple Images High** – The diagram will have the width determined as above and will be split into multiple images such that each will fit in the selected image size.

**Full Diagram** – This has not been implemented yet.

**X-Axis on each page** – if checked, the X-axis will be repeated at the bottom of each page.

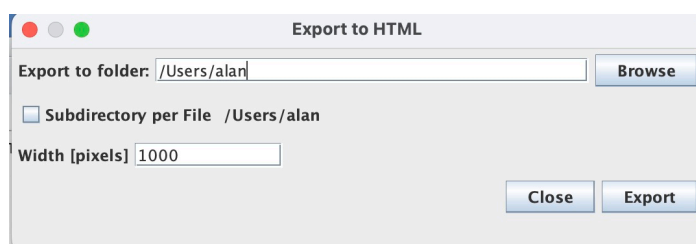
**Split rows across pages** – if this is not checked, the output will avoid splitting a row across pages, e.g., keeping a timeline and its time-line events on the same page. Any rows that do not fit on one page will be shown in the result at the bottom of the export window; these will be taller than the selected page height.

### Export File

Export as – determines the target file to be used. If multiple image files are produced they are given numerical suffixes. Use the Browse button to select the directory and enter the file name.

When started with the “Export” button, the progress of the export and end result are shown at the bottom of the export window.

Note: while the export is running the width of the graphic in the main screen will be changed for the export width and restored when the export is finished.



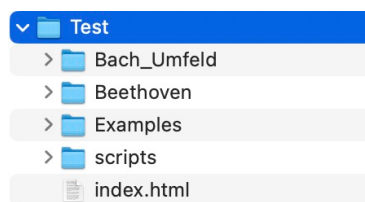
## 6.7 Export HTML ...

Export HTML creates a web site for viewing in a browser. This is useful to make diagrams available on platforms which cannot run the Java application, such as Apple iPads or iPhones, or for making them available without the data files.

A diagram is written for each saved filter as well as for the unfiltered graphic. A data file is written for each event. The Introduction (see section 7.9) and Summary Report (see section 8.4.1) are written and included in the menu.

The export can handle multiple input files, creating a subdirectory for each and a simple table of contents. It uses a JavaScript which is written by the program into a “/scripts” subdirectory.

An example directory structure with “Export to folder” set to Test and “Subdirectory per File” checked, after exporting three input files (Bach\_Umfeld, Beethoven, Examples), would be as shown:



**Export to folder** – use the browse button to select the folder (or directory) in which the html will be written.

**Subdirectory per File** – if this is checked the html will be written to a subdirectory with the name of the input file. The path is shown on the right.

**Width [pixels]** – the width of the main graphics in pixels.

The above settings are saved when the open file is saved and will be re-instated next time it is opened.

**Export button** – this starts the export. Note that existing files of the same name will be overwritten (after confirming with a warning message), but no files will be deleted. It is therefore recommended to delete any old files from the directory before exporting. If “Subdirectory per File” was checked, a table of contents file “index.html” will be written to the top-level folder.

To indicate progress, the number of files done and the total as well as the file currently being written are shown at the bottom right of the “Export to HTML” window.

During export, the main window stops displaying the graphic while it is working through the filters to generate the images and html code.

Note: the file names for the event descriptions are derived from the event names; to avoid problems, the following characters are substituted:

hyphen is changed to slash

dot is changed to underline

new line is changed to space

single quote to underline

All accent and umlaut characters are normalized according to [Unicode Standard Annex #15 — Unicode Normalization Forms](#) with form NFD (canonical decomposition).

Note that this does not guarantee unique file names, but problems should be very rare. A clash will cause the first file written to be overwritten by another with the same name after the above substitutions.

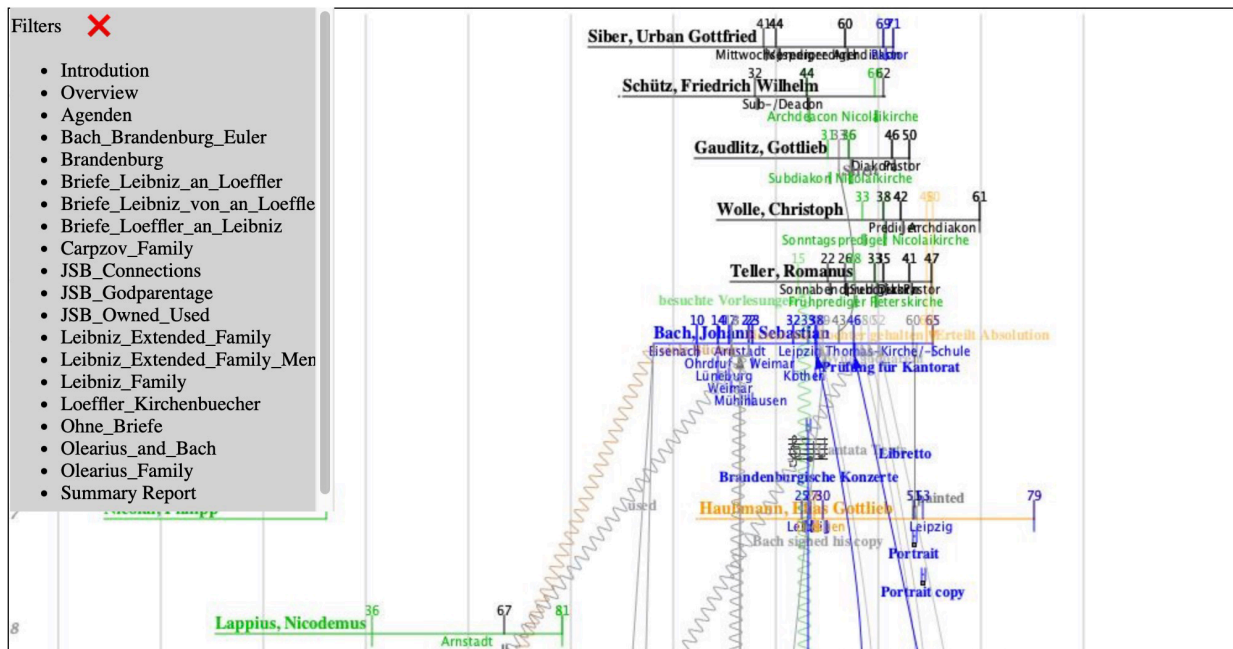
Other problematic characters are prevented in event names (see section 7.1, 7.3, and 7.4).

The resulting html file contains the title from the input file name and a menu of the filters. Clicking on a filter name displays the corresponding graphic. Clicking the red X closes the menu. The “Overview” entry is the unfiltered graphic.

The names of the events can be clicked to bring up a window with a summary of the data. (Note that this does not work reliably in all browsers; the clickable areas have to be adjusted by the JavaScript depending on the window resizing, moving and scrolling.

Note: most browsers will open the data window on the main screen, even if the main diagram is on another monitor. Tablet browsers do not always have independent windows and will usually open the data in a new tab.

## Bach\_Umfeld



## 7 Edit Menu

### 7.1 New Timeline and Timeline Editor

From the “New Timeline ...” menu item a new timeline is created with default settings. If a timeline name is double-clicked an editor for that timeline with its current values is opened. If the editor for that timeline is already opened it will be brought to the front of the screen.

Color	GreyScale	Hex	Name
		0xffa36400	Architect
		0xff666666	Book
		0xffa36400	Building
		0xffff49100	Church
		0xa9787878	Cn_Apprentice
		0xa9787878	Cn_Assisted
		0x9c000000	Cn_Bequeathed
		0xffff49100	Cn_Chapel
		0xa9787878	Cn_Commented
		0xff990033	Cn_Commissioned
		0xa9787878	Cn_Continued
		0xa9787878	Cn_Cooperated
		0xffff6a00	Cn_Criticised
		0xff666666	Cn_Dedicated
		0xa9ff2222	Cn_Destroyed
		0x6aff5858	Cn_Family
		0x819c0000	Cn_Friend
		0xa9787878	Cn_Includes
		0xa9006699	Cn_Influence

**Name** – the name of the timeline, must be unique among all types of events. The name cannot contain ; \ ? % \* : | " < > = as the name is used for file names in the HTML export. A timeline name is on one line.

**Row:**

Current – shows the current row.

First fit – if this is checked when OK or Apply are clicked, the timeline will be placed in the first row where it will fit.

New – if First fit is not checked, a row can be selected in which the timeline will be placed. If it will not fit in that row and error message is shown. The row after the current last row or 0 can be chosen to put the event in a new row at the end.

Note: the timeline will not be moved into rows that have “Keep row empty” checked – see 7.8.

Note: if a new row is entered and rows are manipulated by the row editor such that the current row of the timeline is changed, and the row number has not been edited, the new row will be reset to the new current row of the timeline when the editor gains focus.

**Dates** – give the dates of the earliest and latest start and end of the timeline. A timeline must have an Earliest Start and an Earliest End. See 4.4.

**Colour** – Select the colour from the palette. The palette can be changed or extended in Preferences, see 5.1.4.

Note: this does not affect the colour of the icon.

Note: The colours of ages are determined by the source of the age.

**Icons** – select the icons for the start and end of the timeline – see 4.5. These are optional.

**New Segment Button** – adds a new segment to the timeline and opens the segment editor – see below. This is disabled until the new timeline has been saved with Apply or OK.

Other buttons – see 4.2.

Metadata – see 7.6.1

## 7.2 Segment Editor

Click on “New Segment” in the timeline editor to create a new segment. Double-click on a segment name to change it.

**Line Number** – the line below the timeline for the segment.

**Segment Name** – the name displayed in the segment. It does not have to be unique. It cannot contain semicolons.

**Dates** – the earliest and latest start and end dates – see 4.4. When creating a new segment, the earliest start date is preset to the end date of the previous segment.

**Colour** – There are four colours for a segment, selected in the tabs. For vague dates the time spans between the early and late start and end dates are shaded with a gradient.

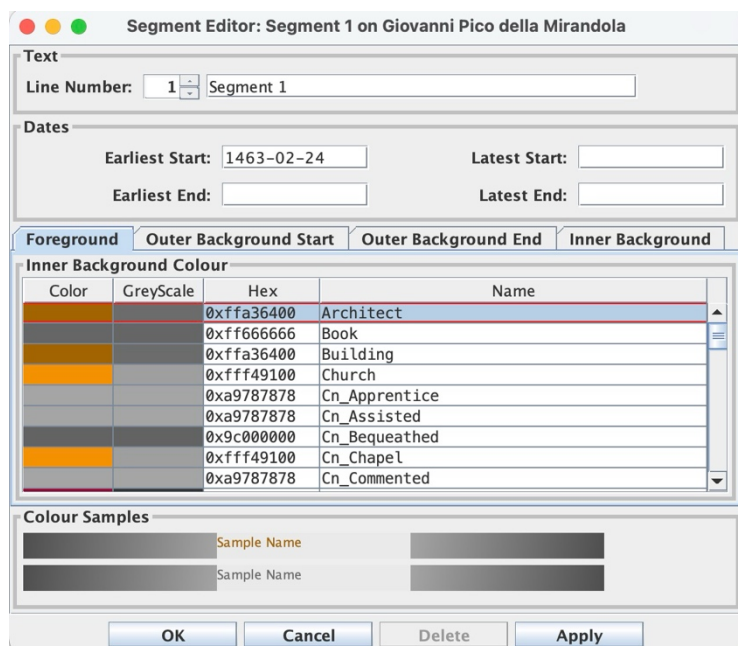
**Foreground** – the colour of the segment text and the ages shown on the timeline.

**Outer Background Start** – the colour with which the shading of the vague time starts, or if the date is exact, a vertical line to mark the edge of the segment.

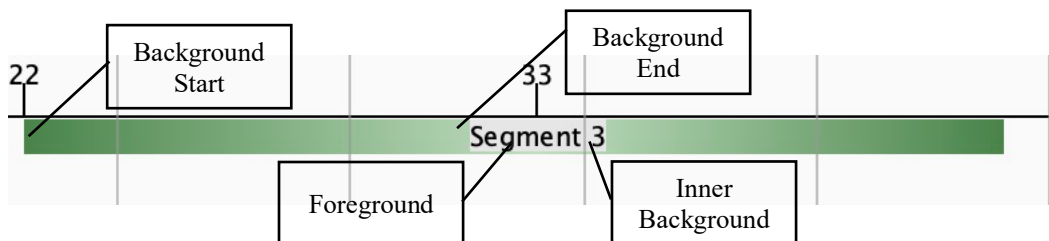
**Outer Background End** – the colour with which the shading of the vague time ends.

**Inner Background** – the shading behind the time between latest start and earliest end dates.

The palette can be changed or extended in Preferences, see 5.1.4.



Note: The segment is created with OK or Apply and will not be removed if the underlying Timeline Editor is cancelled.





## 7.3 New Event and Event Editor

From the Edit menu a new timeline-event or general-event can be created. If an event name is double-clicked the corresponding editor is opened.

**Name** – the name of the event must be unique among all events (including timelines). The name cannot contain ; \ ? % \* : | " < > = . The name can have multiple lines.

**as Title** – the event will be used as a title within the diagram. The icon is then not used. See section 4.1.3.

**Row** (only applicable to general-events):

Current: - shows the current row of the general-event.

First fit – if this is checked when OK or Apply are clicked, the event will be placed in the first row where it will fit.

New – if First fit is not checked, a row can be selected in which the general-event will be placed. If it will not fit in that row and error message is shown. The row after the current last row or 0 can be chosen to put the event in a new row at the end.

Note: the event will not be moved into rows that have “Keep row empty” checked – see 7.8.

Note: if a new row is entered and rows are manipulated by the row editor such that the current row of the event is changed, and the row number has not been edited, the new row will be reset to the new current row of the event when the editor gains focus.

**Timeline** (only applicable to timeline-events):

Timeline – select the timeline with which the event is associated.

**Dates** – give the dates of the start and end of the event. An event must have an Early Start date. See 4.4. The combinations have the following meanings which are represented accordingly:

Earliest Start	Latest Start	Earliest End	Latest End	Meaning
Y	N	N	N	Exact point in time
Y	Y	N	N	Vague point in time
Y	N	Y	N	Exact duration
Y	Y	Y	N	Duration with vague start date
Y	N	Y	Y	Duration with vague end date
Y	Y	Y	Y	Duration with vague start and end dates

Other combinations are not allowed.

**Colour** – Select the colour of the event and its name from the palette. The palette can be changed or extended in Preferences, see 5.1.4.



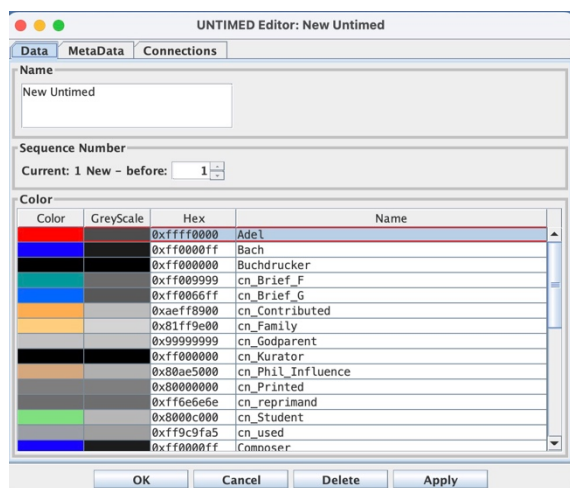
Note: this does not affect the colour of the icon, only the time bracket and for timeline-events, the line to the timeline and the age on the timeline

**Icon** – select the icon for the event – see 4.5. An event must have an icon to represent it on the diagram.

**Buttons** – see 4.2.

**Metadata tab** – see 7.6.1

## 7.4 New Untimed Event and Untimed Event Editor



From the Edit menu create a new untimed event. Double-clicking on an untimed event in the graphic opens its editor.

**Name** – the name must be unique among all events (including timelines). The name cannot contain ; \ ? % \* : | " < > = . The name can have multiple lines.

**Sequence Number** – the order in which the untimed events appear:

Current: - shows the current sequence number of the untimed event.

New: - select the new sequence number. This can be 0 to put it first or one more than the number of untimed events to put it at the end.

**Colour** – Select the colour of the event and its name from the palette. The palette can be changed or extended in Preferences, see 5.1.4.

## 7.5 New Connection and Connection Editor

From the menu create a new connection or double-click on a connection line or on the label to open the editor for that connection and then select Edit from the sub--menu.

### Name:

Enter the label of the connection to be displayed on the screen. This may be empty and does not have to be unique. It can have multiple lines. The position of the name relative to the source or destination end of the connection can be changed by dragging the name with the mouse. If and where the name is shown is determined by the next two checkboxes.

### Show at Source

Check to show the label at the source end of the connection.

### Show at Destination:

Check to show the label at the destination end of the connection.

### Source (where the connection begins):

Select the appropriate event from the list to determine where the connection begins.

**Earliest, Latest** – Only applicable to timelines. The date on the timeline from which the connection from a timeline begins. If none are given, the connection starts from the beginning (earliest start date) of the timeline.

### Destination (where the connection ends):

Similar to source above.

For timelines, when the cursor enters the Earliest field, the earliest and latest dates are preset to those of the source, unless they have already been set.

### Line Type

**Line Type** – whether the line is direct, wave or a helix shape.

**Dash Type** – whether the line is dotted, dashed or dot-dashed.

**Forward Arrow, Back Arrow** – select whether there is an arrow at the destination and/or source end of the connection.

**Curve** – check to make the line curved.

**Bézier Control X and Y** – the control points which determine the shape of the curve – see 10.2

Note: the initial values for the above are set in the preferences – see 5.1.6.

**Colour** – Select the colour of the connection, its name if shown, and the ages where it connects to a timeline. The palette can be changed or extended in Preferences, see 5.1.4.

Note: connections will be drawn over other items, so it may be advisable to increase the transparency (or reduce the alpha) of the connection colour to make the other items more visible. See 5.1.4.

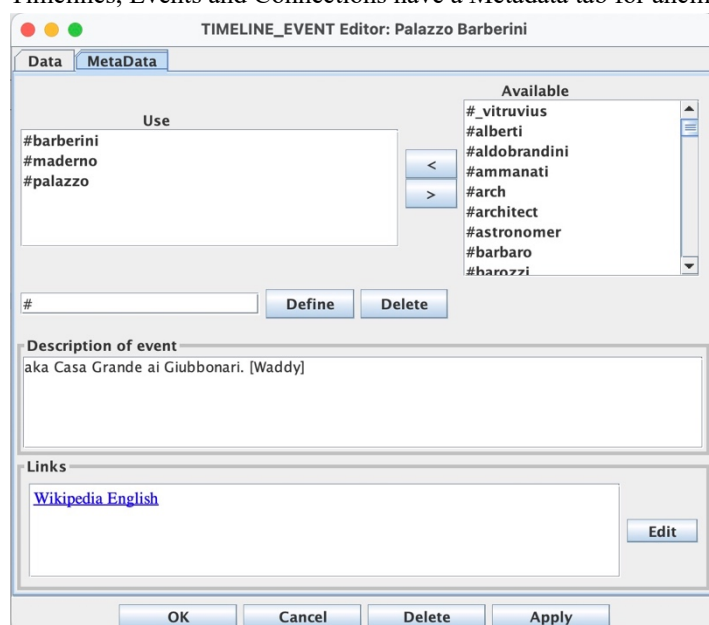
Buttons – see 4.2.

Metadata – see 7.6.1

Note: A connection is uniquely identified by its source, name and destination, so this combination must be unique.

## 7.6 Metadata

Timelines, Events and Connections have a Metadata tab for ancillary information relating to the item.



### 7.6.1 Tags

**Use** – the tags to be used in the event or connection. When the tag selector is opened it shows those currently used

**Available** – shows the tags available for use in the event or connection. It shows all the tags currently defined, less the ones in the “Use” pane.

To quickly find the required tag type in the initial letters of the tag name (without the #). The first tag beginning with a sequence of letters typed within on second will be searched in the list. One second after typing a character the search string is reset and the next letter typed will be taken as the first letter of the sought tag.

#### < and > buttons

Existing tags can be moved between the available tags list (right-hand-side) and those to be used (left-hand-side) by selecting one or more of them and clicking the left and right arrow buttons. A single tag can also be moved by double-clicking it.

#### Define

A new tag can be defined by typing it into the field and clicking Define.

#### Delete

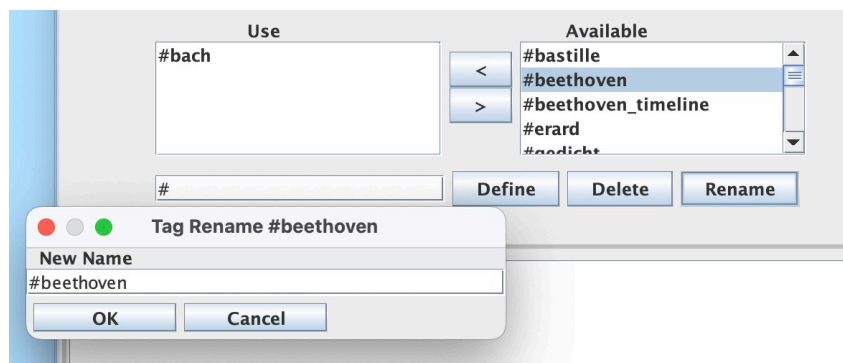
Tags can be deleted from the available list by selecting them and clicking the Delete button. This is only possible if they are not used anywhere (places where they are used are listed in a message). An exception is if the tag is used in a filter –

this is kept in case the tag is re-created and the filter is still required; filters with unused tags are listed in the Missing Metadata Report (see 8.4.3).

Note: the tag is deleted immediately without waiting for the OK or Apply button – the deletion will not be cancelled by the Cancel button.

## Rename

When a single tag is selected in either the Use or Available list, the Rename button shows a dialog to rename the tag:



The renamed tag will be visible in other open editors and the filter window when they regain focus.

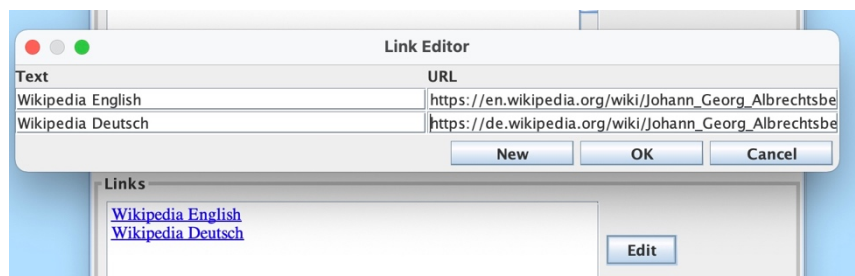
If the last item that uses a tag is deleted, the tag will remain in the list until the file is saved and re-opened.

## 7.6.2 Description

The description can hold a multi-line text. It has no formatting. This is intended for any additional information such as literature sources.

Note: empty lines at the end of the text will be removed when it is saved.

## 7.6.3 Links



Use the edit button in the event or connection editor to open the Link Editor. Links consist of:

**Text** to be displayed and

**Hyperlink** which will be opened when the text is clicked. The program uses the operating system standard browser.

**New button** – adds new rows to the table.

The URL is checked for syntax, but no further checks can be performed on the validity as the user may be working offline or the site may be temporarily unavailable. It is best to copy the link from the browser and paste it into the URL field (use Ctrl-a or Cmd-a to select the existing data and replace it with paste Ctrl-v or Cmd-v).

To delete an entry, delete the contents of one of the fields (Text or URL) and click OK.

See 4.7.4 for inserting map references.

## 7.7 Related Tab

The event editors have a “Related” tab to give a convenient overview of the event’s incoming and outgoing connections, and for timelines, the timeline’s timeline-events.

The screenshot shows the 'TIMELINE Editor: Giovanni Pico della Mirandola' window. It has three tabs: 'Data', 'MetaData', and 'Related' (which is selected). The 'Related' tab is divided into three sections:

- Incoming Connections:** Contains a table with columns 'Source' and 'Name'. The data rows are:
 

Source	Name
Christian Sources	critic
Lorenzo de' Medici (Magnifico)	patron
Marsilio Ficino	tutor
- Outgoing Connections:** Contains a table with columns 'Source' and 'Name'. The data row is:
 

Source	Name
Giovanni Francesco Pico della Mirandola	uncle
- Timeline-Events:** Contains a table with a single column 'Name'. The data rows are:
 

Name
900 Tesis
De hominis dignitate
Oratio de hominis dignitate

At the bottom of the window are buttons: 'OK', 'Cancel', 'Delete', 'New Segment', and 'Apply'.

A double-click on a table row will open the appropriate editor.

The tables can be sorted by clicking on the column headers.

**New button** – Creates a new incoming or outgoing connection with the current event set as source or destination or a new timeline-event with the current event as parent.

**Delete Button** – Deletes the selected connections or timeline-events. Any open editors for the deleted items will be closed.

The connections can be explored on the diagram with the filter - see section 8.1.

## 7.8 Edit Rows and Row Editor

The row editor is opened either from the menu or by double-clicking on a row number. (The row numbers are shown permanently via the preferences – see 5.1.3 – or when the row editor is open.) The row editor acts on the row shown in its title bar; when started from the menu this is the last one used and when started by double-clicking it is the row number which was double-clicked.

The screenshot shows the 'Row Editor: row 23' window. It contains the following elements:

- A 'Row:' label followed by a text box containing '23' and a small arrow icon.
- A checkbox labeled 'Keep row empty' which is unchecked.
- Radio buttons for 'above' (selected) and 'below', followed by an 'Insert' button.
- 'Move Up' and 'Move Down' buttons.
- A 'Delete' button.
- A 'Sort All by Start Date' button.
- A 'Close' button.

The buttons act immediately, so there is no cancel, but any operation except sort can be easily reversed.

<b>Row</b>	Selects the row to act on. This can be set by double-clicking on a row number in the graphic, by incrementing or decrementing the value or by typing in a new value. The graphic will be moved to bring the selected row into view.
<b>Keep row empty</b>	If this is checked: the “First fit” function of timelines and general-events will not move them into this row. This is to ensure the row is kept empty if it is being used as a layout aid. the empty row will be show with a preset height. This can only be checked if the row is currently empty.
<b>Above, Below, Insert</b>	Inserts a new row above or below the current row.
<b>Move Up, Move Down</b>	Moves the current row up or down, wrapping round from bottom or top. The editor shows the new row number. The graphic is moved to keep the row in view.
<b>Delete</b>	Deletes the current row (only possible if it is empty).
<b>Sort All by Start Date</b>	Sorts all the rows by the start date of the earliest entry in each row, with the earliest at the top. Note: do not use this if you have ordered or grouped events in a different way than chronologically! (Or at least, do not save the data after sorting.)
<b>Close</b>	Closes the row editor window.

## 7.9 Edit Introduction

This includes two simple text fields for an introductory text for whole diagram and for technical details.

**Introduction**

This is about Renaissance and Baroque architecture. It concentrates on Rome, mainly to keep the size manageable, but includes other places when they are relevant. The Popes are given as segments of their own timeline, as they initiated a lot of the building. Some scientists and philosophers are included as well as some other major events and inventions that had an influence on the building. St. Peter's Basilica has its own timeline with segments for the chief architect at each time. There are corresponding events for the building. One important aspect is the influence of Vitruvius. The filter "Vitruvius\_Influence" shows this. Since Vitruvius was much earlier than the Renaissance, the overall view is very compressed. The filter "Without\_Vitruvius" shows the timeline without Vitruvius. The multitude of connections, especially waves can affect performance, so checking "Hide connections" in the filter is recommended.

**Technical Details**

**TAG CONVENTIONS**  
Persons' names are surname followed by initials if needed to differentiate followed by elder/younger etc.  
Persons have:  
- name  
- profession(s), e.g. #architect, #philosopher  
Persons and other timelines do NOT have the tags of their event, as the timeline of an event can be shown automatically.  
Events have:  
- a type tag, e.g. #church, #villa, #palazzo, #book  
- the name of the creator  
Connections generally have the tags of the source and destination items.  
The tag #\_vitruvius is applied to any item influenced by him, for the filter "Vitruvius\_Influence".

OK Cancel Apply Wrap text

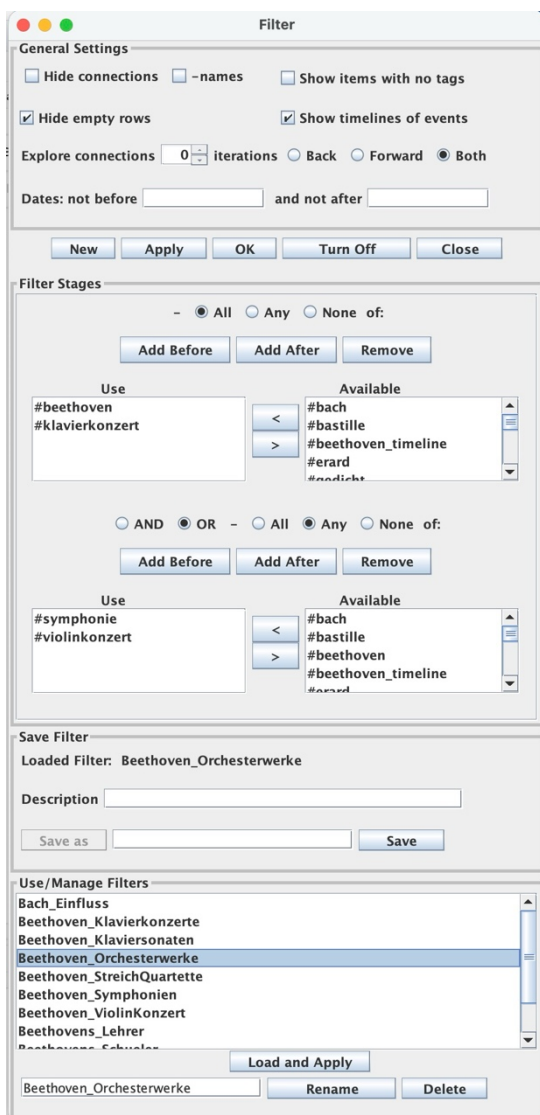
The Introduction text can be included in the Summary Report (see 5.1.7) and is intended for a general overview, list of references, rationale of filters, etc.

The Technical Details are not shown anywhere else and are intended for design information such as conventions for tags.

**Wrap text** – toggles the text wrapping. When displayed in the summary the text will wrap to the window. To avoid unwanted empty lines it is useful to view the text without wrapping.

## 8 View Menu

### 8.1 Filter ...



The filter function allows the user to restrict the amount of data that is displayed to show different aspects or make the diagram more readable. It can also be applied to the contents of the summary report (see 5.1.7).

The filter has the following functions:

- General Settings
- Excluding events and connections with Boolean combinations of tags
- Exploring connections
- Excluding items outside a date range
- Saving filters

Changes to the filter only take effect when the Apply or OK button is clicked.

#### General Settings

**Hide connections** – if checked all the connections are hidden.

This can be useful if there are many connections, for example to see events more easily, and to improve performance on resizing the window.

**Hide connection labels** – if checked all the connection labels are hidden.

**Show items with no tags** – normally, an item with no tags would never be shown if an All or Any filter is active; if this checkbox is ticked, items with no tags will always be shown.

**Hide empty rows** – this will remove any rows left empty by the filter so that all the remaining rows appear together at the top of the window.

**Show timelines of events** – normally, a timeline-event is only shown if its associated timeline is also shown. If this box is checked, the timeline for an included event will be shown with the event, regardless of any other filtering of that timeline. This allows more flexibility in defining tags.

### Explore connections

These fields are for exploring connections to or from the events shown by the filter. It is activated by setting the iterations to 1 or more. For each event initially shown by the filter defined below, its connections will be followed and connected events shown as well. Each connection can be followed back to its source event, forward to its destination event, or in both directions. When these events are shown, the procedure can be repeated to find the events connected to them in turn, and so on, depending on the number of iterations.

**iterations** – the number of times the exploration of connected events is to be repeated.

**Back** – select to follow connections backwards to events which have connections to the currently shown events.

**Forward** – select to follow connections forwards to events which have connections from the currently shown events.

**Both** – select to follow connections in both the above directions.

The explore function does not do any further filtering with tags – one purpose is to show up connections which might not be in any filter.

Another way of viewing connections to and from a single event is the Connections tab in the event editor - see section 7.7.

For an example of how the explore function works, see section 13.9.

### Dates:

The overall result of the filters can be further restricted to events between certain dates.

**not before** – events before this date will not be shown.

**not after** – events after this date will not be shown.

### Buttons

**New button** – deletes the existing filter and removes the loaded filter set.

**Apply button** – applies the defined filter and redraws the main diagram, leaving the filter window open.

**OK button** – applies the defined filter and redraws the main diagram and closes the filter window.

**Turn Off button** – turns the filter off and unchecks the Hide Connections checkbox.

**Close button** – closes the filter window.

### Filter Stages

A tag filter is built up with a series of filter stages consisting of an operation (All, Any, None) and a tag list. The stages are combined with Boolean logic functions (AND, OR). See below.

Each stage consists of a list of tags with:

- **All**            an object is shown if it contains all the given tags (AND function)
- **Any**            an object is shown if it contains any of the given tags (OR function)
- **None**           an object is shown if it contains none of the given tags (NOT AND function)

**AND / OR** – these buttons determine how the filter stages are combined. With AND an item (event or connection) is shown if its tags pass both filter stages. With OR an item is shown if its tags pass either or both of the filter stages.

The first stage does not have logical AND / OR buttons as there is no previous stage.



Note that connections are also filtered with tags, but they will only be shown if both their source and destination are shown, i.e. not filtered out.

Note that if the box “Show timelines of events” is not checked, timeline-events will only be shown if their timeline is shown, so filters to show specific timeline-events must then also include tags for their related timelines.

**Add Before / Add After / Remove** – further stages can be added with the “Add” buttons or removed with the “Remove” button.

### Use and Available

All available tags are listed in the Available list. By selecting one or more available tags and clicking on the left arrow, the selected tags are moved to the Use list. A single tag can be moved by double-clicking on it in the Available list. The Use list shows the tags that will be used in the filter logic.

Tags are removed from the Use list by selecting one or more and clicking on the right arrow or double-clicking on one tag. They then move back into the Available list.

Multiple tags can be selected by holding down the Shift-key while selecting the first and last of a set of contiguous tags or by selecting individual tags with Cmd/Ctrl-Click and then using the left or right arrow buttons to move them from one list to the other.

Note that if the Use list is empty, no filtering is performed.

A tag can be found in the list by typing its initial letters (see section 7.6.1).

### Save Filter

The filter can be saved. All the checkboxes are saved as well. Note: this is only saving within the program – saving to the data file must be done with the Save or Save As function of the main program.

**Loaded filter** – shows the currently loaded filter. A red “Unsaved changes!” appears if the filter has been changed but not yet saved.

**Description** – an optional text to further describe the purpose of the filter.

**Save as** – having defined a filter, type a name in the field and click the “Save as” button. It will now appear in the list under “Use/Manage Filters”.

**Save** – use this button to save the current filter after it has been changed.

Note: Save as and Save only save the filter within the program. To save them to the file, the Save function in the main menu of the diagram must be used. This is indicated by the red Unsaved Changes text in the bottom status bar of the main window.

### Use/ Manage Filters

Select a filter from the list and click “**Load and Apply**”, or just double-click on the filter name. The filter will be loaded into the top part of the screen and applied to the diagram.

The last filter selected is shown beside “Loaded Filter Set”. If any changes are made, “Unsaved changes” appears in red beside the name until Save or Save As is used. This is removed when the changes are saved with Save or Save as, or when the same filter is reloaded or when a different filter is loaded or when New is clicked.

**Rename** – the selected filter can be renamed by typing a new name in the field beside the “Rename” button and then clicking that.

**Delete** – Similarly, the selected filter can be deleted with the Delete button.

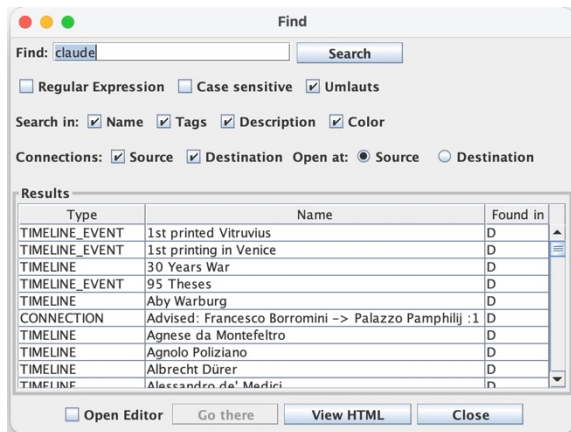
The filters are saved to the data file with Save or Save as in the file menu of the main window and are read back in when the file is opened.

The filter function can be used in presentations by having the Filter window on a second monitor and going through the filters to show the aspects being presented.

More detail on how the filters work is given in section 13.8.

## 8.2 Find

The find function is used to find events, segments or connections and move the diagram to highlight one of the results with a red rectangle while optionally opening its editor. Searches for events and connections can be made on any combination of the name, tags, description and colour. Searches for connections can additionally be made on the source and destination event names and can highlight either the source or the destination end of the connection. The search can be simple or can use regular expressions. It can be case-sensitive and it can transliterate umlauts.



Note: connections that do not have a name can only be found with the search string in the tag, description, colour, source or destination. The Name column shows the name and identifier of the connection (source, destination and index).

The results can be sorted by clicking on the column headers.

**Find** – type the search string into the field.

**Search button** – start the search. The search can also be started by hitting the Enter key while in the Find field.

**Regular Expression** – this performs an advanced search interpreting the string in the Find field as a regular expression. For details of how to use this, see <https://docs.oracle.com/javase/7/docs/api/java/util/regex/Pattern.html>. If not checked, it performs a simple search for the given string being contained in the selected data fields (name, tags, description, etc.). Wildcards are not used.

Note that some regular expressions can cause the program to crash with a stack overflow.

**Case sensitive** – if this is checked, upper and lower case are differentiated when searching. Otherwise, both the search string and the data being searched are converted to lower case before searching.

**Umlauts** – if this is checked, transliterations of German umlauts will be found, ae for ä, oe for ö, ue for ü and ss for ß, including upper case versions.

Note that it will also find these even if they were not from German, for example ae in Raffaello.

Note that case and umlaut alteration is not performed on the search string for regular expressions. If these are desired, they must be incorporated into the regular expression itself.

**Search in: Name, Tags, Description, Color** – check the data fields in which to search. If none are checked, no results are shown.

**Connections: Source, Destination** – check to search in the connection source and/or destination event name.

**Open at: Source, Destination** – this determines whether the source or destination end of connections will be shown.

**Results** – the window shows all the results of the search. One result can be selected to act on with the “Go there” button, or it can simply be double-clicked. The results show the following in each line:

- Item type Timeline\_Event, General\_Event, Untimed, Segment, Connection, Introduction
- Name of the item
- Where the search string was found: N = Name, D = Description, T = Tags, C = Colour, I = Introduction, Te = Technical Introduction. (This is shown when the mouse is over the table header.)

Items that are filtered out of the view are in italics.

**Open Editor** – if this is checked, the editor for the selected result will be opened when “Go there” is clicked or the result entry is double-clicked.

**Go there Button** – Click the button to move the main display to show the selected item in the centre of the main window and highlight it with a red rectangle. If “Open Editor” was checked, the editor will also be opened.

For Introduction and Technical Details, the introduction editor is opened and there is no highlighting. These are treated as Descriptions and only searched if the Description box is checked.

**View HTML** – Click the button to open a new window with an HTML version of the search results, including statistics. This can be exported to a file or printed. The content is suitable for copying and pasting into other programs such as Excel.

**Close** – closes the Find window. In fact, the window is only hidden, so when it is opened again from the menu, it will re-appear in the same place and the fields will be unchanged.

Note: the highlighting rectangle is removed when the main display is zoomed, panned, scrolled or resized and when the Find window is closed.

Note: the search results include items that are hidden by a filter and thus not shown in the graphic. These are shown in italics in the results list. If such a result is double-clicked or selected and “Got there” clicked the Open Editor function still works so that the hidden item can be examined or edited.

Note: when the Find window is opened or regains focus, the previous Find string is preserved, and the search is executed. This also occurs when opening a different file so that searches can be repeated in multiple files.

## 8.3 Close Editor Windows

This closes all event (including timelines) and connection editor windows. It is convenient after a large import when the editors of all imported data could have been opened.

## 8.4 Reports

The reports are produced in new windows. They have a table of contents and are hyperlinked to navigate between items or to external links.

The report can be printed with the Print button. The printout is formatted as shown in the window with the addition of page numbers at the bottom of the pages. This opens a standard printer dialog to select the printer etc. Note that this does not show the number of pages.

The report can also be exported to an html file for use in browsers or import to word processors or other programs.

They are formatted in html so the content can be copied and pasted into other programs such as Microsoft Word along with the exported diagram, and from there saved as a document or presentation.

### 8.4.1 Summary Report

The “Summary report” lists all the items with their data and metadata and statistics, e.g., for use in handouts.

The content can be configured in the preferences – see 8.4.3, to decide which meta-data to include, whether to omit empty titles, and whether only the items shown by the currently active filter should be included.

The final line is “End of Summary Report” which serves to confirm that the report is complete.

### 8.4.2 Cross-Reference Report

To gain an overview of which tags are present and where they are used, the “Cross-Reference Report” function in the View menu produces a formatted cross-reference list showing:

- For each event and connection the tags and colour used
- For each event, the icons used
- For each tag, which events, connections and filters reference it
- For each colour, which events and connections use it.
- The saved filters
- Unused colours

This is useful for finding problems in tags and filters and checking the consistent use of colours.

The content can be configured in the preferences – see 8.4.3.

Unused colours are also shown in the Missing Metadata Report.

### 8.4.3 Missing Metadata Report

This report shows any metadata missing from events and connections, unused colours, duplicate links and empty rows. It can be used to check the completeness of the metadata.

The content can be configured in the preferences – see 5.1.7.

## 9 Help Menu

### Release Notes

- shows information on the changes in the program.

### About

- shows basic information about the program

### Help

- shows how to extract this manual.

### Extract Manual

- extracts this manual file to your computer disc and opens it with your pdf reader. This will try to extract the file to the same folder as the program's .jar file, otherwise to the user's home folder.

Note: it names the file with the program version e.g. “cdManual0905.pdf” and will overwrite an existing file of the same name

### Extract Icons

- extracts some basic icons to your computer disc. This brings up a file finder window to select the folder to which the icons will be extracted. The default for the program is the user's home folder/icons. After extraction the path is set in the Preferences – see 5.1.2.

## 10 Connections

### 10.1 Identification

A connection is identified by its source event, destination event and an index. If there is more than one connection between the same two events in the same direction, they are differentiated by the index starting at 1. The identification is shown in the title bar of the connection editor, in the Find results, in the reports, etc.

See section 10.4 about the name.

### 10.2 Curved Connection Shape

The shape of curved connections is defined by a quadratic Bézier curve. Determining the shape of the curve with the Bézier control point is not intuitive at first sight, so may require some experimentation<sup>5</sup>.

When a connection is selected with a double-click (either on or near the line or on one of the labels), a sub-menu is opened for Edit or Curve. Selecting Edit opens the connection editor (see 7.5). Selecting Curve highlights the connection in the graphic and shows the control point and lines in red (see Figure 10-1). The control point can be dragged with the mouse and when the mouse button is released the altered curve is shown. Clicking elsewhere deselects the connection.

Note: if the connection is not curved, a double-click will open the editor directly; check the Curve checkbox to make the connection curved (and Apply or OK) and then double-click the connection again to select between Edit and Curve.

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<sup>5</sup> See <https://pomax.github.io/bezierinfo/> for a detailed overview with an interactive demonstration.

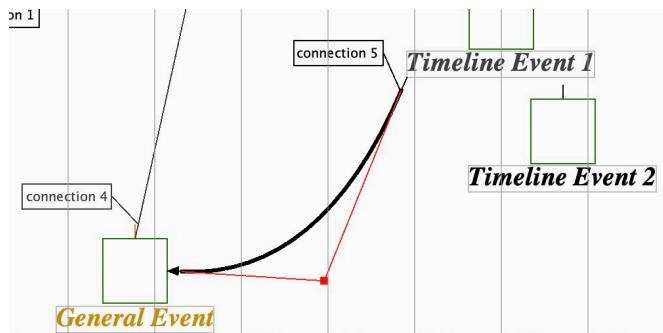


Figure 10-1 Bézier Curve Adjustment

The actual size and shape of the curve depend on the horizontal magnification, the vertical graphic size and vertical scrolling and these are affected by the data shown, which depends on the filter etc. The curve parameters are therefore stored relative to a standard horizontal line between points (0,0) and (0,1). The Control-X parameter is the distance along the x-axis, and the Control-Y parameter is the perpendicular distance along the y-axis of the control point. The values can be negative: a negative X is to the left of the start point so the curve will start by going away from the end point. A negative Y will cause the curve to the other side of the straight line. The values can be greater than 1: Control-X > 1 will cause the curve to go past the end point and then curve back to it. Control-Y > 1 or Control-Y < -1 simply gives a more extreme curve. If Control-Y = 0 the line will be straight.

When drawn, the curve is transformed (enlarged and rotated) to the actual start and end points in the graphic and the control point transformed accordingly – see Figure 10-2. When the curve is adjusted in the graphic as described above, the position of the control point is transformed back to the unit line when the mouse is released.

The X and Y coordinates of the control point are shown in the connection editor (see 7.5). After adjusting in the graphic, these are updated when the editor gains focus.

Note that when drawing, the control point is limited to within the visible bounds of the graphic so that the curve stays completely visible.

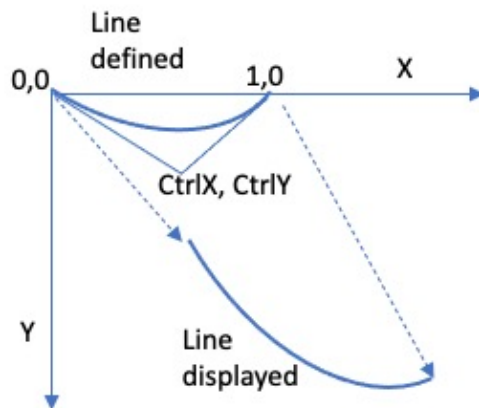
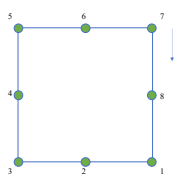


Figure 10-2 Bézier Curve Construction

### 10.3 Connection Points on Events



Connection lines will connect to event icons at the most appropriate of 8 points around the edge of the event depending on the direction of the line.

This will change as the positions of events relative to one another change, depending on the zoom level, the filters used, etc.

The icon should therefore fill its whole area up to those eight points, e.g. with a background or frame.

## 10.4 Connection Labels

The labels are positioned at the ends (source and/or destination) but need not be shown. The meaning of many connections is obvious from the colour and line shape (e.g. helix from a place in one timeline to the beginning of another for a parent-child connection), so the labels can be omitted altogether to avoid clutter.

The labels can be moved by dragging with the mouse. The position is saved relative to the connection end point.

The linkage between label and connection goes to the tail of the connection arrow or an equivalent length from the end if there is no arrow. This avoids optical conflicts with whatever is at the end of the connection.

## 11 Where and When Editors Open

Editors for existing objects are opened by double-clicking on them.

Multiple editors can be opened at once making it easier to adjust the layout by trial and error.

At low magnifications objects will overlap and it may not be clear where to click to open a specific editor. This applies in particular to curved connections, as their bounds are defined by a rectangle as shown in Figure 11-1.

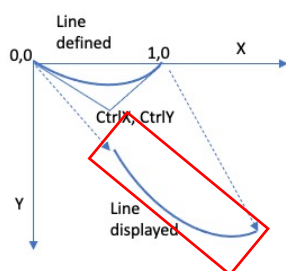


Figure 11-1 Bounds for Mouse-Click on Connection

When the mouse position is within the bounds of multiple objects, double-clicking will bring up a pop-up menu showing the items that are under the mouse (see Figure 11-2) and the desired item can be selected to open the editor. For connections the menu item consists of the source, name and destination and have a further sub-menu for Edit or Curve (see 10.2).

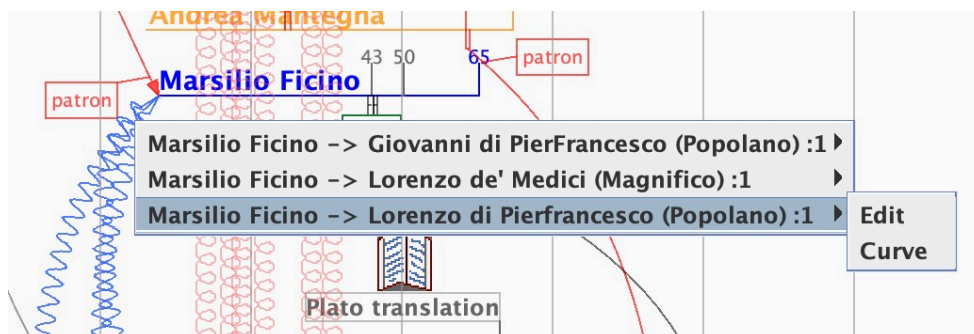


Figure 11-2 Pop-up Menu for Multiple Objects

Selecting an object with an editor already open will bring that editor to the front.

Editors are opened on the right of the screen of the main window (in case you have multiple monitors) and will cascade from the right as more are opened.

The Preferences, Row and Filter editors and the Find and Export windows are permanently present and are hidden or revealed, so they will continue with the data and at the position with which they were last used when opened.

The Row Editor is initially positioned at the top left of the current screen but will reappear where it was when last hidden.

When “Apply” is clicked on a new object, the editor continues with the newly created object and does not create another new one.

## 12 Deleting

Timelines	Any timeline-events associated with the timeline must be deleted or associated with a different timeline before a timeline can be deleted. Any connections to or from the timeline must be deleted or rerouted. Segments do not need to be deleted first – they will be deleted with the timeline.
Other Events	Any connections giving the event as source or destination must be deleted or rerouted first.
Connections	Can be deleted without checks as they have no dependencies.
Segments	Can be deleted without checks as they have no dependencies.
Rows	Can only be deleted when they are empty.
Palette Colors	Can only be deleted when not used.
Tags	Can be deleted from the available list in the tag editor if not used.
Filters	can be deleted from the filter editor.

## 13 FAQ

### 13.1 Why can't I drag events on the screen?

It is not a drawing tool. The graphic is intended to have a consistent and accurately scaled representation of the data.

It would not be possible to accurately drag to a specific date except at the highest magnification.

The only exceptions are the labels of connections which can be dragged to position them as desired, e.g. to avoid overlapping other information, and the curve of connections.

### 13.2 Why doesn't the curve adjustment show the changing curve while dragging the control point?

Dragging the control point continuously shows the position of the lines, but to track the curve requires transforming the curve to the unit line and then back again and then redrawing the graphic. This causes too much jitter in the position of the control point and is not usable. The new curve is shown when the mouse is released, and it remains selected and can easily be moved again until the desired result is obtained.

### 13.3 Why can't I open editors by clicking on ...?

There is often a lot of overlap between artifacts.

Timelines are opened by clicking on the name, not the line itself.

Segments are opened by clicking on the segment name.

General- and Timeline-Events are opened by clicking on the event name.

Connections are opened by clicking on the line or on the label. The clickable area for a connection is actually a rectangle encompassing the entire connection, so connections with a large curve will open in unexpected places.

When the mouse is over multiple overlapping items, double-clicking will bring up a list of objects under the mouse so that the desired object can be selected for editing.

### 13.4 How do I create the different artifacts?

Create new Events and Connections from the Edit menu.

Create new Timeline-Events from the Edit menu or from the timeline editor.

Create a new Connection to or from an event in the connections tab of the event editor.

Segments are created from the timeline editor to make it easier to create them for the right timeline.

Create new rows from the row editor with Insert or when creating a Timeline or General-Event by giving it a row number one higher than the last row. The row editor is opened either by double-clicking on a row number (if they are displayed) or from the Edit menu.

### 13.5 Using General Events as Titles

General Events can be used as titles by checking the box in the event editor. It then uses the Titles typeface from the preferences. No icon is displayed. The title is positioned in the centre of the event's dates – see 4.1.3.

### 13.6 Posthumous artifacts

A timeline-event can be before the start or after the end of its timeline. It will still have a vertical connection to the timeline's position and the age that the timeline would have had. You can add a connection from a point on the timeline to the event, e.g., to indicate when an artifact was written and when it was posthumously published.

### 13.7 Why can't I change the order of filter stages?

The order of the filter stages is not important for the logic (Boolean AND and OR are commutative). Adding the facility to re-order, e.g., move a stage up or down, would overload the user interface. If you need to change the order, add a new stage at the target position, enter the contents of the stage to be moved in the new stage, and then remove the old stage.

### 13.8 How Filters Work

It may be helpful to understand the order in which the filter function processes the parameters.

Each event and connection has an attribute "shown" – if this is set the item is shown on the diagram, otherwise not.

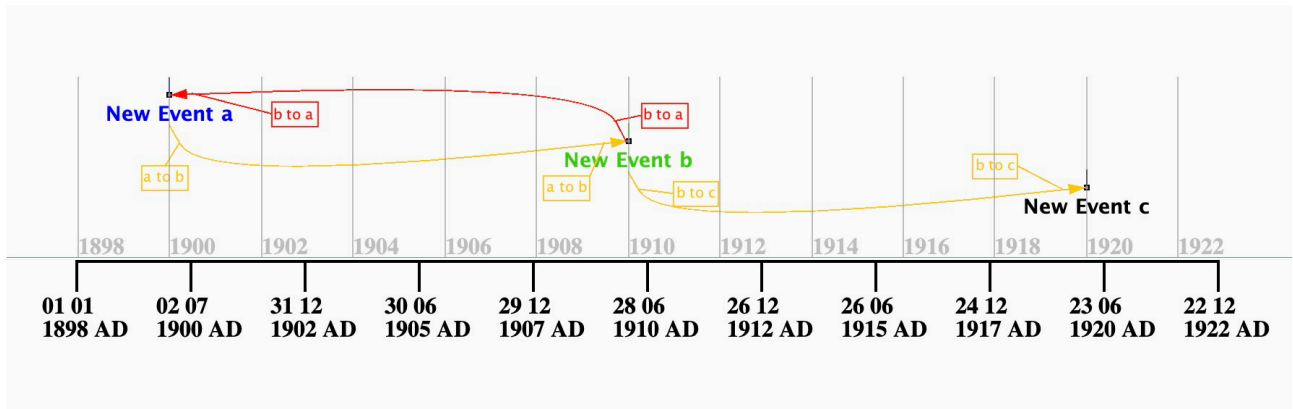
- 1) For each event, set or clear "shown" depending on its tags and the logic of all the filter stages.
- 2) For each timeline, set "shown" if any of its timeline events are shown.
- 3) For each timeline, if it is not shown, do not show its timeline events.
- 4) For each connection,
  - a. set "shown" if both its source and destination events are shown, otherwise not.
  - b. set or clear "shown" depending on its tags and the logic of all the filter stages.
- 5) Explore the connections. On each iteration:
  - a. For each connection, if the event is shown, not the connection and the event - for backwards with the source event, for forwards with the destination event or both.
  - b. Set the noted connections and events to "show".
  - c. For timeline events, set their timelines to show (if 'Show timelines of events' is checked).
- 6) Limit the events shown according to the 'not before' and 'not after' dates:
  - a. If the early start date is before the 'not before' date or the end date is after the 'not after' date, do not show the event.
  - b. Go through the connections again and do not show those whose source or destination events are not shown.

### 13.9 Exploring with Filters

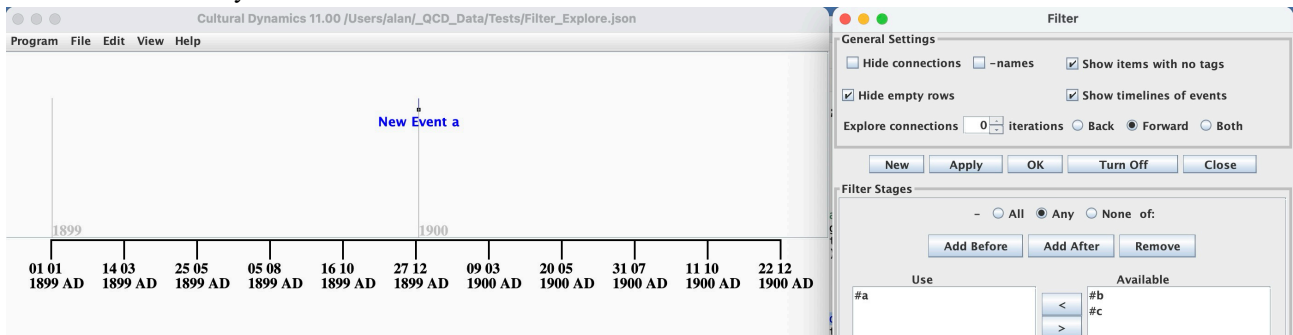
Here is an example of how the explore function of the filter works.



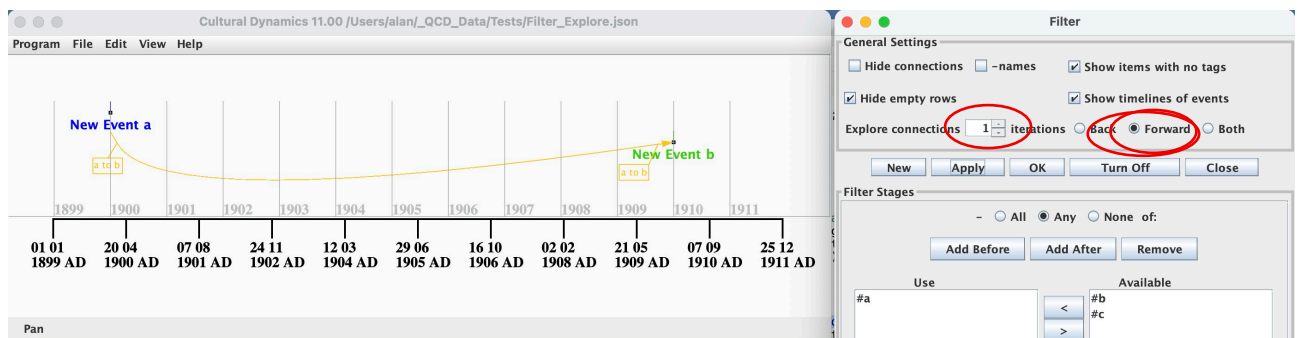
Say we have three events connected as follows:



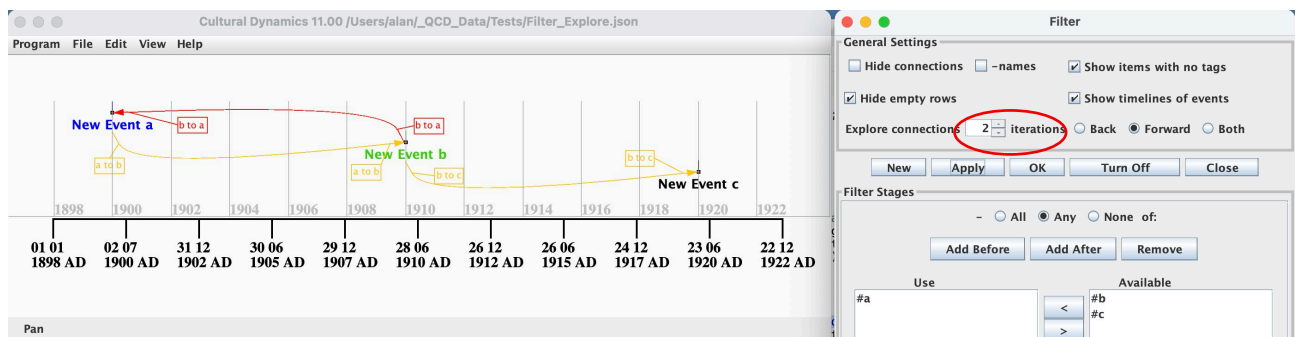
If we filter so that only event “a” is shown:



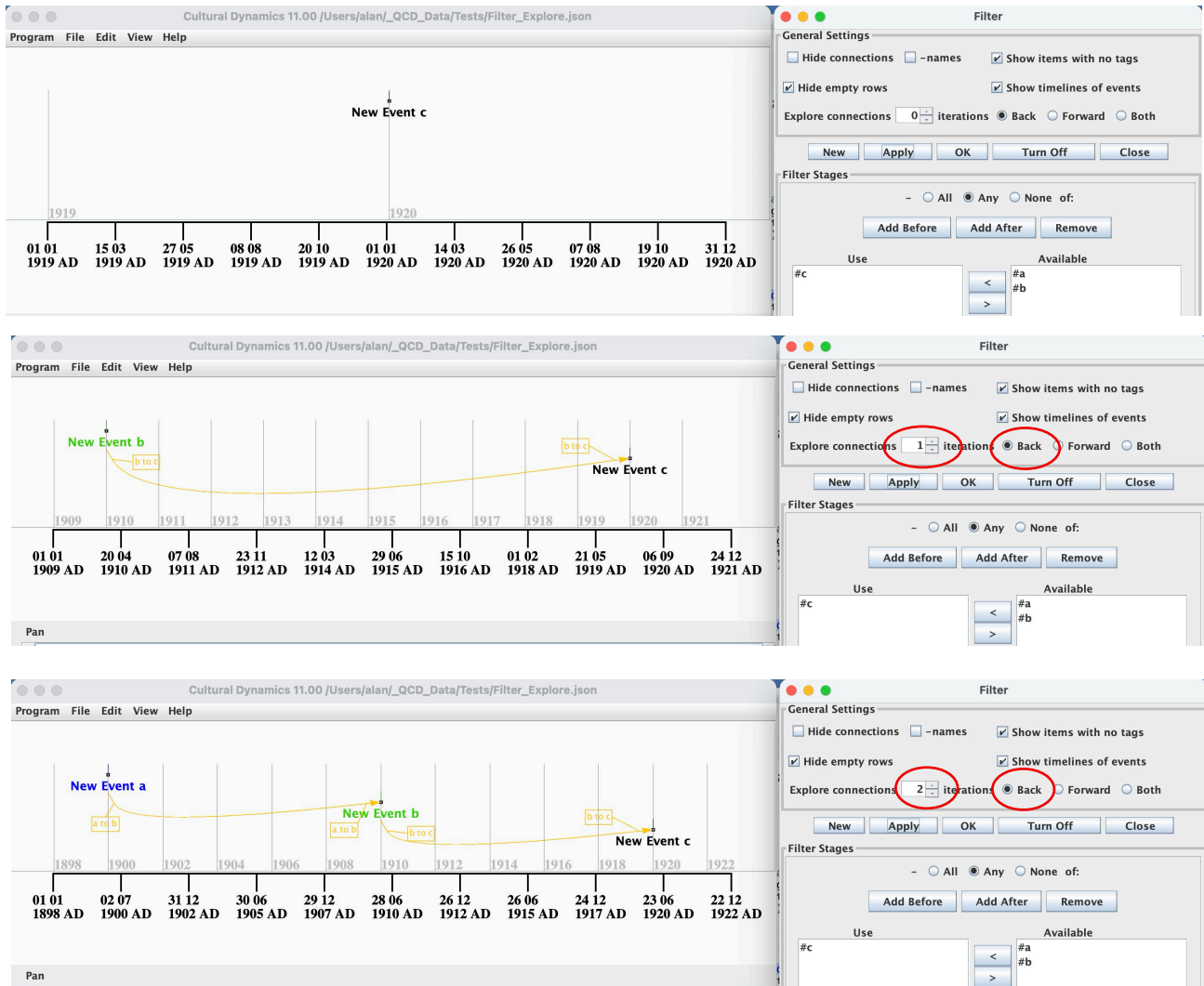
and we do 1 iteration forwards we then see event “b” because there is a forward connection from “a” to “b”:



If we do 2 iterations forwards we see event “c” as well, because there is a further connection from “b” to “c”. We also see the connection forwards from “b” to “a”:



Starting with event “c” alone and going backwards, we see event “b” in one iteration and event “a” in two iterations:



### 13.10 Selective Export/Import for AI

To use AI to generate descriptions and link data, a filtered extract of the data can be exported to a JSON file with the menu File – Save As and checking the Filtered Extract checkbox in the save dialog.

An AI tool can then be used to add descriptions and links to the JSON file – it is advisable to tell the AI to include sources and to prefix its additions to show where they came from.

The enhanced JSON file can then be imported with the appropriate Merge checkboxes checked.